Manual for oral care

The Japanese Society of Oral Care

Nagato Natsume

Manual for oral care

The Japanese Society of Oral Care

Name of the editor : NAGATO NATSUME

The first edition, the edition of 1
Quintessence Publishing Co., Ltd.
3-2-6, Hongo, Bunkyo-ku
Tokyo, 113-0033, JAPAN
Tel: +81-(0)3-5842-2285
Fax: +81-(0)3-5800-7598
E-mail: sasaki@quint-j.co.jp
Printed by Neomedix Co., Ltd.
5-22-28 Chiyoda, Naka-ku Nagoya 460-0012 Japan
Tel: +81-(0)52-241-7428
Fax: +81-(0)52-241-7959
ISBN 978-4-7812-0198-6 C3047 ￥7,700
28 February 2011

Introduction

Japan has the world's longest longevity. That is because Japanese medical treatment has reached to one of the highest level in the world. However, in order to lower a mortality rate further, what we have to do is to encourage people to keep good health and to avoid infection, besides to cure patients. Among measures for avoiding infection, oral care is vital important for babies, infants and elderly people.

Since we have studied oral care for long time, we published a book about our studies in Japanese from the Science Committee of the Japanese Society of Oral Care so as to use it as an oral care standard in Japan. The book was widely used in Japan as a textbook for students to be nurses, dental hygienists, and speech therapists, and as a bible for clinicians of oral care.

We, then, decided to publish a book in English using "Grants-in-Aid for Promotion of Opening Research Results" from "Japan Society for Promotion of Science by Japanese government". We hope this book is helpful to overseas clinicians in learning our results of studies and clinical experiences.

Nagato NATSUME D.D.S.,D.Med.Sc.,Ph.D.

Professor of Aichi-Gakuin University
Executive Trustee of the Japanese Society of Oral Care
Chairperson of Science Committee of the Japanese Society of Oral Care

Contents

I Basic knowledge

II Tooth brushing

III Gargling

Ⅳ Dentures

Ⅴ Halitosis

Ⅵ Patients with a disorder or disease

Ⅶ *Tooth decay (dental caries) and periodontitis*

Ⅷ *Bleeding*

Ⅸ *Xerostomia*

X Eating and deglutition disorders

XI Home oral care

XII Others

I Basic knowledge

1. The definition of oral care

Oral care is called Kouku keh-ah in Japanese. “Kouku” means “mouth”, and “keh-ah” means “care”. Oral care is defined from several perspectives in Japan. For nurses, oral care can be defined as the maintenance of oral hygiene, and preparing the patient to optimize eating, speaking and breathing abilities. For patients with cerebral hemorrhage, oral care can be defined as approaching the patient with consideration of oral anatomy and function, abilities, environment and mental state for maintaining oral hygiene and feeding abilities. From a wider perspective, oral care can be defined as maintaining all oral functions, including eating, chewing and swallowing food, composing sounds, oral esthetics, recovery of esthetics and saliva secretion.

In English, the word “care” includes meanings of looking after, protecting and temporary hospitalization of patients. Japanese does not really have an equivalent word, although the Japanese word for “care” has a somewhat similar meaning. The subject of a cure is the patient or organ showing a pathological state. Conversely, subjects of care are both healthy and unhealthy individuals, and the body as a whole. Finally, the purpose of care is to increase quality of life (QOL).

In this text book, “oral care” is defined as the art and science of increasing QOL by preventing oral disease, maintaining and promoting oral health, and achieving rehabilitation of oral function.

MEMO Oral care can be considered to cover 15 items, as follows:

1. Oral cleaning
2. Spreading of fluoride
3. Cleaning and attachment of implants (prostheses) in the oral cavity
4. Chewing food
5. Accepting and swallowing food
6. Removal of oral odors
7. Preventing oral disease
8. Relieving oral pain
9. Preventing oral bleeding
10. Massage of gums (gingiva) and cheeks
11. Movement of chewing muscles, oral circumference muscles and tongue
12. Speech practice
13. Help with eating
14. Periodic oral examinations
15. Appearance of the mouth, oral cavity and teeth (oral esthetics)

Methods of maintaining good mastication and nutrition may be added to these 15 items.
Some items of oral care summarized above are explained in greater detail below.

1. Preventing disease

Prevention of disease can be categorized as primary, secondary or tertiary in relation to the stage of the disease or condition. Primary prevention involves preventing the disease or injuries. This includes maintaining and promoting healthy behaviors. For dental caries, primary prevention includes tooth brushing, abstaining from excessive consumption of sweets and use of fluoride. Secondary prevention means identifying diseases in the early stages before symptoms become apparent. Periodic oral examination is thus a secondary prevention. Tertiary prevention means controlling the pathological processes after symptoms have occurred, to prevent exacerbation of symptoms. Rehabilitation is therefore included as tertiary prevention.

2. Rehabilitation

Rehabilitation involves returning the individual as close as possible to the maximum level of function.

Rehabilitation in terms of oral care involves regaining biting and swallowing functions by rehabilitation the relevant muscles or by applying prostheses. Paralysis of oral muscles or the tongue is observed often in patients following cerebral hemorrhage. Such paralysis also affects the voice, so voice training can be another important part of rehabilitation.

3. Quality of life

QOL can be defined as the individual's feeling that they are functioning well in all aspects of life - physically, mentally and socially. Patients involving their place in society with communication with family and society can help us to improve QOL. In promoting QOL, we aim to prolong a life that the individual enjoys living, rather than simply prolonging life at all costs.

4. The science and art of oral care

Oral care is both an art and a science, resting as it does on the basis of medicine and dentistry. Science involves the determination of objective, verifiable facts and often takes a broad, population-based perspective. In clinical medicine and dentistry, however, the individual is the whole focus, rather than the population. With individuals, the human relationship between the therapist and the patient, the mind of the patient, and the ingredients required to make a life worth living are of prime importance. The art is thus the clinician's skill in applying observations and facts to healing the patient, an outcome that is subjective rather than objective. The emphasis in oral care is thus on the art of healing the patient, rather than the science of treating the disease.

As we can see from the above, a wide range of definitions are required when talking about oral care. In practicing oral care, a multi-disciplinary approach is required, involving professions such as doctors, dentists, nurses, dental hygienists, oral therapists, workers in care facilities, as well as the patient and their family. This concept is a crucial characteristic of oral care that must always be kept in mind.

(Katsumi Yamanaka)

2. The meaning of chewing

1. What is eating?

Eating is an indispensable function in life. This doesn't only refer to the means of achieving nutrition. The series of motions such as putting food into the mouth, chewing, and swallowing are carried out by physiological activities under the control of higher brain functions. In other words, the motion of eating involves conscious activity, but chewing food rhythmically and swallowing are rarely the focus of our attention, and are instead performed according to patterns that are programmed in advance. Therefore, if difficulty is encountered with one of these activities, with the whole process of oral ingestion is in jeopardy. Moreover, aging and declines in body function due to sickness do not automatically result in a loss of appetite. Supporting the patient in meeting their appetite might thus be a basic goal of oral care.

Oral and maxillofacial functions involve a large number of neural networks. As the area of cerebral cortex associated with these functions is larger than motor and sensory areas for the limbs, their importance is obvious. The sensory networks present allow us to perceive even a single hair in our mouth. Such sensitivity can also be described as the result of a teleological evolution. That is, the function of "eating" is indispensable for the life of each individual. Unless we know what we have to eat, where those foods are, and what we have to do in order to eat them, we cannot sustain our life. This corresponds to the development of our senses in the oral cavity and the function of the hand in the course of evolution, changing from individual behaviors to group behaviors, and eventually enabling mammals to engage in social activities. In addition, a wide variety of foodstuffs and ways of cooking are seen in different human communities, resulting in the many gastronomic cultures seen around the world. The Japanese developed as an agricultural people, creating a unique culture and tradition of food with an emphasis on rice, seafood, and seasonal fruit and vegetables. While we have gained access to food from all over the world in recent years, Japan has retained a firm sense of "tastes" and "textures" cultivated by a long gastronomic culture.

2. Effects and function of chewing

Chewing function has six effects, as follows (MEMO 1).

MEMO 1 Effects of chewing

1) Improving salivary flow, and not only clearing the mouth (self purification), but also helping to prevent dental caries and periodontal disease.
2) Allowing food to be tasted, which helps provide satisfaction when eating.
3) Promoting good digestion in the stomach and intestines.
4) Helping to prevent overeating and obesity by feeling full after chewing.
5) Providing pressure on the teeth to stimulate the gums and jaws, and consequently promoting the growth of teeth and jaw bones.
6) Activating the autonomic nervous system, thus improving blood flow to the brain, and helping to prevent aging and dementia.

Humans normally have 28 teeth in the upper and lower jaws, excluding the wisdom teeth, but most people gradually lose teeth due to factors such as dental caries and periodontal disease. The Japan Dental Association created a campaign showing "Try to keep 20 teeth up to 80 years old", and is trying encourage good health of teeth and prevention of odontopathy. Recent statistics have shown that the average 80-

year-old person is estimated to have 9.8 teeth (5.9 teeth in 1993, 8.2 teeth in 1999), and the proportion of individuals with more than 20 teeth is estimated at around 24.1% (from "The odontopathy survey of actual conditions, Ministry of Health, Labour and Welfare in 2005"). The number of teeth remaining has been increased annually. However, the role played by artificial teeth (dentures) in compensating for lost teeth is important in maintaining good chewing function and ability to eat preferred foods given the rapid aging of society. According to the same survey, many senior citizens are wearing complete dentures.

When teeth are lost, artificial teeth may be required to maintain adequate chewing ability. In particular, individuals who have not been able to chew food often appear to derive a great deal of pleasure when they are provided with artificial teeth and regain even a small ability to chew. Such positive feelings can represent a strong and continuing motivator to improve oral health care. Actually, compared with senior citizens who are unable to chew, those who can chew well reportedly show a higher level of ability to live independently. This shows that the act of chewing with artificial teeth can exert a significant influence on QOL, and also highlights the potential importance of encouraging use of artificial teeth during nursing care, rather than removing these prostheses to simplify care.

The teeth are not the only important structure for chewing. The tongue is just as important, with crucial roles in moving food around the mouth, positioning food on the teeth for chewing, and gathering the chewed fragments into a ball (bolus) for swallowing. In addition, the tongue provides sensory information on the taste and texture of food, and the location of foreign objects that should be removed (e.g., bones). The tongue also plays a key role in speaking ability. Declines in tongue function may be caused by aging, cerebrovascular disorders, and deficits resulting from events such as surgery or tumor invasion. Improving tongue function by providing appropriate rehabilitation and support for oral health care is thus important.

(Shogo Ozawa, Yoshinobu Tanaka)

3. Mechanisms and functions of the oral cavity

The oral cavity is the space at the entrance to the digestive tract, consisting of lips, cheeks, gingiva, palate, oral floor, tongue, and teeth. The salivary glands open into the oral cavity. The oral cavity can be divided into the outside vestibule and the inside oral cavity proper with the dental arch of the maxilla and mandible (Fig. 1). The oral cavity has several functions: accepting food; mixing food with saliva; facilitating digestion by chewing food into smaller fragments; tasting food; and sending food into the pharynx. The oral cavity also functions as a supplementary airway and resonance cavity for the voice along with the nasal cavity.

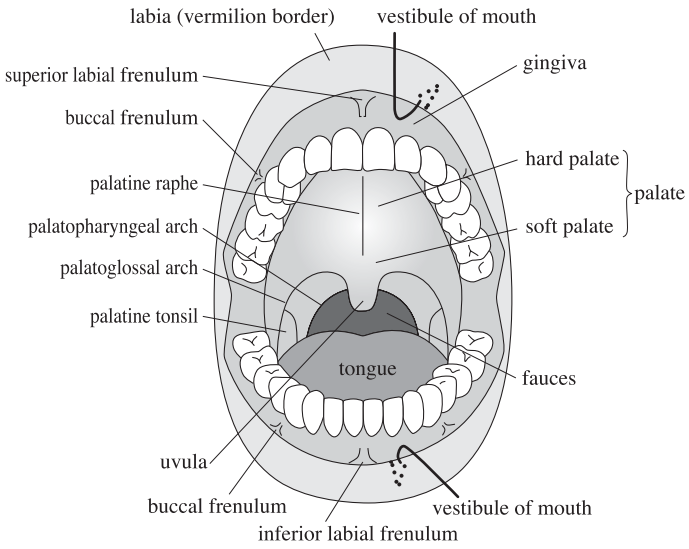


Fig. 1 front view of oral cavity

In mammals, the lips (labia) and cheeks developed first, then the vestibule appeared, resulting in the ability to breastfeed.

1. Vestibule of the mouth

The vestibule of the mouth comprises the lips and cheeks as the external boundaries, the gingiva and mucous membranes of the maxilla and mandible, and the dental arches as the internal boundaries, thus showing an overall horseshoe shape. Two vertical folds are seen in the center of the labial mucous membranes, called the superior labial frenulum and the inferior labial frenulum. The fold of mucosa connecting the cheek to the gingiva is called the buccal frenulum. The parotid papilla situated in the buccal mucous membrane opposite to the maxillary second molar is where saliva from the parotid gland enters the vestibule of the mouth.

1) Labia

The labia comprise an upper lip and a lower lip, meeting at the angles of the mouth (oral commissures) and representing the entrance to the oral cavity. The labia are divided into the pars cutanea, vermilion border, and pars mucosa, with the orbicularis oris muscle lying underneath. The mucosal epithelia comprise non-keratinized stratified squamous epithelium, lamina propria, and submucosa inside the mucous membrane, into which the labial glands open.

2) Cheeks

The cheeks are covered with skin externally, and with mucous membranes internally, covering the mimic muscles such as the buccinators. The histology resembles that of the labia. The minor salivary glands open here.

3) Gingiva

The gingiva cover the alveolar bones of the jaws (the mandible below and the maxilla above) and part of the teeth, providing support for the teeth and playing an important role in masticatory function. The

gingiva can be divided into the free gingiva between the teeth and the attached gingiva bonded to the alveolar bone. In addition, the free gingiva is divided into outer epithelium facing the vestibule of the mouth and inner epithelium facing the teeth. The gingiva have no submucosa and show poor movability, unlike the other areas of oral mucosa.

2. Oral cavity proper

The tongue typically remains in the oral cavity proper, which is bordered by the sublingual mucous membrane at the floor, the palate at the ceiling, the gingiva, mucous membranes and dental arches on the front and lateral sides. At the back, the oral cavity proper joins the pharynx through the fauces.

1) Palate

The palate represents the boundary between the oral and nasal cavities. The front part forming the roof of the oral cavity proper is called the hard palate, due to the presence of underlying bone. The rear part is called the soft palate, consisting striated muscle with no underlying bone. The soft palate is involved in movement of the food bolus into the esophagus. The mucosal epithelium covering the palate consists of keratinized stratified squamous epithelium, onto which numerous minor salivary glands (palatine glands) open. The palatine raphe is apparent at the center of the hard palate, behind the incisive papilla and palatine rugae. At the center of the rear edge of the soft palate is the uvula.

2) Oral floor

The mucous membrane of the oral floor is thin, with a narrow submucosa overlying the mylohyoid and mentohyoid muscles. The lingual frenulum attaches to the center of the undersurface of the tongue. Excretory ducts of submandibular and sublingual glands open onto the sublingual caruncule on both sides. Minor salivary glands open onto a sublingual fold outside each sublingual caruncule.

3) Tongue

The lingual muscles allowing the tongue to move are striated muscles. The mucous membrane of the tongue is thicker than that seen in other areas of oral mucosa. A vast number of lingigual papillae are present on the back part of the body of the tongue. The majority of lingual papillae are filiform papillae, which have keratinized mucosal epithelia, but no taste buds. The foliate papillae and circumvallate papilla contain taste buds in the epithelium, allowing the sensation of taste. Fungiform papillae are, as the name suggests, slightly mushroom-shaped, containing taste buds and appearing noticeably red due to the rich supply of blood vessels. The foliate, circumvallate and fungiform papillae all display non-keratinized epithelium.

3. Teeth

Vertebrate animals from fish to reptiles are often homodonts, showing numerous similarly cone-shaped teeth lining the jaws. These animals are also often polyphyodonts, with new teeth continuously growing to replace old teeth throughout life. In contrast, mammals are heterodonts with differentiation of tooth shapes according to position along the jaws. Different species of mammals show specific numbers of teeth, differentiated into four types. These teeth show one or several roots extending into the alveolus of the maxilla and mandible. Diphyodontia is also characteristic of mammals, with an initial deciduous set of teeth replaced by a permanent set that does not show natural replacement.

The permanent teeth in adults form the dental arch, with the roots extending into the tooth sockets of the maxillary and mandibular alveolar processes. There are 32 teeth in all, comprising 8 incisors, 4 canines, 8 premolars, and 12 molars. The third molars are also called the "wisdom teeth", because these teeth typically appear at around 20 years old, if at all.

Teeth consist of an exposed dental crown and a root lying in the alveolar bone. Moreover, the teeth comprise various tissues: dentin; enamel; cementum; and dental pulp. The enamel covering the crown is the most mineralized tissue in the body, resulting in the extremely hard, brittle nature of teeth (Fig. 2).

The tissues around the teeth that function to fix the teeth to the jawbones are collectively known as the periodontium or supportive tissues of the teeth, comprising the periodontal membrane, alveolar bone, gingiva, and cementum. The cementum on the roots of the teeth is connected directly to the bone of the jaws by periodontal fibers, also called Sharpey's fibers.

Teeth are principally involved in the chewing (mastication) of food, play a central role in the articulation of dental consonants necessary for pronunciation in speech, and are also esthetically important.

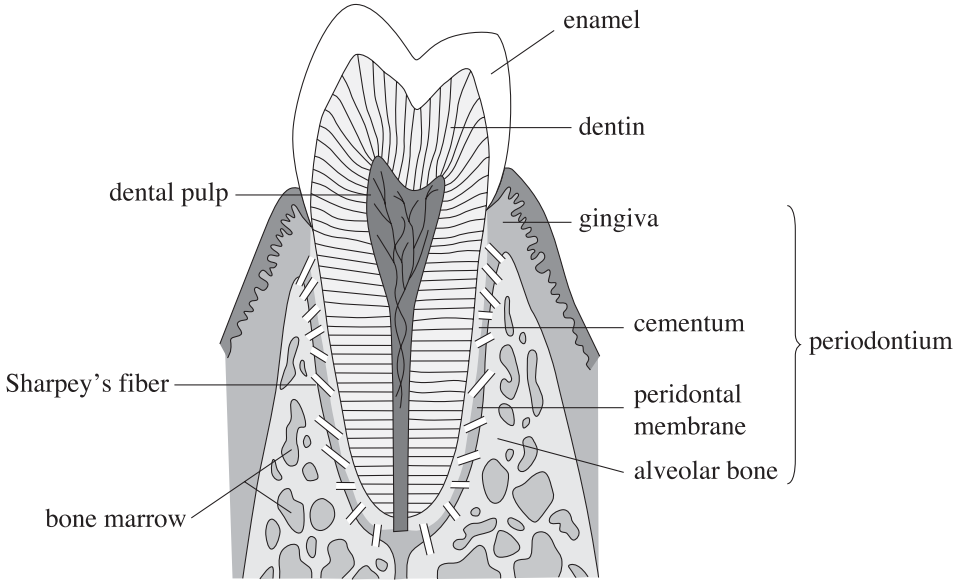


Fig. 2 Tissues formed teeth and periodontium

(Norikazu Ohno)

4. Changes of the oral tissues with age

Progressive changes in organs and tissues throughout the body are seen with age. In the oral cavity, aging results in changes of the tissues such as the teeth, periodontal tissues, alveolar bone, oral mucosa, and salivary glands. However, given the exposure of the oral cavity to such a wide variety of external factors, such as ingested foodstuffs, alcohol, brushing, plaque deposition, and traumatic occlusion, strict determination of whether changes are due to aging or other factors is difficult to dicide.

1. Changes in dental hard tissues

1) Changes in the enamel

The enamel shows decreasing thickness with age, due to wear on the occlusal and proximal surfaces. The labial and buccal surfaces of teeth also show thinning due to wear from activities such as brushing the teeth. Enamel is composed of mineralized enamel rods interspersed with organic matter. However, the enamel becomes hard and more fragile with age due to decrease in the proportion of organic matter. This also results in decreased translucency and a darkened coloration. In addition, the fluoride content of the enamel surface increases with exposure to fluoride in food and drinking water, and thereby increases the resistance of enamel to dental caries.

2) Changes in the dentin

The thickness of the dentin increases, as production of this material continues throughout life as secondary dentin. In particular, plenty of physiological secondary dentin is formed around the coronal pulp, furcation (Photo. 1) and pulpal wall of the root. When attrition or wear occurs over time,

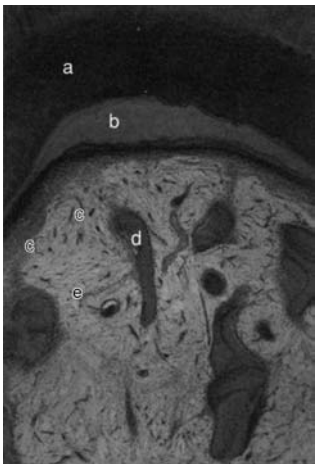


Photo. 1
The formation of the secondary dentin is observed in the furcation. The periodontal ligament and the alveolar bone remarkably decrease, and the periodontal ligament and the alveolar bone are connected directly. Moreover, the bone marrow cavity is occupied with the adipose tissues
a: dentin
b: physiological secondary dentin
c: periodontal ligament
d: alveolar bone
e: bone marrow cavity

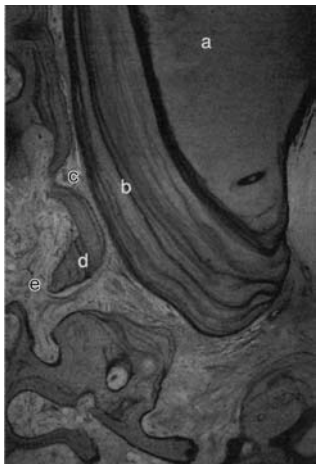


Photo. 2
The cementum of the root is thickened. The periodontal cavity narrows, and the bone marrow cavity is occupied with the adipose tissues
a: dentin
b: cementum
c: periodontal membrane
d: alveolar bone
e: bone marrow cavity

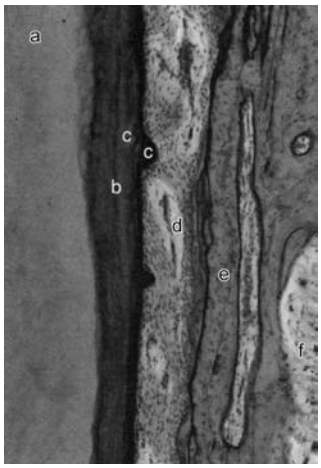


Photo. 3
Two attached cementicles are observed on the surface of the cementum. Physiological distribution of periodontal fibers disappear
a: dentin
b: cementum
c: attached cementicle
d: periodontal membrane
e: alveolar bone
f: bone marrow cavity

pathological secondary dentin is formed at the boundary between the dentin and corresponding tooth pulp. Moreover, because Tomes fibers in the dentinal tubules become calcified and the tubules is closed, the dentin becomes transparentized and hardened, showing decreased permeability. The dentin also becomes more fragile with the loss of organic components and water from the matrix, reducing elasticity.

3) Changes in the cementum

The cementum becomes thickened with continued formation over time (Photo. 2). Moreover, Sharpey's fibers gradually become calcified and decrease in number. In addition, three kinds of cementicle (free, attached, and embedded) appear with age. Cementicles are a type of circular calcification. Free cementicles are seen within the periodontal ligament, attached cementicles (Photo. 3) adhere to the surface of the cementum, and embedded cementicles are buried within the cementum.

2. Changes in the dental pulp

The pulp cavity, containing the dental pulp tissue, becomes narrowed with the production of physiological secondary dentin over time. In addition, the pulp cavity is further narrowed when pathological secondary dentin is produced in response to attrition, wear or irritation from insults such as dental caries. Young individuals show numerous cellular and vascular components in the dental pulp tissue, and few collagenous fibers. These components decrease with age, while collagenous fibers increase. Odontoblasts also decrease with age and show some regressive changes such as degeneration and atrophy. Moreover, diffuse calcification arises in the dental pulp tissue (Photo. 4) along collagenous fibers, nerve fibers, and blood vessels.

Denticles also increase with age. Denticles are classified into three types, and represent circular calcifications of various sizes. Free denticles, showing no contact with the dentin of the pulpal wall, are located within the pulp tissue, while attached denticles adhere to dentin of the pulpal wall and embedded denticles (Photo. 5) are buried within the dentin.

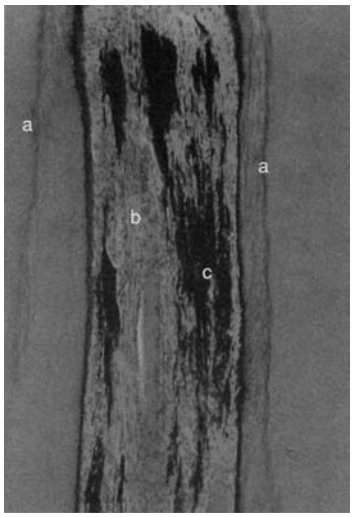


Photo. 4
Diffuse calcifications are observed in the dental pulp
a: dentin
b: dental pulp
c: diffuse calcification

Photo. 5
Attached denticles are observed in the dental pulp
a: dentin
b: dental pulp
c: attached denticle

3. Changes in the gingiva

Cementum often becomes exposed with age because of gingival recession (Photo. 6). However, this may be attributed to periodontal disease, and is difficult to distinguish from changes due to aging. Relatively few changes in the gingival epithelium appear to be caused by aging, although at the microstructural level, the structure the basement membrane tends to become complicated just below the basal-cell layer of the epithelium with age. In addition, cellular and vascular components decrease and collagenous fibers increase in the gingival connective tissue.

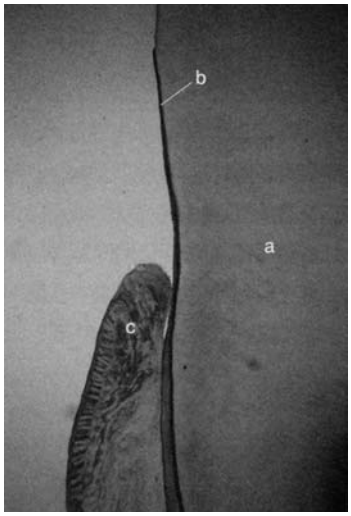


Photo. 6
Cementum is exposed because of gingival recession. This is thought that it isn't actual aging change, but it is caused by inflammation of the gingival.
a: dentin, b: cementum, c: gingiva

4. Changes in the periodontal ligament

In the periodontal ligament, the periodontal space narrows with age (Photo. 7), and cellular and vascular components and periodontal fibers (collagenous fibers) decrease (Photo. 8). Vitrification, calcification, and laceration of the periodontal fibers are also observed.

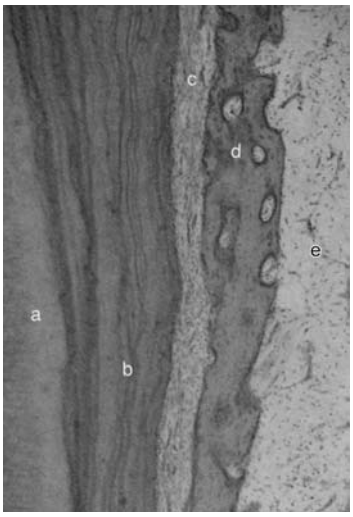


Photo. 7
The periodontal space narrows, and physiological distribution of periodontal fibers disappear. The cementum of the root is thickened
a: dentin
b: cementum
c: periodontal ligament
d: alveolar bone
e: bone marrow cavity

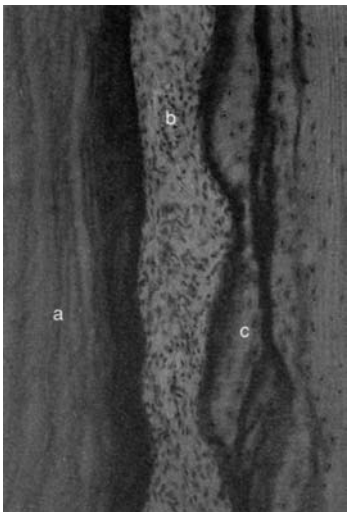


Photo. 8
Decreasing of cellular and vascular components are observed, and physiological distribution of periodontal fibers disappear
a: cementum
b: periodontal ligament
c: alveolar bone

5. Changes in the alveolar bone

Alveolar bone becomes more porous and bone mineral density decreases with age. As the alveolar bone decreases, regions of communication between the bone marrow cavity and the periodontal ligament widen (Photo. 1). In addition, adipose tissue increases within the bone marrow tissue. As inflammation resulting from the periodontal disease extends to the alveolar bone, resorption of the alveolar bone occurs, but this may be difficult to distinguish from age-related changes.

6. Changes in the oral mucosa

In the oral mucosa, the epithelium becomes thin, and epithelial processes at the boundary with the underlying connective tissue become shortened, resulting in a flattening of the boundary between the epithelium and the connective tissue (Photo. 9). In the connective tissue under the oral mucosa, the cellular and vascular components decrease and collagenous fibers increase, and elasticity deteriorates. The minor salivary glands under the oral mucosa also decrease in size and number, and the oral mucosa tends to become dry.

7. Changes in the lingual mucosa (tongue and gustation)

The filiform papillae become atrophied and disappear from the lingual mucosa with age, and the surface of the tongue thus becomes smooth (Photo. 10). Moreover, the epithelium becomes thin, and cellular and vascular components decrease in the underlying connective tissue. In addition, as the number of taste buds in the lingual mucosa decreases, gustatory receptivity decreases.

8. Changes in the salivary glands

Generally speaking, serous and mucous cells in the salivary glands acini atrophy and disappear with age, and the acini become replaced by the fibrous connective tissue. Moreover, fibrosis and fatty changes occur in the connective tissue of stroma between acini. Among the major salivary glands, atrophy and disappearance of serous cells in the glandular acini are particularly marked in the parotid gland. Secretion of serous saliva is therefore decreased, and this results in xerostomia.

In the ducts of salivary glands, oncocytes appear in the ductal epithelial cells, and epithelial cells proliferate with age.

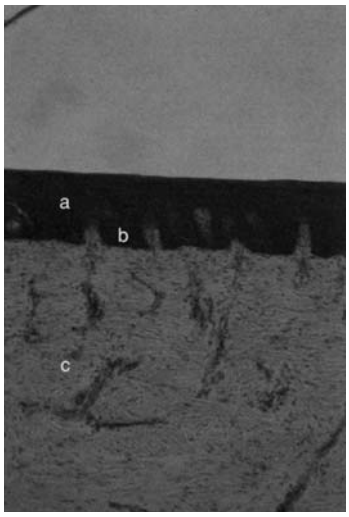


Photo. 9
The epithelial ridges of the oral mucosa are shortened
a: gingival epithelium
b: epithelial ridge
c: gingival connective tissue

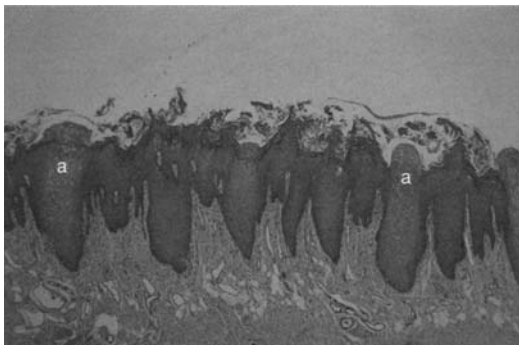


Photo. 10
The filiform papillae on the surface of the lingual mucosa are shortened
a: filiform papilla

9. Changes in the temporomandibular joint

With the loss of teeth, changes occur in the condyle that occupies most of the temporomandibular joint. Most of the mandibular condyle disappear in the severe cases, due to changes such as thinning of the osseous tissues under the fibrous tissues of the joint surface of the mandibular condyle (Photo. 11), or recessus resulting from phenomena such as resorption of bone. In addition, in cases of the edentulous jaw, the cancellous bone in the bone marrow cavity in the mandibular condyle becomes thin, and the bone mineral density is decreased. In general, the compact bone outside the bone marrow cavity of the mandibular condyle shows overall thinning. In addition, the bone marrow cavity of the mandibular condyle comes to be occupied with the adipose tissue with age.

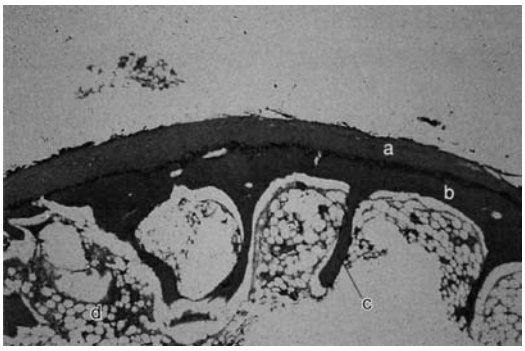


Photo. 11
The articular surface of mandibular condyle are covered with fibrous tissues, and the bone under them becomes thin. And the bone marrow cavity is occupied with the adipose tissues
a: fibrous tissue, b: osseous tissue, c: cancellous bone, d: bone marrow cavity

(Yoichiro Kameyama)

5. Microorganisms in the oral cavity

1. Microorganisms in the healthy mouth

Numerous microorganisms (mostly bacteria) are normally found in the oral cavity of even healthy individuals. It has been known for more than 300 years that hundreds of kinds of bacteria live on the surface of the teeth, tongue, and mucous membranes, such as bacilli, cocci, and spirilla. Moreover, when the microscope was first invented, it was discovered that more bacteria are found in elderly individuals with poor oral hygiene. Microorganisms naturally present in the oral cavity are generically referred to as oral bacteria. Although viruses, which are smaller organisms than bacteria, are also microorganisms, we mainly describe bacteria and fungi here.

More than 1 million oral bacteria are present in 1 milliliter (the volume present in a cube with sides 1 cm in length) of human saliva. As 1,000-1,500 ml of saliva is secreted daily by the healthy individual and swallowed with or without foods, oral bacteria do not “live” in saliva, as such. Rather, propagated bacteria adhering and living on the surfaces of the tongue and oral mucosa fall into saliva by its washing effect.

Bacteria adhering to each part of the oral cavity are thus present at much higher densities than in saliva. This covering of bacteria is called dental plaque. Recently, the term “biofilm” has also been used. Numerous kinds of bacteria can be identified when dental plaque is dyed and observed (Photo. 1).

Abnormal proliferation is prevented by the various defensive functions present in the host, although a surprising number of bacteria still live in the oral cavity. However, bacteria adhering to the oral cavity tend to be increased due to modern eating habits, which include relatively high proportions of soft, high-calorie foods. If thorough "maintenance" oral cleaning (included brushing, etc.) is not performed, oral bacteria cannot be decreased until oral conditions return to a healthy state.

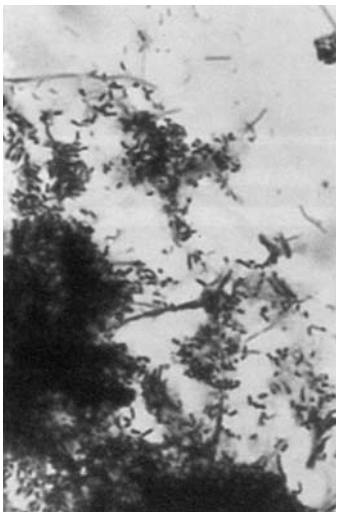


Photo. 1
Photomicrograph of the dental plaque
The dental plaque with Gram stain is observed. Purple are gram-positive bacteria, and red are gram-negative bacteria, we can identify bacilli, cocci, and so on

2. Bacterial flora in the oral cavity change during life

As the prenatal embryo grows in aseptic amniotic fluid, the oral cavity is aseptic, with no bacteria or fungi present. However, after delivery, the newborn continues to be exposed to an environment teeming with microorganisms. Bacteria transferred from contact with individuals such as the mother and other family members start to colonize the oral cavity. Various exogenous bacteria are thought to try to take hold in the oral cavity, but only some kinds of microorganisms that are adapted to this peculiar environment gradually come to establish a foothold, forming the oral bacterial flora.

When teeth erupt, the bacterial flora show some changes, such as the appearance of *Streptococcus mutans* as a causative organism for dental caries. Children of mothers with high counts of *Streptococcus mutans* are reportedly more easily colonized by these bacteria, and tend to suffer from dental caries. Micro-spaces arising between the teeth and gums (as the so-called gingival sulcus) become colonized by obligate anaerobes that avoid or cannot grow in oxygen. Various periodontal diseases in adults are thought

to be caused by anaerobes or the combined effects of multiple species. Keeping the prevention of periodontal disease in mind is important, particularly after the individual enters their late thirties, as periodontal disease that follows a long course represents a kind of chronic infection, which is a feature of lifestyle-related diseases.

Oral bacteria thus changes little by little, and also become a cause of dental caries and periodontal disease in later life.

3. Oral flora changes with physical condition

The oral flora are reportedly affected by changes in physical condition and hormones. In particular, some kinds of anaerobes are thought to increase in the gingival sulcus with rising concentrations of estrogen in serum. Stress is also thought to influence the bacterial flora through mechanisms such as the flow of hormones and saliva, eating habits, and immune responses. However, this area remains poorly elucidated, and the influence of hormones on oral bacteria remains controversial.

Moreover, under circumstances of decreased immune function, the surface of the tongue and inside of the oral cavity can become mossy with a kind of fungus named *Candida*, such as with infection by human immunodeficiency virus (HIV) resulting in acquired immunodeficiency syndrome (AIDS). This fungal overgrowth is called candidiasis, and might be useful for early detection of HIV-positive status (Photo. 2).

Oral bacteria might occasionally invade blood vessels following tooth extraction. Under such circumstances, if the physical condition of the patient is bad or some kind of underlying disease is present, oral bacteria might have adverse effects on other areas in the body. Oral bacteria that invade blood stream can on rare occasions reach the heart and cause endocarditis.

On the other hand, under normal conditions, non-pathological conditions the oral bacterial flora fulfill a biophylactic function in preventing more pathogenic bacteria from becoming established in the oral cavity. Oral bacteria adjusted to the oral environment suppress the proliferation and colonization of exogenous bacteria. In addition, bacteria are washed down to the stomach by saliva, and are sterilized by the gastric acids.

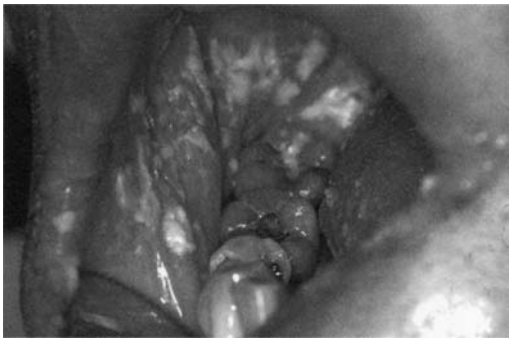


Photo. 2 Picture in the oral cavity with the candidiasis
Candidiasis seen in the oral cavity of an inpatient, who is a male in his fifties with aggravated diabetes mellitus. Yellowish white spots on the mouth mucous membrane are *Candida* foci

4. Do numbers of *Candida* (a kind of fungus) increase with age?

As the host individual often loses teeth and shows decreased salivary flow with age and increasing use of medications, inhibitory functions against bacteria are decreased and immunity decreases little by little. As a result, *Candida* counts also increase with age.

Accumulation of large numbers of oral bacteria beyond normal levels can not only result in foul-smelling breath, but also carries a risk of complications such as senile pneumonia following aspiration and various infectious diseases. Striving to keep oral health care in mind and maintaining hygienic conditions in the oral cavity with age is thus important.

Glossary:

Oral bacterial flora: A biological term covering all the various bacteria living in the environment of the oral cavity. Bacteria living in the intestinal tract are referred to as the intestinal flora.

(Yukitaka Murakami, Fuminobu Yoshimura)

6. Main points of observation in the oral cavity

To provide sufficient and safe oral care, we must gain an understanding of the condition of the oral cavity by making initial observations. The condition of the oral cavity is a result of and changes due to factors such as disease and progression, sequelae, and medicines being administered. Moreover, lifestyle and the degree of interest and understanding of the patient regarding health of the oral cavity are also important factors.

Oral functional changes generated by aging, disease progression or sequelae, and previous treatments of the teeth (including fillings, dental prostheses, crowns, etc.) often create a state of damage, or Omission, and incompatibility with fillings or dental crowns.

Furthermore, as patients who cannot accomplish sufficient self-care depend on nursing attendants and caregivers, their oral condition will also depend on the interest, knowledge, skill and sense of responsibility of these individuals. A firm grasp of not only the patient, but also their surrounding environment is therefore necessary.

Based on these factors, various perspectives for making oral observations can be suggested, as follows.

1. Condition of the oral cavity

l) Visible features

① Absence of teeth, region and condition
② Tooth mobility
③ Sharp edges in decayed and treated teeth
④ Size and condition of dental prostheses: records of the prosthesis (It is necessary for verification of damage, loss, and swallowing by mistake), use of stabilizers and cleaners
⑤ Gingiva bleeding
⑥ Pathological and abnormal changes of the oral mucosa: keratin; ulceration; swelling; bleeding; Candida; fur coating of the tongue, etc.
⑦ Degree of oral dryness
⑧ Oral hygiene: residual food; ability for self-care

2) Invisible features

① Pain
② Halitosis (foul-smelling breath)
③ Dysphagia
④ Lack of appetite and difficulties with ingestion
⑤ Speech difficulties

2. Changes in the oral tissue and function with age

Various changes occur in the oral cavity with age, in the same way as in other organs. Specifically the following changes are suggested:

1) Teeth: wear; shortening; yellowing; cracking; weakening

2) Gingiva: atrophy, decreased elasticity, relative lengthening of the dental crown

① Food is easily caught between teeth
② Teeth is easily decayed
③ Dental prostheses easily cause wounds

④ Stability and compatibility of dental prostheses are inferior due to decreased flexibility of the oral mucous compare to young age

3) Lips: atrophy and decreased elasticity
   ① Mouth-opening becomes more limited, wearing of dental prostheses becomes difficult
   ② Angular stomatitis occurs more easily
4) Jawbone: general decreases in size and thickness (maxilla shows outside absorption, mandible shows inside absorption)
   ① Mandibular protraction appears
   ② Even if fracture occurs, subjective symptoms may not develop
   ③ Dementia may delay reports of symptoms
5) Temporomandibular joint: flattened, transformation by chewing motions
   ① The mandible appears to take a more forward position and is more easily dislocated
   ② Dislocation easily becomes habitual, but treatment is difficult when the patient does not comprehend the problem
6) Salivary glands: show atrophy and decreased production of saliva
   ① Depression of self-purification, unsteadiness of dental prostheses, dry mouth, diseases of the oral mucosa
   ② Frequent oral care is required when the oral cavity dries and production of sputum is difficult
   ③ Bolus formation, chewing and swallowing become difficult
   ④ Movement of oral mucous membranes and tongue are limited, speech is more difficult
   ⑤ When secretion of saliva is excessive in a patient dysphagia and/or disturbance of consciousness, aspiration may result
7) Involuntary movements of the lower jaw and tongue
   ① Manufacture of dental prostheses becomes difficult
   ② Dental prostheses become unstable
8) Soft tissue disease arise more easily
   ① Endermosis arises more readily
   ② Candidacies spreads easily
9) Increased pain threshold due to sensory depression
   ① Few complaints may be made, and pathologies may thus go undetected
   ② Symptoms easily become exacerbated due to reduced awareness
10) Gustatory changes: caused by medications, atrophy of the taste buds, dry mouth, etc.

3. Factors affecting oral care

l) Overall status
   ① Specific diseases such as brain infarction and muscular dystrophy (a target disease for nursing care insurance), disease progression affecting activities of daily living (ADL), range of mobility of the arms and fingers
   ② State of advance of dementia and psychopathologies
   ③ Temporomandibular joint disorder due to rheumatic diseases
   ④ Trismus due to facial muscle disorders and disorders of consciousness
   ⑤ Respiratory failure in patients with impaired pulmonary function
   ⑥ Terminal care of patients with malignant tumor in or outside the oral cavity

2) Patient environment

① Characteristics for comprehension of and collaboration with nursing and care (including by the family), role of the attending physician

② Abilities available from nursing personnel and caregivers

③ Cost and financial burdens

④ Collaboration and cooperation with care managers

(Toshio Suzuki, Satoshi Suzuki)

MEMO 1 External observations suggesting oral conditions

1. From the perspective of weight loss: jaw and gingival obsolescence and regression, ill-fitting dental prostheses, pain
2. From the perspective of speech, eating/swallowing, reduced appetite and difficulties with ingestion: alterations to the oral cavity with age; loss of teeth; ill-fitting dental prostheses; dry mouth

7. Instructions for oral care

1. Know the aim of oral care

The oral cavity is an important organ for carrying out functions such as eating, talking, and laughing, all of which are indispensable for maintaining QOL. However, the oral cavity does not usually get much attention during daily life or in typical daily nursing activities. Only after the patient makes a complaint involving eating, pain or some other kind of oral symptom or sign do eyes turn to the oral cavity.

We must therefore first confirm the aims of oral care.

① Prevent pathological deterioration
② Inhibit the reproduction of endodontic bacteria and prevent secondary infection
③ Promote salivary secretion and self-purification
④ Prevent decay and periodontitis
⑤ Remove unpleasant feelings in the oral cavity and plan appetite enhancement
⑥ Prevent unpleasant oral odors
⑦ Preserve human relationships by maintaining the esthetics and behaviors needed for ADL

2. Assessment of food intake into mouth

We observe the following particular:

l) Opening and closing of the mouth and mandibular movement
  ① Obstructions inhibiting intake of food
  ② Force available to chew food
  ③ Normal mandibular movement, jawbone sounds on opening/chewing

2) Lip, mouth angle, oral cavity
  ① State of the lips: dry, rough, bleeding, etc.
  ② State of oral mucosa and pharynx: redness, swelling, erosions, ulceration, bleeding tendencies, stomatitis
  ③ State of the tongue: drying, rhagades, redness, white moss, tumor
  ④ Halitosis: ammonia smell, blood smell, putrefactive smell

3) Gingiva, teeth
  ① State of the teeth: dental arch, occlusion, missing teeth, dental caries
  ② Presence or absence of dental prostheses
  ③ Gingival state: bleeding, swelling, pain

4) Oral sphincter
  ① Ability to hold air in the oral cavity and puff out cheeks
  ② Ability to drink using a straw

5) State of the masseter muscle
  ① Force required to chew food
  ② Pain on chewing

3. Know the cause of the oral problem occurrence from the systemic information

As has already been described in Chapter 6 “Main points of observation in the oral cavity”, oral conditions are closely associated with the general state of health, including systemic diseases, medication, and aging. For example, the healthy individual takes in food via the mouth and promotes the secretion of

saliva by chewing. The friction of the food with a thin film of saliva against the oral mucosa and associated bacteria counteracts bacterial mucoadhesion.

However, when the individuals is unable to take in food due to some kind of systemic factor, and the capacity for saliva secretion and self-purification decreases, the environment of the oral cavity becomes difficult to maintain. Systemic factors causing oral problem thus need to be assessed to optimize oral care for each patient.

4. Important points in oral care

l) Collect information required for assessment

① Determine causes of oral problems and related factors (including disease, treatment, diet, etc.)
② Disease state associated with the specific oral problems and actual symptoms
③ Analysis of dietary contents
④ Verification of chewing/swallowing function
⑤ Overall state of the tongue
⑥ State of salivary secretion
⑦ Overall observation of the oral cavity (see “1. Condition of the oral cavity” in Chapter 6 “Main points of observation in the oral cavity”)

2) Choice and manner of the procedure depending on pathological state

① Choice of moisturizer to decrease oral bacteria without adverse effects on the patient
② Choice of moisturizer to protect oral mucosa
③ Choice and manner of moisturizer use to promote salivation and moisture retention
④ Choice of medication to mitigate pain due to oral abnormalities
⑤ Choice of methods to minimize pain during oral care.
⑥ Choice of tools for oral care suitable for the specific disease state
⑦ Choice of secure/comfortable posture depending on disease state of the patient (prevention of aspiration)

3) Appropriate feeding

4) Education and direction for self-care

5) Informing nurses and caregivers of accidents that may occur

① Infection: HB, HC, HIV, TB, scabies, etc.
② Injury: pay attention to not being bitten on the finger
③ Contamination: do not contaminate sheets and clothing
④ Loss/failure of dental prostheses: do not wrap dental prostheses in tissue. Do not wash hard.

6) Use of the oral care assessment sheet and swallowing function test list

7) Utilize the assessment of oral care

(Shizuko Yamada)

8. Oral care effects for preventing infection

Effective oral care helps in the normalization of the oral environment and improvement of oral functions, in addition to simple oral cleaning. Saliva acts to wash away waste material and bacteria in the mouth, and acts directly on bacteria to provide bacteriostatic and bactericidal effects.

Decreasing the number of oral bacteria is a valid path to achieving infection prevention not only in the oral cavity, but also in the respiratory system. The stimulus resulting from oral care also activates oral and deglutition functions, allowing us to plan improvements in saliva secretional capacity, self-purification, and deglutition function.

1. Saliva and oral infection prevention

Saliva is one of the most important factors determining the oral environment1). Physical properties such as the salivary viscosity coefficient and flow ability and chemical properties such as various ions and pH exert strong influences on oral bacteria in particular.

In terms of the inorganic component, the bicarbonate concentration is higher in saliva following stimulation than in resting saliva. Bicarbonate ions that come into contact with acids or alkalis change to carbon dioxide or carbonate ions, preserving the salivary pH at a neutral level. This pH-adjusting function acts to neutralize the acids generated by caries-causing bacteria. The mucin included in saliva is a high-polymer polysaccharide and displays electrolytic behaviors. By connecting with each other or with other polysaccharides, mucin forms a viscous liquid that protects underlying epithelial cells.

On the other hand, in terms of biochemical components, statherin and acidic proline-rich glycoproteins which prevent separation of calcium crystals in saliva, histidine-rich proteins which help to protect calcium crystals in the mineralized matrix of teeth, the alpha-amylase of the amylolytic enzyme, and carbonic anhydrase having reversible hydration of carbon dioxide to form bicarbonate ions. Saliva also plays a role in oral immunity.

In terms of immunological components, saliva contains secretory IgA, which is the main immunoglobulin present in secretory fluids, salivary peroxidase to inhibit the activity of toxic substances, lactoferrin and lysozyme to provide bacteriostatic and bactericidal actions, salivary agglutinin to allow clumping of bacteria in saliva, cystatin to inhibit the proteolytic enzymes generated by bacteria, and histatin to inhibit the growth of Candida and other microbes.

Therefore, when oral functions are improved by oral care and decreased saliva production is increased to normal levels, the local immune system is markedly enhanced by the restoration of self-purification functions. This in turn results in decreased tooth decay, periodontal disease, and onset of other infections. The risk of infection is also decreased because the number of endodontic bacteria present is itself decreased by the plaque discharge effect.

2. Effects of saliva on oral regional infection

Tooth decay and periodontal disease are strongly associated with salivary self-purification and viscosity.

Many factors are associated with decreases in saliva production, particularly in the elderly, and endodontic moisture retention and improvement of salivation are required so that salivary hyposecretion does not generate root caries or exacerbation of periodontal disease.

As the onset of periodontal disease is associated with the number and kind of bacteria present in

plaque, and to the strength of the local immune system, oral care using tools other than the simple toothbrush is required. Onset of gingivitis is known to be decreased by carrying out thorough oral care.

As the onset of candidias is associated with embrittlement and damage to the oral mucosa, care must be taken to avoid causing damage with toothbrushes. Also, preventing acidification that might result from decreased quantities of saliva is important, as Candida has an ability to keep growing at low pH. Furthermore, because stomatitis or ulceration is associated with damage to the oral mucosa, we must be careful to avoid causing such damage, particularly during the oral care of elderly individuals. As the rate of candida detection is increased among individuals who keep dentures in place during the night, directions for handling dentures are an important part of oral care.

3. Preventive effects against fever and pneumonia

Pneumonia is a frequent cause of death in the elderly, and represents an important problem. When salivation decreases, pathogenic bacteria are more likely to remain in the oral cavity for long periods and can increase the incidence of carious infections. Mastication disorders and dysphagia can arise when dry mouth occurs. Elderly patients requiring nursing care are therefore at particular risk of pneumonia from gram-negative bacilli remaining in the oral cavity.

Research investigating the effects of oral care on incidences of aspiration pneumonia and fever and frequency of deaths due to pneumonia found clear decreases in the group that performed specialized oral care for two years. The preventive effects of Oral care thus exerts clear preventive effects against aspiration pneumonia.

Table 1 The preventive effect of the oral care for the fever incidence, a pneumonia incidence and the pneumonia death

	Oral care group (184)	Control group (182)
Fever incidence rate	14.7%	29.7%
Pneumonia incidence rate	11.4%	18.7%
Pneumonia death rate	7.6%	16.5%

We conducted the oral care as specialized mouth cleaning in oral care group, and we conducted the oral care without positive involvement besides care in control group. All of the fever incidence rate, pneumonia incidence rate, and pneumonia death rate significantly decreased in the oral care group when we compared it with the control group.

(Yasuaki Kakinoki)

9. Oral care and aspiration pneumonia

1. Aspiration pneumonia

l) Definition

In sorting by the pneumonic beginning, the pneumonia to be produced with aspiration, accidental ingestion or the aspiration of something is called the aspiration pneumonia. It is rare to occur in a healthy subject suddenly, but it is usually easy to occur in the patients with the factors such as dysphagia (MEMO 1).

MEMO 1 The clinical conditions which are easily develop an aspiration as a complication

1. Neurologic disease
 ・Cerebrovascular disorder
 ・Parkinson disease
 ・Dementia
 ・Recurrent nerve paralysis
2. A bedridden state
3. Endodontic abnormality
 ・The cross obstruction of teeth
 ・Endodontic tumor ground
 ・Dry mouth
4. A hypopharynx disease
5. Stomach and esophagus diseases
 ・Gastro-esophageal dyskinesia (Achalasia, Scleroderma)
 ・Esophageal cancer
 ・A gastroesophageal reflux (Esophageal hiatus herunia)
 ・Gastrectomy
6. Mechanical factor
 ・The nasogastric tube
 ・An endotracheal intubation
 ・A tracheostomy
7. Iatrogenic cause
 ・Sedatives, Sleeping pills
 ・Medicine which causes dry mouth (including the anticholinergic drug)

2) Clinical manifestations

(1) Aspiration of the gastric content

We may aspirate gastric content at vomiting and a gastroesophageal reflux. After that, bronchus often has convulsions and followed by the bronchial obstruction with foods and a bacterial pneumonia occurrence (Photo. 1). Symptoms such as a fever, a cough, sputum and shortness of breath appear.

When we aspirate strong acid gastric juice at vomiting, a chemical pneumonia develops and shows the severe symptom such as the rapid breathing, a cyanosis, and hypoxemia.

Photo. 1 Right lung sectioned surface image (an example in pathologic autopsy: aspiration pneumonia 93 years old, man). Bronchus shows an obstruction of the food

(2) Microaspiration

Unconscious aspiration or dwellings from a larynx to trachea without swallowing action are often occurring in the patients with cerebrovascular disorder or bedridden state. It is called as “microaspiration” or “silent aspiration”. The episode of the unconscious aspiration is not apparent, and it is the pathosis which must be distinguished from the aspiration. Microaspiration may be cause pneumonia directly or indirectly, and this pneumonia is included in aspiration pneumonia in a broad classification.

3) Diagnosis and treatment

The repetition of pneumonia in the host who is in the easy situation to cause pneumonia is strongly doubted as aspiration pneumonia. If an aspiration or an episode of the accidental ingestion is apparent, and the clinical manifestations such as a fever, a cough, and the sputum are appeared, and pneumonic shade and shadow is confirmed in a chest X-ray, aspiration pneumonia is diagnosed. When an aspirated thing is expectorated from mouth or when we confirm alien substance by endotracheal suctioning, influential bases of the diagnosis will be gained.

Treatments of the aspiration pneumonia is discharge of the aspiration matter, cancellation of the diet, oxygenation, and an administration of the antibacterial drug, fluid therapy are basic in the acute period.

2. Prevention of aspiration pneumonia

The aspiration pneumonia is easy to occur in the depressed patients with underlying disease or in long term bedridden. As it protects all treatments, it may be the fatal factors occasionally. Therefore we must understand an occurrence mechanism of the aspiration pneumonia and incident situation and it is important to try for prevention. We perform aspiration preventive measures in combination depending on the deglutition degree of lesion of the patients (MEMO 2).

MEMO 2 Prevention of aspiration pneumonia

1. Appropriate food selection
2. Eating / deglutition training
3. Oral care
4. Muscular strength reinforcements such as chewing muscles / the face muscles
5. A pharmacotherapy
6. Tube feeding (nasogastric tube, gastric fistula tube)
7. A transvenous nutrition method
8. Surgical operation (a cricopharyngeus muscle amputation, larynx elevation technique)

Also, in elderly people, asymptomatic cerebral infarction is high occurrence, and in particular, in the cerebral infarction with the stoppage nest in the basal ganglia area are injured a deglutition reflex and a cough reflex. Therefore the micro aspiration during night is common and pneumonia is easy to come to develop.

Particularly in these patients, the prevention of the aspiration pneumonia by the oral care including eating training and the oral massage is expected.

3. Effect of the oral care

In the saliva of the healthy subject, resident flora of 10^8/mL is quite present, but is said to be it when the number of organisms increases more when an oral cavity is insanitary. In the elderly people with little salivary secretional capacity and the endodontic self-purification decreases generally is it in the situation which bacteria is easy to proliferate. Particularly in the bedridden patients, the cleanliness of the oral cavity is not often kept. When ADL decreases with aging and an antimicrobial agent is given for the repeated pneumonia and urinary tract infection, gram-negative bacilli comes to settle in the pharyngeal mucosa. Furthermore, various bacteria are firmly established in the patients during tube feeding in a stomach. Existing bacteria in these oral cavities, pharynx, and stomach may become the causative organism of the aspiration pneumonia.

When we conduct oral care appropriately removing the dirt of the oral cavity, the salivary secretion is promoted and self-purification works and the bacterial growth of the oral cavity is inhibited. It becomes unlikely that pneumonia develops promptly even if microaspiration occurs. Oral care is actually provided at getting up, after every meal and before going to bed. Oral care before sleeping is in particular effective.

In late years, the underlying and clinically evaluated researches regarding oral care are reported. For

example, by oral care using the mouthwash, oral and pharyngeal pathogenic bacterial decreasing is reported.

Also, a deglutition reflex is improved in a clean mouth by the stimulus of the oral care and particularly massage gingiva. As for this effect, it is thought the possibility that a gingival massage activates cerebral nerve, and improved a deglutition reflex.

Yoneyama et al. reported that pneumonic episodes significantly decreased when the conducted oral care appropriately (Table 1).

Table 1 The relation between the concern of oral care and the pneumonia episode in nursing home residents

Research manner:	The rate of pneumonia was observed for two years in randomly divided tow groups; 184 oral care replication group (an average of 82 years old) and control group 182 (an average of 82 years old), in residents of the nursing home.
Manner of the oral care:	Oral care was carried out by nursing and care persons after every meal; cleans the teeth of subjects with toothbrush and douches pharynx with the applicator which is soaked into 1% povidone iodine solution. A dentist evaluated the oral cavity condition once a week.
Consequence:	Pneumonia prevalence: Oral care replication group 19% Control group 11%

The prophylaxes of the elderly people pneumonia include common measures, control against underlying disease, aspiration preventive measures, vaccination (influenza vaccine, a pneumococcal vaccine), and breathing rehabilitation. However, we cannot conclude with the aspiration pneumonia preventive effect by the oral care stat as the participation of the underlying disease of subjects and these pneumonia precautions, the pneumonic kind which occurred is not determined in this study. Therefore research with a clinical epidemiologist and the pulmonologist who was familiar with geriatric disease seems to be a need in future.

(Kanzo Suzuki)

Glossary:

A gastroesophageal reflux: The phenomenon that esophageal assistance part (a cardiac strangulation part) is not firm enough, and gastric content regurgitates to a gullet.

A chemical pneumonia: The pneumonia occurred by the gas and liquid chemical action which is inspired.

A silent infarct: Asymptomatic cerebral infarction.

A deglutition reflex: Reflex deglutition action to occur in the job kernel stimulus of palate / the pharyngeal wall.

10. Oral cancer and oral care

The incidence of the oral cancer in Japan is not shown in the clear statistics, but occupies approximately around 5% of the whole malignant tumor, and it is speculated that about four or five people per 100,000 populations for a year. However, in late years the incidence becomes more frequent by aging.

The most of the oral cancer is assumed to occur in the mucosal epithelium as its mother ground. In histology a squamous cell cancer accounts for 80-90%, and sarcoma, malignant lymphoma, and malignant melanoma occur rarely. For the site of origin, the most common place of oral cancer is tongue, but in others, gingiva, floor of mouth, buccal mucosa, palate, and lip. By the site of origin, it is called a tongue cancer or gingival cancer so on respectively.

As predilection age and sex, it is told 40-70-year-old men that there is many it, but, in the recent super aged society, the first medical examination age becomes higher and the percentage of the women who are longevity than men is increasing.

The treatments by the surgical remedy, radiation therapy, and chemotherapy are performed, and the intensive care by the combination of these therapies is performed depending on the symptom aggravation extent. In late years a treatment outcome improves remarkably, and it is nearly 100% for the early cancer. However, in the advance case, without difficulty of cancer control, we may generate severe functional obstructions. So, early detection of cancer is vital.

In this regard, we can observe the oral cavity directly, and easily touch with a finger, so we can find oral cancer and various kinds of diseases early if we acquire fundamental knowledge. Therefore, on the occasion of oral care, not only the cleaning of teeth and prostheses but also the careful observation of oral mucosa of tongue, gingiva, floor of mouth, and all of the oral cavity is necessary. Particularly we meet with oral cancer and precarcinomatous lesions in high probability at the oral care of elderly people and we need careful observation and an acquisition of fundamental knowledge.

1. Clinical condition of precancerous change and the early cancer.

The leukoplakia that is a white torulus lesion appearing to an oral mucosa may be accompanied with a histological epithelial variant, it is considered to be representative precancerous change with the great risk of cancerating (Photo. 1). An erythroplakia with a red lesion mixed, and the papilloma with papillary upheaval are precancerous changes, too.

The pathological changes of the oral cancer are divided in two types from growth form; an extrovert type (type growing towards outside) and an introvert type (type growing towards the deep part). In the first, white spot, papillary shape and brood bud are formed, and in later, sore, ulcer, and mass induration are often formed, and by progress these are mixed.

For the early oral cancer, it may present with a sore and an ulcer similar to stomatitis, periodontitis, and discrimination with the decubitus bedsore-related ulcer by the sharp edge of teeth and periodontitis becomes important (Photo. 2).

Healing is obtained when it follows up around 1-2 weeks except the divisor of stimulus for these inflammatory lesions, but, for the cancer lesion, the healing is not obtained.

These cancer lesions are touched as the immobile induration.

Therefore, the white color lesion and the sore of the oral mucosa, an ulcer, a mass is very likely to be an oral cancer when it is the immobile induration. Careful observation and the close cooperation with the stomatic specialist become important.

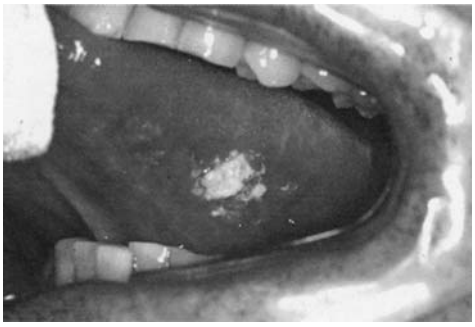


Photo. 1 Leukoplakia/ a tongue cancer (a white spot state)
Upper: A case diagnosed as the leukoplakia that occurred in tongue and gingiva without the feel of induration in the white spot
Lower: A case diagnosed as a tongue cancer with the induration in the white spot

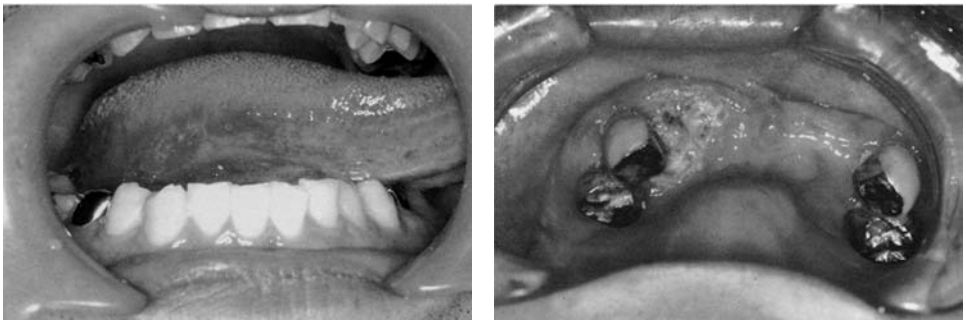


Photo. 2 A case diagnosed as early oral cancer
Left: A tongue cancer case with a sore and an ulcer of the margin of tongue part and feel of an induration
Right: An upper jaw gingival cancer case with an ulcer of the upper right side cuspid periphery

2. Oral care and prevention.

The stimulus for oral mucous such as incompatible prostheses (a metal crown, dental prosthesis) and sharp edges of the decayed tooth are noted as a local factor of the oral cancer incidence practically. The clear mechanism of the carcinogenesis by these factors is unknown, however, in a clinic; a cancer often produces to an agreed mucous membrane in the place of the decayed tooth edge, the sloping crown tooth, and the dental prosthesis.

Also, from the cases which papillary hyperplasia and oral cancer produce in the generating periodontitis site and in candidias mucous membrane by dirty dental prosthesis, it is strongly suggested the relevance of these factors.

Generally, the concern of inflammation and the carcinogenesis is examined fundamentally and clinically in much other organ cancers as well as an oral cancer, and it is suggested that the various vital reactions against to the inflammation stimulate texture chronically and associate for the carcinogenesis and the malignant transformation of the cancer deeply.

Therefore, the prevention of dental inflammation and stomatitis by appropriate oral care is very effective for oral cancer prevention.

(Toshiyuki Shibata)

11. A point of the hand washing before the oral care

1. Oral care and infection

The oral cavity of elderly people and the patients has oral resident flora, and it also has periodontal disease germ and Candida attaching to the prosthesis, and it may be hemorrhagic. Therefore, when the patient has some kind of infection including the viral hepatitis, the risk of infection to an operator/a caregiver and the risk of hospital/institutional infection increase. Besides if the fingers of an operator and the caregiver have small wounds, the risks will increase more.

In general, much bacterium inhabits on the skin of a normal human. The number of bacteria of the finger is different individually, but it is reported from 40,000 to 4,500,000 approximately. They are classified as two types; transient bacteria flora and indigenous bacterial flora.

The transient bacteria flora is a microbe flora which attaches to a skin or nail surface; the gram-negative bacteria such as colibacillus and the gram-positive bacteria such as Staphylococcus aureus are included. It is eliminated by ordinary hand-washing, but when a healthcare worker comes in contact with the patients or their personal article directly, it attaches and become the source of infection. Also, it is said that is the most related bacteria to the hospital/institutional infection.

The indigenous bacterial flora inhabits in a skin deep layer, and it is not easily eliminated by the ordinary hand-washing. But most of them are not associated with for infection.

Some experimental studies reported that moist hands carry more bacteria than dry hands, and it is clarified that the wet or moist hands of healthcare worker are easy to be the inflectional sources.

As described above, there are many risks of the infection through the finger of the care giver, so it is required scrupulous remarks in oral care.

2. Infection route and infection manner

There are two main infection routes; one is the infection from a patient to an oral care giver and another is from an oral care giver to a patient. In addition, the infection routes to a patient or a care giver from the appliance which is not sterilized / disinfected, the suit of the operator, a belonging or the suit of the patients, and environmental goods are suspected.

As an infection manner, infections through saliva / blood, contact infection, and air / droplet infection are suspected. When a pathogenic germ causing disease to a human enters the body, the infection may develop in the balance with the resistibility of the host for the infection. The preventive first step for the infection is “hand-washing”.

3. Kind and manner of the hand-washing

As mentioned above, the fingers of the healthcare worker are contaminated with large number of bacteria or pathogenic germs which are the transmission media of bacteria. The fundamental protectoral measure for infection is an enforcement of “hand-washing” at each medical activity, and it is similar at the oral care operation. There are three types of hand-washing; “ordinary hand-washing”, “hygienic hand-washing”, and “the surgery hand-washing”. The selection of the appropriate hand-washing type depending on the aim and the situation are important.

In the usual oral care or diet care, “ordinary hand-washing” by running water and the soap (non-antibacterial soap) for enough time is appropriate. However, when the patient has some kind of infection which needs contact infection prevention plan, or when the immune function depression of the patient is

suspected or apparent, “hygienic hand-washing” is required.

To prevent the infection through the hand of the operator to the patients, to prevent extension of infection, and to prevent infection to operator oneself, it goes without saying that the hand-washing is extremely important not only before the oral care but also just after the oral care.

l) Ordinary hand-washing

This is simple hand-washing to conduct in normal life by only running water or by running water and a soap (including the non-antibacterial soap = normal soap). The soap including the antibacterial component may be used. It is basic to conduct by scrub method for 15-60 seconds.

We can remove transient bacterial flora by this hand-washing. However, we can remove physical dirt and a microbe present in that, but it is insufficient for the precautions of hospital infection or the health care-associated infection.

2) Hygienic hand-washing

It is hand-washing to conduct for prevention of hospital infection in the clinical setting. It is aimed for transient bacterial discharge and sterilization.

When there is an apparent pollution, we perform it by detergent including the disinfectant (chlorhexidine, povidone iodine, the benzalkonium chloride etc.) and running water (by scrub method 15-60 seconds) and wipe it off with paper towel (Photo. 1). When there is not the visible pollution,, the sterilization is possible only by rubbing the waterless finger disinfectant (an alcohol antiseptic hand rub) (the rubbing method) (Photo. 2). The common use of the towel should be avoided because there might be pollution again and the infection expansion.

3) Surgery hand-washing

It is performed before the operation or the operational manipulation, and is the most hygienic hand-washing. We can remove the most of transient bacteria and decrease the resident flora as much as possible and we make the depression effect persist by surgery hand-washing.

Corynebacterium amycolatums are usually innocent, but require severe remark to may cause infection when they are in the tissue through surgical operation; because the elderly patients or the immune strength decrease patient are at great risk of falling into severe infection in particular. Therefore, a surgery hand-washing requires the resident flora decrease with disinfectant as much as possible, and for this aim the prolonged effect disinfectant is used.

MEMO 1 A notice about the hand-washing

1. Cut a finger nail.
2. Take off a clock and a ring.
3. Roll up a sleeve.
4. Use a paper towel or your arms not to touch a stopcock directly (An automatic faucet is desirable).
5. The liquid soap which can extract without touching it directly is desirable (including the standstill equation).
   Note1: Do not add it.
   Note2: Describe the starting date in container.
6. Attention not to scatter water to a suit and the floor in the rinsing.
7. Dry a hand enough taking about two pieces of paper towel downward out of the holder. (Do not use the cloth towel frequently).
8. Do not touch a face or the hair after hand-washing.
9. Use a skin protective agent; the rough skin by the hand-washing is the source of infection.

Photo. 1 Hygienic hand-washing —running water and medicinal soap—

4. Hand rough skin

There is a problem of the hand rough skin as an important matter associated with the hygienic hand-washing. The finger surface with rough skin has innumerable wounds and suspected that a number of bacteria are increased. In other words, a risk of the infection rises.

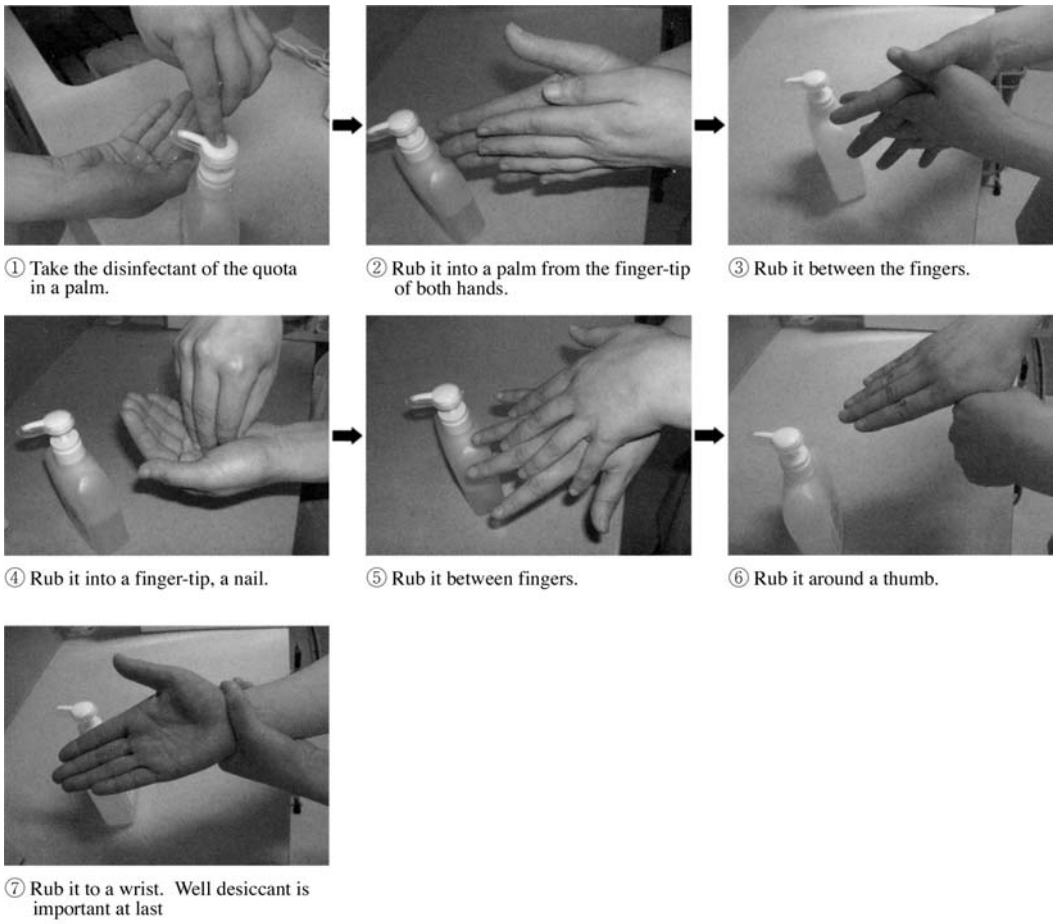


Photo. 2 Hygienic hand-washing —the sterilization by rubbing hand—

MEMO 2 A point to be careful for the prevention of hand rough skin(quoted from "Asahikawa Medical College infection measures manual 2005")

1. After hand-washing, dry hands as soon as possible and prevent drying by the evaporation of the water.
2. When there is not visible contamination, minimize the delipidation of the skin by rubbing alcohol sterilization.
3. Supplement fat with a moisturizer (lotion・cream) after the hand-washing.
4. Do not turn up hangnail, crazing, and the scales forcibly. Cut with nail clippers or scissors.
5. In winter wear gloves at going out because the water evaporation of the skin rises by wind..
6. At a tableware washing, flush with thin density and low warm water, without adding a stock solution of the detergent to a hand.
7. Gloves wearing
   - ・Latex gloves recommendation (plastic gloves in the case of an allergy to latex)
   - ・Recommendation of the gloves wearing in the housework.
   - ・Recommendation of the gloves wearing in washing with shampoo and hair color.

We may impair hand-washing act when we feel stimulation at hand-washing. As the frequently use of disinfectant may induce hand rough skin, it is important to choose medicine in consideration for hand rough skin. We should not choose the antiseptic detergent account for only bactericidal activity. For the treatment of rough skin, there are some manners such as a discrimination of the causes as possible as discharge, a skin care to protect dry skin, an inspection of life style causing drying skin, and a medical treatment for inflammation control. It is important that we receive a direction of a skin department, and uses prescribed medicine appropriately without providing personal treatment.

5. About the gloves wearing as standard precautions

When the contamination of the finger is intense, it is difficult to completely remove potential pathogen even if we conducted hygienic hand-washing. Also, when the rough skin is intense and finger or hand has a wound, there is a risk to be easy to receive infection. An examination for infection is less accomplished in all patients. Risks of the various infections are always present. There is the concept called standard precautions, the one gloves for one patient method is recommended as one of this criterion precautions.

The aims of the gloves wearing are follows; ① reducing the risk of infection of a healthcare worker from the patient ② infection protection of the patient from a healthcare worker ③ reducing the risk of transient infection of a healthcare worker's hands by the plexus of bacteria which may propagate to the patients. However, we must not forget that we cannot completely protect contamination by the wearing gloves if there is a small hole in it. Also, because when take off gloves, we may contaminate it, the hand-washing before and after wearing is necessary.

MEMO 3 Standard precautions

CDC (Disease Control prevention Center) guidelines are used as the criterion of Hospital infection measures because of its handiness / rationality. There are standard precautions in that, and it is manner applied to all patients, and all people engaging in treatment, patient's configuration / transportation should perform it thoroughly. The all of the moist biological substance (blood / biological fluid/ secretion and excretion) is considered as in danger of the infection, and the following manner is applied;

- When touch the moist biological substance, wash hands.
- When suspected to touch the moist biological substance, wear a mask, an aprons, and gloves.

(Mitsuyoshi Matsuda)

12. Common manner of the oral care

The oral care must be carried out by the most reliable manner based on the whole body and oral state respecting the cared person on his intentions and life habits.

The general manners are gargling, tooth brushing, and mouth cleaning.

Gargling that removes a saburra or dental plaque helps refreshment and normal sense of the oral mucosa.

Sometimes the oral care is carried out with a moderate massage to buccal mucosa and lips as stimulus in consideration of oral function training.

Even as for the person who do not ingest, the preprandial or postcibal moderate stimulus and massage help the recovery of the oral function.

Also, the oral care before taking foods is effective for preparation and the warm-up of the oral function for the person with the dry mouth and the mouth breathing.

1. Gargling

There are two ways in gargling , one is the “rattle” gargling to clean the throat and another is the “bubbling” gargling to clean the oral cavity(Fig. 1).

The "rattle" gargling removes an extraneous dust and a bacteria in the throat.

So after taking water in a mouth and making head lean back, we gargle to move the water with a large "rattle" sound.

The “bubbling” gargling removes large bits of food in the oral cavity. After including a little water in the mouth, we move the water in the cheek up and down and right and left with the “bubbling” gargling sound so that the water extends over in the mouth as much as possible. This gargling is also an exercise of the muscle around the mouth.

There are some requirements to have the gargling.

Before gargling instructions for elderly people, we must confirm whether they meet the requirements (MEMO 1).

MEMO 1 Requirements for gargling.

1. Be clear Consciousness.
2. Can close lips and hold water in a mouth.
3. Can move a cheek and tongue.
4. Can take water out of the mouth.
5. Can make head lean back.

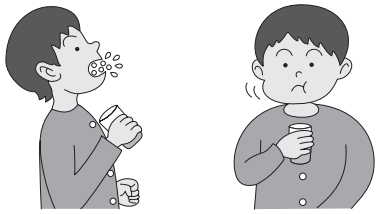


Fig. 1 “Rattle” gargling “Bubbling” gargling

2. Tooth brushing

The tooth brushing is to brush its teeth using toothbrush. However, we do not merely “polish” it. It is important that we can “polish” it and remove dental plaque thoroughly which is a principal factor of the two big endodontic diseases; the cavity and the periodontal disease. For a person with teeth, brush using a toothbrush is basic.

If it eats, we polish it, but we are basic, but it is important once a day at least to polish carefully. Particularly, the front to lie is effective at night.

“After eat, polish tooth” is the basic, but it is important to polish carefully at least once a day. The brushing before sleep at night in is particular effective.

The dentifrice does not have to use it as a general rule.

When use it, the small bean size for a finish of the tooth brushing is useful to be fresh.

The use of tooth wash and dental conditioner in substitution for dentifrice are good.

Because a saburra is easy to be left, the use of the interproximal brush and floss is effective for an interdentium and the teeth-gingival border.

The brushing method is divided into two kinds of the next by the aim.

① Manner to use the side of the toothbrush for expecting gingival massage effect: Rolling method, Stillman method, Charters method

② Manner of the toothbrushing for the purpose of the plaque discharge of the tooth neck primarily: Fones method, Bass method, Scrubbing method, the polishing method by one by one according to teeth long

Because the fur coating of tongue become the bacterial hotbeds and cause aspiration pneumonitis and the halitosis, a tender toothbrush or modifies force with a tongue brush are light to clean.

3. Wiping oral care method

The fundamental oral care of the person with teeth is toothbrushing, but for the person without one own teeth, with disturbance of consciousness and impossible for gargling, and with a severe dysphagia, the wiping oral care method are used.

Also, it is necessary to perform the wiping oral care for the person whose salivation decreases, and for the patients in tube feeding with jelly one-shaped plaque on the mucosa side.

The wiping oral care method is carried out under the full-opening mouth, and performed spreading between buccal mucosa and gingiva calmly with tongue depressors. The use of the sponge brush is generic recently. We may use a volute padded clothes, a cotton swab, and a finger winded gauze in substitution for a sponge brush.

Because a mucous membrane may be damaged when we make a wiping with drying these tools, we wipe it off after making water absorbed enough. When we use a sponge brush, we must squeeze it enough after having dipped it into the tepid water. For the patients with dry mouth, it is effective to dip into the mouthwash rinse.

4. Posture

When the oral care is provided, we choose safe, comfortable posture,

① Do not develop aspiration.

② Do not make get tired.

③ Do no make a press of the same part.

Because in the Farrar posture it is possible for an anteflexion, aspiration is hard to occur in. However,

because it is fatigable posture, we must pay attention to hour of the posture conservation depending on the patient status.

We can move a neck and a waist of patient when we make a space using towel under the knee and the back of the head. For a person produced only as for the supination posture, turn only the face for the oral care.

(Tomomi Azuma)

Glossary:

Fur coating of tongue: Epithelial tissue called the filiform papilla of the tongue face grows as hair, and the thing which the burble epithelium of the oral mucosa, bacteria attached there, and came to be seen like a white one. (Extracted from the Ryosuke Shiba: “How clean tongue fur?”, Tsuyoshi Kawai et.al ed., “ABC of the oral care”, Medicine teeth medicine publication, 1999, 188, Tokyo)

13. The oral mucosa care method

1. An oral anatomy and oral mucosa

All inside of the oral cavities are covered with a mucous membrane with the stratified squamous epithelium. However, the oral mucosa greatly varies in characters by the anatomical parts. In other words, the mucous membrane of gingiva and hard palate are firm and conjunctive thickly with subjacent bone in immobility, and it is covered with keratinized mucous membrane. But the mucous membranes of a lip, a cheek, soft palate, and the lower undersurface on the tongue are soft and movable, and it is covered with epithelium which does not usually reveal keratin (not keratinized).

A lip and horse's hoof-shaped narrow space among the buccal mucosa, with the row of teeth of the fluctuation and alveolar part of mandible (the planted part of teeth), are called a buccal cavity, but residual such as the food is easy to collect in this part. Also, in the part between the mandibular alveolar part of mandible and the tongue, it is transitional region with a horse's hoof-shaped ditch (a floor of mouth part), saburra are easy to collect. Frenulum are present between a lip / a cheek and an alveolar part of mandible and between tongue and the alveolar part of mandible, sometimes oral cleaning may be complicate in these parts .

2. The depurative need and significance of the oral mucosa

When the bacterium living in an oral cavity enters the lungs by mistake in the elderly people decreased resistance force, it causes aspiration pneumonitis. And the bacterium can be thought to influence another disease. In the oral care, it is important to remove dirt (an oral microbe) which attached to teeth and dental prosthesis, but because many microbes inhabit in the saburra and sputum / the secretion which attached to an oral mucosa, the care for the oral mucosa is required. When we massage an oral mucosa with tender brushes, a circulation improves and it gives the patients refreshment.

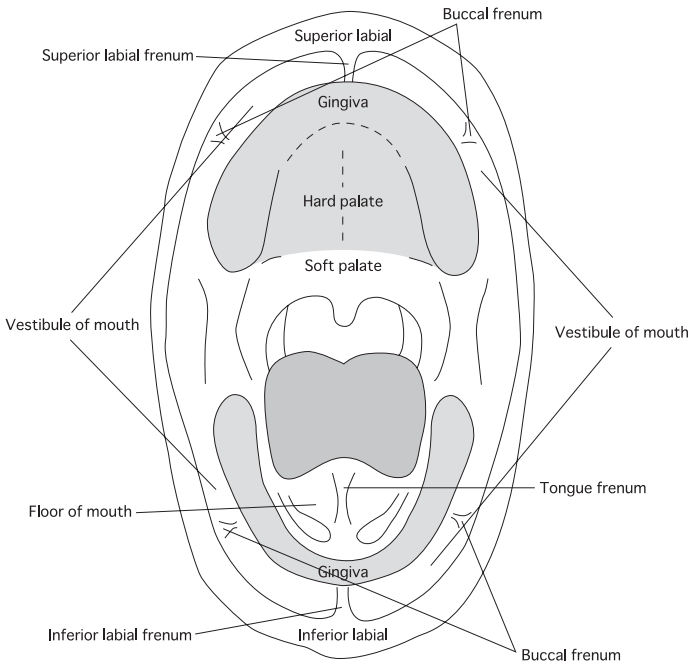


Fig. 1 Oral construction (edentulous jaw)

3. The cleaning method of the oral mucosa

There are three cleaning method of the oral mucosa; the functional cleaning method, chemical cleaning method, and the mechanical cleaning method. When we usually chew food, we are conducting the endodontic cleaning by tongue and a lip. As the saliva flows back in an oral cavity and washes away food, various antibacterial agents in saliva control oral microbial excessive breeding. These are the mechanical cleaning methods, and when the mechanical cleaning becomes poor by the depression of the oral cavity function and salivary decreasing, a dirt is easy to stay in an oral cavity only by in taking for tender food.

The chemical cleaning is to douche an oral cavity using mouth-wash and disinfectant.

The effects of oral cleaning increase more when we use the mechanical cleaning method together. For the oral mucosa care, oral moisture retention is necessary, and the use of the moisturizer is valid for the discharge of prevention and the dirt of the oral contamination.

The mechanical cleaning method is cleaning to wipe an oral mucosa with gauze, a sponge, and a brush. Specifically, we describe it next.

4. What is the real mechanical cleaning method?

Because the oral mucosa varies greatly in characteristics according to its site, it requires some remarks. The gingiva and the hard palate are covered by a hard mucous membrane; we can endure relatively strong external force. But in the other sites, the mucous membrane is soft and easy to be damaged; the tooth brush for the dental cleaning basically can not to be used because it may blemish a mucous membrane.

The saburra is easy to collect in a lip / a cheek and gingiva transitional region and tongue and the gingiva transitional region. Also, the sputum or the secretion often attach to mucous membrane of palate and tongue.

Specifically, we soak gauze, a sponge, and a brush with water or mouth-wash / disinfectant, and after squeezing extra water, clean an oral cavity mucosa and gingiva. When gauze, a sponge, and a brush are stained, we use it while washing off extraneous dirt with water each time. We conduct the cleaning from the back to the front to prevent aspiration.

Table 1 Cleaning tools for oral mucosa

Cleaning tools for oral mucosa	Usable site and aim	Characteristics
Cotton (swab, cotton-winded swab, cotton swab)	・Overall oral mucosa ・To clean up saburra from the oral vestibule and the oral floor	・Mild usability ・Low capacity of contaminant adsorption
Gauze, Non woven fabric	・Overall oral mucosa ・To clean up saburra from the oral vestibule and the oral floor ・To clean up saburra or secretion from the hard palate and the alveolar	・Higher cleaning effect than cotton ・Bigger than cotton ・Inferior to cotton in softness
Sponge	・Overall oral mucosa ・To clean up saburra from the oral vestibule and the oral floor	・Higher cleaning effect than cotton and gauze ・Disposable ・A little expensive
Brush for mucous	・To clean up saburra from the oral vestibule and the oral floor ・To clean up saburra or secretion from the hard palate and the alveolar	・The bristles of the brush are thin and soft. ・Cleaning effect is high by increasing the bundles of bristles. ・Some brush is spherical in its shape, and it enables the brush to spin around and remove intraoral dirt. ・Reusable by sterilization

If the mouth opening is too wide, it is rather hard to clean because a buccal cavity becomes small by masseter muscle and mandibular processus muscles. A mouth should be opened small as the appliance enters for perform better cleaning.

When we finish, we confirm no gauze or no sponge in the oral cavity. The person with strong dry mouth, moisturizer is effective to prevent the adhesion of dirt to a mucous membrane.

Various kinds of tool are developed and are used for the purpose of the oral mucosa cleaning (Table 1). Classification by the material contact with a mucous membrane is followed. We can divide it into four; ① Cotton (a swab / a cotton-tipped swab) ② Gauze / Nonwoven fabric ③ A sponge brush ④ Brush for mucous membranes. We need to understand these tools characteristics and use the tools properly adjust to the cleaning site and aim.

(Kenji Kurashina, Hiroshi Kurita)

14. The lingual cleaning method

1. A target of the tongue cleaning ― Fur coating of tongue ―

Fur coating of tongue is accretion to dorsum linguae and its color is brown, black or white. It generates from burble epithelium, saliva component, a saburra, a white blood corpuscle, lymphocytes, and a microbe which are delayed.

In the oral cavity, a balance and quantity of the bacteria are usually preserved by self-purification. However, microbisme selectionne et substitue by the oral functional decline due to aging and the disease, salivary secretion depression by the medication or taboo eating/drinking, a chronic administration or the immune strength depression of the antimicrobial agent, worsens oral cavity environment and increases fur coating.

2. A need of the fur coating discharge

Fur coating of tongue is not necessarily a morbid thing for a healthy person.

However, it becomes the hotbeds of the pathogenic germ by deterioration of the overall status or oral cavity function depression.

This state raises the risk of the infection episode and cause aspiration pneumonitis or a glossitis.

Also, it causes the gustatory interference and bad breath.

Therefore, in consideration of effect on overall status and QOL, the lingual cleaning is necessary to maintain normal oral environment.

3. Attention at cleaning

The tongue is easy to be damaged very much because the surface texture is complicated.

Also, the lingual back cleaning may induce a vomiting reflex and a deglutition reflex.

Because an aspiration accident and the unpleasantness lead to refusal for the subsequent oral cleaning, we are requiring remark.

4. What is the actual tongue cleaning?

Firstly for mucosal protection, the person who can do gargling gargles and the person who can not do gargling is cared a humectation in the oral inside cavity with water or moisturizer with a sponge brush make. Next, the projected tongue is rubbed with a tongue brush slowly from back to front: the tongue is pulled by himself or pulled by care person's hand slightly according to the ability of a person(Photo. 1). The number of brushing times should be less than 30 times, and the sliding scrape on the surface without a pressure is desirable.

We perform it while washing a dirty brush in water.

At last we finish it with gargling or wiping by a soaked sponge brush with water.

According to the degree of the drying, we finish it with moisturizer and mouth washing rinse.

We observe quantity and a quality of the fur coating of tongue well.

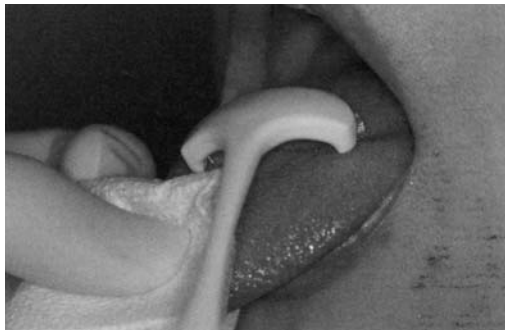


Photo. 1 Tongue brush using
The holding tongue is easy with gauze

In the person who has thick and caked dry fur, it is necessary to gradually approach to the normal mouth condition removing it little by little every day without overdoing.

Also, it is important to draw the maximum function of the patients or the nursing cared person and to raise self-purification having functional assessments usually.

5. The instrument choice

A tongue brush is optimal. When we use a toothbrush, we must use it with caution, because we are easy to injure tongue depending on hardness and the geometry of the point of a brush.

The sponge brush is suitable for soaked using with a medicinal solution or a dental conditioner.

For the facility, the volute thing can use gauze for a finger and half-split' chopsticks, too, but damp it by all means and warn pressure.

6. The effect of the medicinal solution

It is effective in discharge of thick fur coating of tongue to use 2% sodium bicarbonate water and 3% oxydol water temporarily.

If there is the feeling of stimulation to a dorsum linguae tissue, we discontinue it immediately.

The antibacterial mouthwash is valid to suppress the germ increasing after the cleaning.

By use with dilute density displayed by a product, we can obtain precise effect safely.

(Sumiyo Sakuma)

15. The oral care of bedridden elderly patients

The oral cavity is a very sensitive region. Therefore, to begin oral care for a bedridden elderly patient, we must start by sufficiently explaining the need for care to both the patient and their caregivers. Obtaining the understanding and cooperation of the family is almost as important as the understanding of the actual patient. The success or failure of oral care depends on three elements: the physical element; the psychiatric element; and the environmental element (Fig. 1). Cooperation and collaboration are necessary, not only with the patient and their family, but also with other professionals to solve the unique problems encountered in each individual.

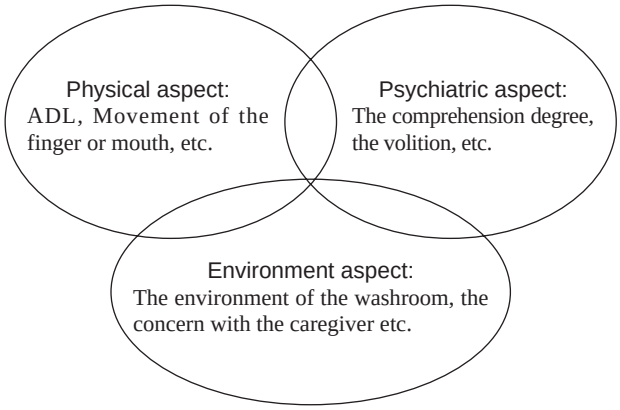


Fig. 1 Three influential elements for the self-oral care

To assist oral care in accordance with the degree of physical independence, we perform screening for independence of mouth cleaning using the BDR index (Table 1).

When considering the manner of assistance to provide, we try to make use of whatever ability is remaining to the fullest extent possible. Self-help devices or cleaning tools specially developed for each individual are used to allow patients to do as much as possible by themselves, promoting involvement and providing physical exercise.

Table 1 The revised BDR index (the independence degree of a mouth cleaning)

		Independence	Partial assistance	Complete assistance
BDR index	B Brushing	a Almost toothbrush by oneself a1: In a washroom a2: In a bedside	b Partially toothbrush by oneself. b1: Preserve a sitting position b2: Cannot preserves a sitting position.	c Can not toothbrush by oneself c1: Take a sitting position/a semi-sitting position c2: Can not take even a semi-sitting position
	D Denture Wearing	a Put on and take off a denture by oneself	b Either putting on or taking off	c Can not do by oneself at all
	R Mouth Rinsing	a Gargling bubbling.	b Can include water in a mouth.	c Can not even include water in a mouth
The independence situation of an oral cavity and the denture	Spontaneity	a Clean advancing from oneself.	b Clean by oneself with an instruction	c Not clean by oneself
	Habituation	a Clean every day a1: Around one time a day a2: Above twice a day	b Sometimes clean b1: more than once a week b2: Under once a week	c Hardly clean
	Efficiency (site delivery/ operation /hour)	a Operate a tool for cleaning precisely and can clean an oral cavity thoroughly	b Can not reach and toothbrush effective in some regions	c Can not reach and toothbrush effective in many regions

A criterion of the efficiency.：Observe the efficiency from following three points primarily

① The basic regional accessibility of the tool for cleaning (a point of a brush) judgment: Dentulous calyx place; the reaching to the fluctuation all around inside and outside. Dental prosthesis; the reaching to the front and back side, and the uncus teeth of denture

② Basic operability: Toothbrushing movement in the tooth surface is done. Use of the denture cleanser is possible with the dental prosthesis

③ Reasonable duration: Hour to be enough to almost clean teeth or dental prosthesis, Hour to be enough to continue a cleaning action (at least approximately around one minute)

The posture of the patient needs to be secured depending on the degree of physical independence, such as a sitting position, a Farrar position, a Semi-Farrar position, a lateral decubitus position or a dorsal position. If the patient shows paralysis, the paralyzed side is kept to the top, with the healthy side below.

Bedridden elderly individuals often display decreased deglutition function. When deglutition is defective, aspiration must be prevented by turning the face toward the side and pulling much a lower jaw with a pillow. Suction is used if available, but if not, we use only a small amount of water and prepare a cotton swab or cut cotton to wipe any fluid away immediately.

In addition, when patients remain bedridden for a long time, the oral cavity is often left unattended, and observation is needed to identify any problems in the oral cavity.

As pain can cause patients to avoid oral care, we should check for the presence of problems such as stomatitis, missing teeth, gingival swelling, and damage caused by dental prostheses.

We talk with dentists and dental hygienists if patients have relatively complex problems, such as those involving dental prostheses.

If oral intake and conversation are difficult, and stimulation of the oral cavity is lacking, salivary secretions are likely to be decreased. Dry mouth can also readily result as a side effect of medications. Dysfunction of the self-purifying activities of saliva leads to a “dirty” oral cavity. In the case of patients receiving tube feeding, oral care is particularly necessary, and lingual cleaning is indispensable along with the teeth and oral mucosa. Fur coatings on the tongue that isolate the epithelium or blood constituents deposited to the tongue surface become a breeding ground for bacteria, causing halitosis. We try to use supplementary cleaning tools (electric brushes, sponge brushes, interdental brushes, tongue brushes, etc.) to relieve the burden on the patient and allow efficient cleaning in a short time.

In the elderly with poor general immune status, oral bacteria and remnant food fragments cause aspiration pneumonia. Therefore, as well as mouth cleaning, we plan to use the various methods of oral care in combination, such as functional training (tongue gymnastics, face gymnastics, deglutition gymnastics) and massage of the salivary glands and oral mucosa (Fig. 2). We need to promote salivary secretions to restore oral functions and facilitate the self-cleaning properties of the oral cavity.

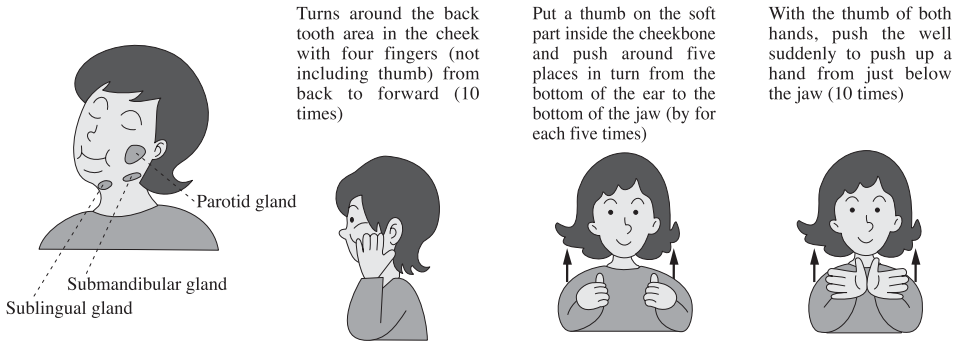


Fig. 2 Salivary gland massages.
A secretory function decreases by aging, and a dry mouth is easily caused by the influence of medicine. The massages promote a salivary secretion

(Kayo Teraoka)

16. Importance of a multidisciplinary approach for oral care

In the field of medical treatment and nursing, the team approach to patient care has gained prominence in recent years. Obviously the same principles can be applied to oral care. In this section, we highlight the importance of a team approach to oral care.

1. Reasons why a team approach is helpful in oral care

1) State of the patient receiving oral care

The patient receiving oral often cannot clean their own mouth due to various diseases. Moreover, most such patients display difficulties with feeding and deglutition.

Sufficient expertise is needed to identify the principal oral care problems according to the specific pathologies present, as the diseases present in patients vary widely. In addition, experience with these underlying diseases is needed. This kind of situation is likely to require more expertise and knowledge than will be present in any single profession. By bringing together a variety of professions with expertise in a wide range of areas, the specific problems of the patient can be addressed and solved safely and effectively. Such an approach thus offers the best opportunity to achieve effective, efficient oral care by applying the knowledge and experience of each profession to the maximum potential.

2) Oral care is offered universally and continuously.

Oral care is a standard part of care. In daily life, “care” can be considered to represent the activities that the individual engages in on a regular basis to maintain health and well-being.

For instance, achieving the normal oral care that is recommended for individuals in their daily life would require a dental hygienist to attend the patient three times a day, every day. Clearly this is almost impossible in all but a few special cases.

Even if the patient can be attended that regularly by professions and family caregivers outside the odontology department, the oral care provided may not be of a similar level to that provided by hygienists from the odontology department. A cooperative team-based approach is thus important in allowing specialists in oral care to improve the level of care provided by non-specialists in that specific area.

2. Putting together a team for oral care

1) Understanding other professions

When a team is put together, understanding of other professions is needed. In particular, because oral care involves many issues concerning the specialized area of the odontology department, health care practitioners from other specialties outside the odontology department may consider the issues as unrelated to them. In such cases, tame members associated with the odontology department need to be able to request understanding from their fellow team members.

At the same time, all professions related to the patient should recognize oral care not as a specialized area of care, but rather as a facet of daily care that is just as important as the other areas.

Photo. 1 The intelligence sharing is important to make the team approach of the mouth caring succeed. The education to inform other members of the knowledge of the mouth caring is needed for that

Importantly, the dentist and dental hygienist should not reduce reports to other professions. As typically non-regular employees (home-visit medical service, etc.) at the site of medical treatment and nursing, the dentist and dental hygienist risk being neglected as key members of the team. Patience is thus required to build more intimate relationships with other team members and facilitate understanding with each other.

2) Conferences

The basis of the team approach to care is often considered to be the conference. However, it is not easy for nurses and other caregivers involved in providing care to numerous patients to frequently hold conferences at which all the professions are gathered together. Methods besides the conference must therefore be provided through which information can be shared between other professions.

Moreover, a team leader for oral care needs to be nominated from among staff in the site of medical treatment and nursing, although the care manager's activity becomes important for users of long-term care insurance.

The oral care team leader needs to have an understanding of all information regarding the patient, and provides information to all professions involved, as necessary.

3) Making an appropriate oral care plan

A care plan is important in allowing the team to provide appropriate care. The basis of the care plan is to set up objectives that professional team members, patient and their family can all understand, to provide procedures to achieve these objectives, to clarify the person in charge, and to schedule activities in a manner that can be monitored. It is important that the team then follows this oral care plan.

(Hideo Sakaguchi)

17. Oral care and speech

Speech is achieved using various organs of the mouth and respiratory system. Problems or abnormalities in these organs can thus affect speech. Such issues are particularly evident in articulation, meaning the ability to make the sounds needed to pronounce words correctly.

To examine oral care from the perspective of speech and language pathology, the role of different parts of the mouth and observations that can be performed are described in this paragraph.

1. The act of speaking

Speaking involves various processes. First, the individual starts by determining the ideas that they wish to convey at the speech center of the brain. Next, specific words, phrases and sentences are assembled according to a grammar (e.g., Japanese grammar), and are then associated with the required motor coordination. As a result, the necessary parts of the mouths and velopharynx are organized to move appropriately, creating the required sounds.

Speaking a word thus occurs through the mouth via this series of processes. The structures that produce the sounds of speech are called speech organ. The speech organ is organized by the tube of the respiratory organs from the lungs to the velopharynx and various parts in the mouth that also perform roles in chewing function.

Speaking also involves a role of the individual as a listener, and a role of answering. Therefore, speaking requires that the individual to meet various conditions of intellectual ability, hearing, emotional and psychological aspects, the proper environment besides the speech organ.

2. Role of oral function with speech sounds

The lips, teeth, tongue, and palate function to create various sounds used in words, such as bilabials (p, b, m, w, F), dentals (s, z, ts, dz), alveolars (t, d, r, n, ɲ, ʃ, ʒ, ʧ, ʤ), palatals (ɕ, j), velars (k, g, ŋ), glottis sound (h) (depending on the system of sound notation used), and vowels (a, i, ɯ, e, o).

The main points of inspection are abbreviated as follows.

1) Teeth

The abnormalities in alignment, occlusion, teeth (e.g., lack at front teeth, particularly in the early stages of losing the maxillary incisor) etc. can cause articulation disorders, and the ability to gain an understanding of potential problems from listening to speech in the interview and from visual inspection is important.

2) Lips

The lips perform a wide variety of movements as combinations of opening and closing the lips (e.g., “papapapapa”, representing a rapid alternation of movements, or diadochokinesis), at appropriate speeds. These labial motor functions are under the control of the facial nerve (cranial nerve VII). Issues affecting the facial nerve thus influence bilabials.

The form of the lip may have no influence on articulation if no functional problem is evident, even if the appearance is different from “normal”.

3) Tongue

Various speech sounds are made using the tip, central part and posterior region of the tongue with the teeth, and hard and soft palate. The ability to recognize issues such as a large or small tongue (macroglossia, microglossia), absence of the tongue (aglossia, exicision with cancer), marked deviation of

tongue position (palarys, ankyloglossia), is important for identifying problems involving the tongue.

In general, during infancy, an abnormal frenulum linguae (e.g., ankyloglossia) can cause problems with not only sounds made using the tip of the tongue, but also those involving the central and posterior regions.

Treatments such as functional training and articulation exercises can often improve articulation if the patient can the lift the tip of the tongue on the occlusal plane. When improvements are not readily obtained, particularly in sounds such as [r] by around 5 years old, when the tip of the tongue is unable to be lifted, surgery may be considered to address the abnormal frenulum linguae.

When the loss of normal tongue function results from excision such as with tongue cancer, articulation disorders are likely to be severe. Articulation disorders can also appear in articulations that use the rear of the tongue such as in velars when the tip of the tongue is excised. In such cases, it is important to confirm a movable ability of the remaining organization.

The motor function of the tongue is under the control of the hypoglossal nerve (cranial nerve XII). Therefore, patients with paralysis involving this nerve will show the tongue veering toward the paralyzed side when attempting to stick the tongue out. In addition, shrinkage of muscles (atrophy) might be apparent on the affected side.

Self-purification is thus decreased when paralysis and decreased motor function of the tongue are seen, and findings like white moss (Photo. 1) may be identified on the back of the tongue.

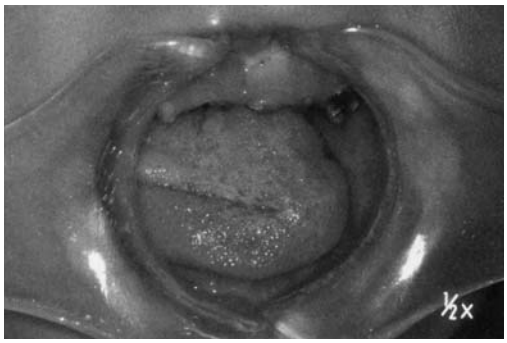


Photo. 1 Fur of the tongue. It adheres to tongue of atrophy(Because the tongue is paralyzed and self purification decreases)

Difficulties may be seen with the articulation of the [r] sound, which uses the tip of the tongue.

4) Hard palate (including the alveolar part)

The observer must confirm whether bone defect is apparent in a reverse-V shape at the bone edge of the hard palate (V-notch), identify any loss of organization or presence of a communication with the nasal cavity and also U or V pattern in palate. The presence and rough shape of the bony defects may be identified by feeling the bony edge of the hard palate using the middle finger.

5) Soft palate (including the uvula)

When inspecting the functional side, getting the patient to make an “[a]” sound can confirm whether the soft patale moves upward and backward. The glossopharyngeal and vagus nerves participate in this function. Paralysis causes the affected side to hang down during movement.

The length of the soft palate, the presence of the fistula and the defect and, the presence of the fissure in the muscular layer of the central soft palate, and morphological defects of the uvula (fissure, loss, etc.) may be identified on inspection. The central soft palate looks dingy by presence of the defect and when making an “[a]” sound, the part becomes hollow like a ditch. Moreover, because the part looks bright when light is directed toward the palate from the nostril, distinguishing of the defect or not is easy.

Detection of defect of this muscle, a bony V-shaped defect of the hard palate (following description) and bifid uvula are essential for diagnosing the submucous cleft palate. The presence of short, malfunction and fistula of soft palate occurs velopharyngeal closure insufficiency (VPI).

The pronunciation of words in Japanese is not affected even if fissures or loss of the uvula are present.

6) Velopharyngeal closure

With normal speech, sounds are made while exhaling. Velopharyngeal closure is needed to divert exhalation from passing through the nasal cavity and keep in the oral cavity sufficient exhalation for the pronunciation. This function is essential to articulation, blowing, swallowing, sucking food, and is thus very important for quality of life.

If the velopharyngeal closure insufficiency occurs, speech may suffer from insufficient exhalation for the decreased oral pressure, causing weak consonants, the hypernasality and nasalization of speech sounds.

Several methods are available to clarify velopharyngeal closure function. The general method is to judge the presence and level of hypernasality by listening to the patient talk.

A second method is to get the patient to whistle blow, while placing a stainless steel plate (metallic board, mirror, or other shiny flat surface) under the nostril, to determine whether air is escaping through the nose. Escaping air (nasal emission) will be apparent as a mist on the plate surface.

Various specialized equipment is also available, to measure flow nasalitygraph (SN-01; made by Rion and proposing by this author), analyze sound spectrograph (sonagraph), examine the velopharynx directly (by fiberscopy), measure muscle activity (electromyography), and provide images (radiography, fluoroscopy, and echography).

7) Others

Various other aspects of speech may also show disturbance, such as abnormalities of prosody, rhythm, voice. These can be classified as dysarthria. It is not covered in this book for lack of space.

3. Devices for treating articulation disorders

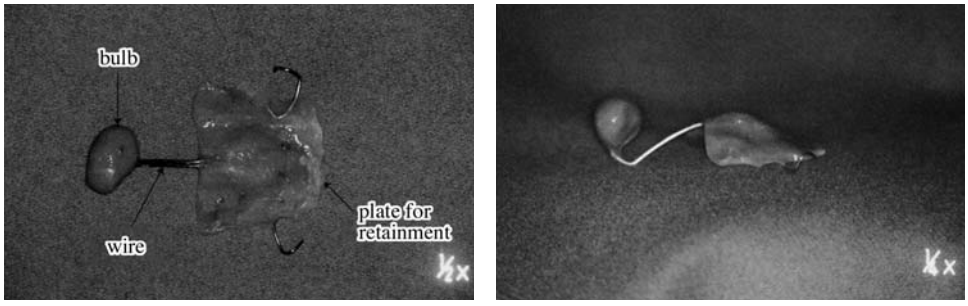
Various devices can be applied to treat articulation disorders. When such a device is applied, care must be taken to keep the device clean in the mouth. Moreover, pay attention in the handling.

1) Treatment and care of velopharyngeal closure insufficiency (VPI)

In addition to surgical interventions, two main methods are used to impove velopharyngeal closure insufficiency:

(1) Valvular speech aid (abbreviation AID)

This is used when velopharyngeal closure insufficiency results from the soft palate being too short despite adequate motor function. The device comprises three sections (Photo. 2). It comprises valve that supplements the imperfect close, a plate kept the hard palate and a wire that connects a bulb and a plate. As the whole device readily becomes dirty, care must be taken to keep all the parts clean. When handling the device, it is important to avoid changing the valve position or the angle of the part that is in contact with the velopharynx parts.

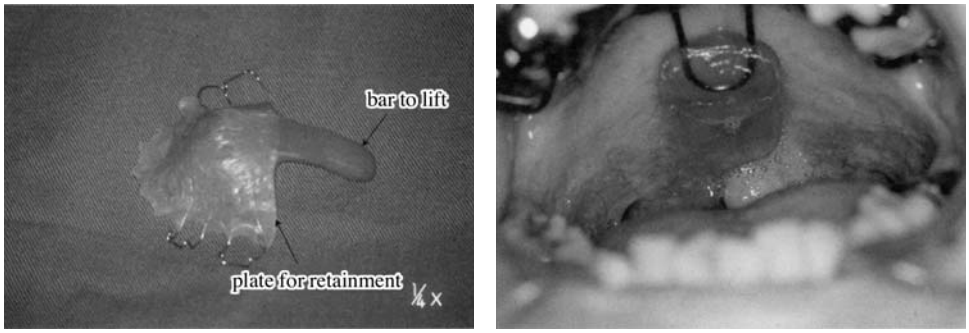


a: Nasal cavity side. b: Side.

Photo. 2 valvular speech aid

(2) Palatal lift prosthesis (PLP) (Photo. 3)

When the soft palate is sufficiently long but motor function is poor, a PLP can be applied. This device comprises two parts: a bar to lift the soft palate; and plates to maintain the device. Care must be taken not to change the angle of the bar during handling.



a: Nasal cavity side b: At wearing

Photo. 3 Palatal lift prosthesis (PLP. various forms in bar part)

2) Devices for shape correction

(1) Obturator

When a fistula or defect in the palate presents, devices use instead of an operation. Such devices are handled similar to denture.

(2) Prothesis

It applies to the defective part of the organization that causes it in the palate including the alveolar part. It is used also for the upper and lower jaw.

(3) Hotz plate (palatal plate)

This prosthetic appliance can be applied to facilitate correction of cleft lip and palate child's palate form, and allow nursing. The appliance is used as soon as possible after birth.

(4) Epithese (facial prosthesis)

An epithesis (Weiskpf, 1969) covering a loss of organization on the surface of the body, particularly the facial.

3) Devices applied in the tongue

(1) Tongue contact plate

This device is applied in the maxilla and is used to improve articulation disorders, and chewing and swallowing difficulties caused by decreased motor function or defect of the tongue following cancer excision.

(2) Artificial tongue plate

This device is applied in the mandible and is used following total resection of the tongue, to improve chewing and swallowing functions.

(Setsuko Itoh)

Glossary:

Submucous cleft palate: As this abnormality is a mild form of cleft palate that is easily missed, diagnosis might be delayed. The resulting speech disorders include hypernasality and articulation disorders caused by velopharyngeal closure insufficiency.
The diagnosis is confirmed by a V-shaped bony defect behind hard palate (V-notch), mascular defect (seen description below) and bifid uvula.
These three findings are called the three signs of Calnan (Calnan, J. 1954).
Hypernasality: Caused by velopharyngeal closure insufficiency. Velopharyngeal closure insufficiency results in a peculiar distortion of sound during articulation, because the vowel becomes hypernasality, with air escaping through to the nasal cavity. Speech sounds are weakened and show nasalization.

18. Nursing support for inpatients requiring oral care

Listed below are oral disorders and forms of treatment.

Oral disorders: oral cancer; odontogenic tumor; maxillofacial cystic disease; maxillofacial trauma; severe odontogenic infection; severe oral mucositis; severe dental diseases with preexisting systemic disease.

Treatment: surgery; chemotherapy; radiotherapy; medication; dental treatment; oral care.

Most of the patients with oral cancer are treated by surgery and pre- or post-operative chemotherapy and radiotherapy are given according to the specific case.

1. Surgery

Plan	Consideration	Intervention
Preoperative		
Collect patient's information on admission	Overall status Method of oral hygiene, e.g. frequency, time, toothbrush material View on oral care Acceptability for the pain	Oral care planning in hospital Preoperative oral care ・Encourage toothbrushing prior to every meal and sleeping ・Confirm oral hygiene ・Explain and teach the way of oral care
Scaling Discuss postoperative care with doctor	Plaque control status, mouth odor	* For patients taking anticoagulant, use soft toothbrush
Altered body image	In consideration of post-operative dysfunction, check the below ・Tongue range of motion ・Speech evaluation (refer to speech therapist)	Evaluate two days prior to surgery and explain to the patience way to deal with it.
Informed consent	Confirm responses of patient and his/her family members	Confirm the patient and his/her family's responses to the diagnosis, and when necessary, inform it to doctor
Postoperative		
Monitor postoperative pain	Assessment using pain score	Perform pain control under the instruction by doctor
Communication	Establish the way of communication	Establish the way of gesture,. e.g, use of pat or a piece paper
Observation of vasculized flap	Maintain blood flow Observe flap color ・Pain and swelling ・mouth odor Cervical motion	When changes, inform early to doctor and discuss the way to cope with the case Assist patient to find comfortable body position based on the instruction by doctor
Observation of breathing status after neck dissection	・Pain and swelling in the wound ・Breathing status Secure airway: tracheotomy, nasalairway	Frequent visit to check swelling and breathing status, cope with the case When changes of the patient condition, report to the doctor and discuss the earliest procedures.

Observation of overall status relating infections	・Pain, redness and swelling in the wound, e.g. intraoral, cervix, ・Oral hygiene; oral mucosa, gum, teeth ・Vital signs, WBC, CRP	Try early detection of signs; when checking vital signs and the laboratory data
Tracheostomy	Prevention against aspiration-pneumonia ・Check respiratory sound ・Check for fever ・Check saliva suction, swallowing and drainage state ・Early postoperative ambulation: ・Observe the tracheostomy site: skin, smell ・Check for sputum contamination	 Observe breath sound and for wheezing at the time of suction Observe the swallowing status Find ways for safe, comfortable ambulation Encourage handwash and disinfection to prevent infection When the wound contaminated, inform doctor and ask for advice
Tube feeding	・Observe mucosa ・Check for aspiration ・Check for sinusitis finding ・Check for diarrhea ・Check nutritional status	Assist and observe patients using the tracheal tube long period Check for diarrhea and seek ways to cope Measure weight and check, IN/OUT Check laboratory data (TP, Alb)
Oral gygiene	Confirm the method and the site of surgery and discuss ways of oral care with doctor ・Lip swelling ・Mucosa swelling	Perform oral care 4 times per day and assist patients with it, when necessary Care of drainage from mouth, humidify lips when the lip can not be closed When toothbrush can not be used: ・Use spongebrush, gargle with mouthwash ・Use oral water pick ・Support for establishing self-caring
Trismus	Assessment on trismus	Check opening range and provide mouth-opening training Psychological support Select a suitable brush for the range of mouth opening When gargling, massage mandibular joint with warm towel
Dysphagia	Assessment on food intake and dysphagia Rehabilitation (tongue, jaw, lip)	Peform assessment on food intake and dysphagia with the doctor on the ninth and four-teenth day ・Tongue range of motion ・Water drinking test ・Support when initiate swallowing (indicate how to use ‘toromiappu’ which adds biscusity to the liquid food) ・Tongue stretch ・Tongue-tip elevation exercise ・Tongue bearing exercise ・Lip and cheek massage ・Closed lip bearing exercise ・Vocal chord closing exercise ・Suckling exercise Support for the above rehabilitation

Speech therapy	Check speech state	Rehabilitation for 'hard-to-pronounce words' (Learn the speech therapy method and do it at bedside) Psychological support
Assist social reintegration	Assist temporary dischage	Psychological support ・Ask how he spent during the stay-out at home ・Grasp support by family ・Check what are the difficulties and anxieties to the patient, discuss them between the patient, medical professionals and family members.

2. Chemotherapy

Chemotherapy upsets the balance of intraoral indigenous bacteria by decreasing systemic or local defenses against infection, allowing more growth of bacteria. As a result, chronic oral lesions (periapical lesions, periodontal pocketing and impacted teeth) lead to inflammatory manifestations such as gingival swelling and pain.

1) Nursing support
   ① Oral assessment before giving anticancer drugs
   ② Side-effects of anticancer drugs
   ③ Countermeasures against infection
   ④ Oral observation when difficulties in food intake are caused by digestive manifestation
2) Oral care
   ① Brushing (select toothbrush according to the condition of the patient)
   ② Isodine gargling

3. Radiotherapy

In radiotherapy for oral cancer, when the total dose of radiation to the tumor reaches 10-20 Gy, redness and burning sensations of the mucosa can occur, progressing to erosion and ulceration. In addition, damage to the salivary glands leads to reduced salivary production, weakening oral self-cleaning function. As a result, secondary infection is likely to develop in the inflamed area, and stomatitis is likely to result when radiotherapy is combined with anti-cancer drugs.

1) Nursing support
   ① Oral assessment prior to radiotherapy
   ② Clarify side-effects of radiotherapy
   ③ Observation and assessment during radiotherapy
   ④ Prevention against infection: glycerin gargle (solution of glycerin and sodium polyacrylate in water)
2) Oral care
(1) Countermeasures against infection
   ① Brushing (use a soft brush with short handle)
   ② Aznol gargle
   ③ Care using a tongue brush
(2) Improve saliva production
   ① Brushing
   ② Azunol gargle
   ③ Apply Oral Balance

(Tomoko Tezuka, Junko Morikawa)

19. Nutritional management and oral care

"Nutritional support" means improving physical condition by improving the nutrients ingested in food, while "nutritional status" represents the physical condition resulting from food intake. Since food is ingested through the mouth, maintaining healthy oral functions facilitates to nutritional support, resulting in improved nutritional status.

Daily oral care is thus important to improve nutritional status. For patients to maintain oral hygiene, both health-care professionals and those around the patient (family and other social supports) need to be involved in oral care.

1. Nutritional assessment

Nutritional assessment means objective assessment of the nutritional status of the individual or group, and is carried out in hospitals to provide patients with nutritional care. However, evaluating nutritional status in an objective manner is not easy.

Malnutrition is the state of deficiency or excess of one or more essential nutrients, or an imbalance between nutrients. Assessment is made in an integrated manner using different methods, based on the information obtained from clinical examinations, anthropometric and clinical tests and food intake records, as changes in nutritional status in a limited area of the body do not occur and because the use of laboratory test values alone is inadequate for determining changes in status. In addition, gaining an understanding of the psychological and social aspects of the patient is also important, e.g., past lifestyle and future expectations for life.

2. Procedures for nutritional assessment in hospital

With the April 2006 revision to the Health Insurance Law, nutritional care in hospitals is now evaluated as a medical treatment fee, which is added to the payment to medical institutions. Under this system, patients undergo nutritional screening on admission and a "nutritional care plan" is made for each inpatient. For patients defined as malnourished or at risk based on the results of the nutritional assessment on admission, a more detailed nutritional assessment is undertaken. A nutritional care plan is then drawn up, involving both nutritional support and a plan for implementation of nutritional guidance individualized to the patient. Monitoring, follow-up, and reviews of nutritional support and guidance are implemented as a systematic series to achieve adequate nutritional care. The four categories needed for implementing nutritional assessment are as follows.

1) Clinical assessment

Clinical assessment provides subjective and objective information on the condition of the patient's body, gained through interviews and observations. Specifically, the following are checked: ① past/present illnesses (patient and family); ② medication history/condition; ③ vital signs (appetite, bowel movement, urination and dizziness); ④ presence of bedsores and wounds, condition of skin, nails, hair, teeth and oral cavity, and frequency of swallowing difficulties and food intake. Since mastication and creation of the bolus play important roles in oral function, evaluation and checking for the following are critical: ① swallowing (dentures, occlusion, dental fractures, caries); ② swelling and inflammation of gingiva and mucosa; ③ food debris in the mouth; ④ stomatitis, swelling, inflammation and ulceration; and ⑤ tongue (discoloration, shape).

Table 1 Signs and Symptoms of Nutritional Deficiency

Symptom or Signs		Deficiency
Skin	Dry	Zinc, vitaminA, essential fatty acids,
	Film-like	Protein
	Purpura	Vitamin C and K
Hair	Alopecia	Protein, zinc, essential fatty acids
	Curling of hair	Vitamin A
Nail	incurvated nail	Iron
Abdomen	distention	Protein, energy
Extremities	Edema	Protein, energy
Skin, Mouth	cheilosis	VitaminB_2, and B_6, nicotinic acid
	Glossitis	VitaminB_2, B_6 and B_{12}, nicotinic acid, folic acid
	Taste disorder	Zinc
	Gingivitis	Vitamin C

2) Anthropometric evaluation

Anthropometric measurement is a cheap, non-invasive method of collecting data for nutritional assessment. The required skills can be taught to almost anyone. Measurement of height, weight, mid-arm circumference, triceps skinfold thickness, scapular skinfold thickness and leg circumference is common. As a static nutritional assessment, these measurements have been adapted for senior and chronic patients, but not for acute postoperative patients.

3) Laboratory investigation

A number of physiological and biochemical methods are available for nutritional assessment. Accurate nutritional assessment relies on making full use of the characteristics of each measure. The following are important features for identifying poor nutritional status: hemoglobin, serum protein and serum albumin levels can identify poor nutrition; plasma glucose and hemoglobin (Hb)A1c levels can identify glucose metabolism disorder; total cholesterol and triglyceride levels can reveal dysfunction of lipid metabolism; AST, ALT and total bilirubin can show liver function: urea nitrogen and creatinine levels can clarify renal function, electrolytes Na, K, and Cl relate to fluid balance, and white blood cell counts and C-reactive proteins (CRP) indicate the severity of inflammatory reactions.

4) Dietary investigation

Different methods are used to assess the nutritional status in outpatients, such as 24-h recall of food intake using questionnaires and interviews, daily food records on portion size and frequency and estimated food intake. For inpatients, nutritional intake is calculated based on the amount of leftover, as quantities of food served in the hospital can be strictly controlled. Changes in the amount of food left over are thus evident. ‘Continuous evaluation on food figuration with patients’ condition of food intake is needed and with the basis of that evaluation, keeping adjustment of food figuration is also needed.

(Keiko Inoue)

20. Nutritional care management and oral care

1. What is nutritional care management?

Nutritional care management is defined as that part of the health care service aimed at realizing effective and tailored nutritional care for the individual. Such management consists of: nutritional screening; nutritional assessment; and preparation, implementation, and reevaluation of the plan for improving nutritional state. Continuously improving these components is also an important element. Individually tailored nutritional care is planned and performed based on an overall understanding of the patient's nutritional state, obtained through simple medical history-taking and the results of physical examination and blood testing, if available. In addition, regular assessment of the individual's nutritional state and continuous evaluation of the interventions being applied will contribute to a healthy life expectancy with an emphasis on the quality of daily life.

In more recent years, emphasis in clinical practice has been placed on providing treatment and management that takes into account the preferences of the patient and their family, without sacrificing quality of life. This approach is equally valid in the area of nutritional management. Top priority is given to achieving a cure through "safely enjoying a good meal". We therefore believe that it is extremely useful not only for caretakers and medical care providers, but also for those involved in patient care to know about oral care and acquire adequate familiarity with the necessary techniques.

Here we describe the practical aspects of nutritional care management performed with long-term care services and in hospitals.

2. Nutritional care management with long-term care services

In October 2005, following revisions to the provision of long-term care services, "Nutritional management system fee", "Nutritional management fee", and "Oral intake shift fee" were created. From April, 2006, a new system emphasizing prevention of severe diseases through "nutritional care management" and "oral function improvement" was implemented within the framework of "New prevention benefits". This system includes approaches related not only to nutritional state, but also to improvement of motor function and prevention of social isolation, dementia, and depression. These are all means to encourage the elderly to participate in society. At the same time, methods of care for daily physical exercise and training for activities of daily living at "day services" were revised. This enabled care recipients to get out and socialize more.

In fact, for the population over 65 years old, holding local educational activities aimed at improving nutritional status is recommended. These activities should be advertised through posters or events. Identification of elderly individuals at risk of requiring long-term care using a basic check list (Table 1), and preparation of a long-term care plan is also recommended. In particular, individuals with a body mass index (BMI) below 18.5 or serum

Glossary:

"New preventative benefits": Long-term care insurance system for elderly individuals requiring support and long-term care type 1 for whom the necessity for long-term care is relatively low (referred to as "Person requiring support type 1 and 2" in the new system)

"Elderly individuals at risk of requiring long-term care": Elderly individuals more than 65 years old who will most likely require long-term care services in the near future, but who do not need such services now.

albumin level under 3.5 mg/dL, and who have lost more than 2-3 kg in the last 6 months (as mentioned in the basic check list), are considered to be at high risk of nutritional impairment. Such individuals require adequate nutritional care.

Elderly individuals with a relatively low requirement for long-term care are also supplied with adequate rehabilitation and nutritional management, if they are considered at risk according to the basic check list. This is to prevent the need for long-term care from arising. The required amount of energy, protein and liquid (to prevent dehydration) is calculated, and a management plan that enables the patient to achieve this calculated intake is proposed. Periodical evaluation is needed to identify changes in nutritional status and improve the management plan.

Table 1 Check List

No.	Question	Answer	
1	Do you go out by bus or train alone?	Yes	No
2	Do you buy your daily necessities?	Yes	No
3	Do you put savings in and out?	Yes	No
4	Do you visit your friend?	Yes	No
5	Do you accept consultation of your family or friend?	Yes	No
6	Can you go up the stairs without holding on handrail or wall?	Yes	No
7	Can you stand up without holding on something from the state of sitting on a chair?	Yes	No
8	Can you walk for 15 minutes?	Yes	No
9	Did you fall down in last one year?	Yes	No
10	Is your anxiety for falling down large?	Yes	No
11	In last six months, did your weight decrease more than 2 or 3kg?	Yes	No
12	Height cm Weight Kg (BMI)*		
13	Are you hard to eat something hard as compared it six months ago?	Yes	No
14	Are you choked on tea or soup?	Yes	No
15	Are you worried about oral thirst?	Yes	No
16	Do you go out more than once a week?	Yes	No
17	Does your number of going out decrease in comparison with the last year?	Yes	No
18	Are you noted forgetfulness by the circumferences? For example, you ask always the same thing and others.	Yes	No
19	Can you search the phone number and call by yourself?	Yes	No
20	Do you lose today's date?	Yes	No
21	You don't have a sense of fulfillment toward every day life (in last two weeks).	Yes	No
22	You can't enjoy the thing you were pleasant till now (in last two weeks)	Yes	No
23	The thing you can do it easily becomes troublesome (in last two weeks).	Yes	No
24	You can't think yourself to be useful (in last two weeks)	Yes	No
25	You feel tired for no reason (in last two weeks)	Yes	No

＊ BMI(= Weight (kg) ÷ Height (m) ÷ Height (m)) < 18.5

MEMO 1 Additional nursing care and medical treatment for nutritional management

＜Sanatorium Medical Facility for the Elderly Requiring Long-Term Care, Long-Term Care Health Facility, Public Aid Providing Long-Term Care to the Elderly＞

1. Nutritional management system fee: When a regular administrative dietitian or dietitian is assigned to more than one elderly person in long-term care:
   Administrative dietitian placement fee → 12 units/day
   Dietitian placement fee → 10 units/day

2. Nutritional management fee: When we perform nutritional management of the resident in collaboration with various types of medical staff to assess nutritional status in elderly individuals under long-term care:
   Nutritional management fee → 12 units/day

3. Oral intake shift fee: When we perform nutritional management based on instructions from a doctor to promote oral intake in elderly individuals under long-term care who are taking nutrients by intubation (parenterally):
   Oral intake shift fee → 28 units/day (180-day limit)

4. Oral intake maintenance fee: When the elderly individual in long-term care needs continued special management to prevent aspiration, in addition to meeting the following criteria:
   ① Eating and swallowing function has been adequately evaluated by medical staff.
   ② A risk management regime for aspiration has been implemented
   ③ Appropriate care to prevent aspiration has been accomplished
   Oral intake maintenance fee type I → 28 units/day (180-day limit as a general rule)
   Confirmation by video X-ray cystography or endoscopy is necessary
   Oral intake maintenance fee type II → 5 units/day (180-day limit as a general rule)
   Confirmation using a water-drinking test or other method is necessary

＜Long-Term Outpatient Day Care, Outpatient Rehabilitation for Preventive Long-Term Care＞

5. Nutritional improvement fee: When we perform appropriate nutritional management based on a nutritional plan for malnourished elderly individuals that an administrative dietitian has made in cooperation with nursing care or medical staff
   Nutritional improvement fee → 100 units/month

6. Oral function improvement fee: When we make a plan for oral function improvement and dental hygienists perform appropriate management based on this for elderly individuals with decreased oral function or fear of dental treatment
   Oral function improvement fee → 100 units/month

＜Medical Insurance Medical Fee＞

7. Nutritional management enforcement fee: When we perform nutritional management during hospitalization using a team consisting of various types of medical staff led by an administrative dietitian
   Nutritional management enforcement fee → 12 points/day

3. Nutrition Support Team (NST) - Nutritional care management in the hospital

A NST is a means to achieve nutritional care management by combining the knowledge and technique of various professions. These professions include medical doctors, nurses, dietitians, pharmacists, physical therapists, and speech-language-hearing therapists. In Japan, this concept was introduced by Higashiguchi and colleagues time in 1998, at Suzuka Central General Hospital in Mie. Use of this approach has now spread to 983 hospitals around the country.

Until recently, a system to manage nutritional condition for each patient was lacking in Japan. The introduction of NSTs has had various effects, such as reducing the time needed for patient recovery and the frequency of surgical complications.

In April 2006, the “Nutritional management enforcement fee” was authorized as a fee-for-service, allowing nutritional management for all patients using a NST led by dietitian on hospitalization to create, enact and evaluate a plan. The method used here resembles that used in long-term care management. However, since tests and procedures are handled by experts, more finely tuned and effective management becomes possible. Please refer to the details at our homepage (http://www20.atpages.jp/hospynst/).

4. Nutritional care management and oral care

The relationship between nutritional care management and oral care might be considered to mainly involve rehabilitation of eating-swallowing functions, but oral care is essential for nutritional management, which attaches great importance to “eating”. Many reasons are given for this emphasis, including reducing the risk of aspiration pneumonia by oral care, promoting appetite by addressing oral pain and discomfort, and preventing secondary infections by the bacteria in the oral cavity. With appropriate oral care, we often find that that the elderly regain a sense of rhythm in their daily life and show an improved degree of self-reliance clinically.

In the Japanese Society of Oral Care, we are promoting the organizational concept of the oral care team (OCT) and expect this idea to spread throughout Japan in the near future.

(Yuuki Takeuchi, Yuko Tomomatsu)

II Tooth brushing

21. Selection of a toothbrush

1. Sections of the toothbrush

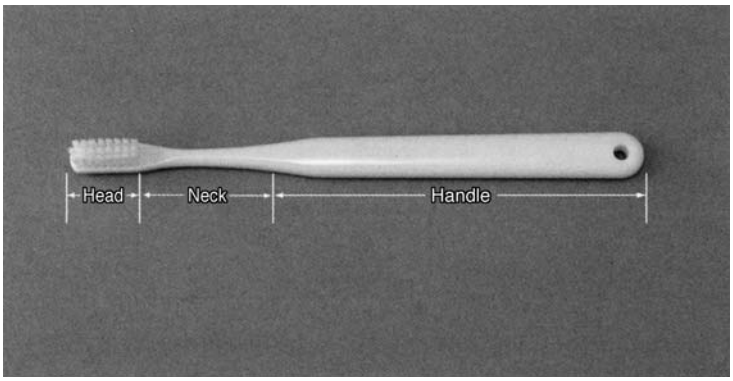


Photo. 1 Selection of a toothbrush

1) Head: Section to which bristles are fixed
2) Handle: Section gripped by the hand
3) Neck: Section between the head and handle

Selection of a toothbrush that meets the specific needs of the individual is important. Here we give information on how to select the best toothbrush.

2. Key points for selecting the best toothbrush

1) Types of bristles

(a) Thick bristles

Bristles are fixed thickly to the head (in many rows), so that plaque can be removed efficiently. However, the bristles do not dry rapidly. Care must therefore be taken to keep the bristles as dry as possible.

(b) Thin bristles

As the bristles are fixed sparsely (in about three rows of around 24 holes in total), water readily drains away to allow rapid drying.

2) Bristle material

(a) Natural bristles

Natural bristles such as swine bristles are thick and absorbent, taking a relatively long time to dry. Such bristles are thus likely to become dirty in colonized by bacteria. These bristles are not particularly elastic or resilient.

(b) Nylon bristles

The bristles show little absorbency, thus drying easily and remaining hygienic. These bristles are strongly resilient and elastic.

3) The end of the bristle

Good bristles for brushing teeth are round-cut bristles, and tapered-cut bristles in which the end become thinners to allow easy insertion into the gingival sulcus (gingival pocket).

4) Bristle stiffness

Broadly speaking, there are three kinds of stiffness: soft; medium; and hard. While bristles that are too

soft cannot remove plaque well because of their pliability, bristles that are too stiffness cause damage to the gums. Medium bristles are thus considered suitable for most people.

Selecting a suitable stiffness to meet the needs of the individual is important. Dentists and dental hygienists can provide advice on suitable bristle stiffness.

3. Key points for selecting the best toothbrush for different age groups

1) For babies and infants

Usually, a parent cleans the teeth of the infant. A toothbrush with a small head and slender, long neck to fit a small mouth is thus suitable.

Toothbrushes used by infants should have a thick handle to allow the infant to achieve a firm grip, and strong and resilient bristles are needed.

2) For children

Toothbrushes with a small head and thick handle that can be firmly gripped are recommended. These toothbrushes can be easily manipulated even in the complicated conditions of a mouth with mixed dentition. A neck slightly longer than that for infants is also recommended, as the adult molars that erupt first appear behind the baby molars.

3) For adults

The head of the toothbrush should be of a size that can be guided smoothly into the lingual side of the front mandibular teeth.

4) For elderly people

Bristles with a soft end and a thick, light and easily gripped handle are recommended. For people who have trouble with fine motor control of the hands, an electric toothbrush is a useful option. Electric toothbrushes also display rehabilitative effects, with the vibrations stimulating muscles inside and around the mouth.

(Rieko Toyoshima)

22. Kinds, effects and usages of dentifrice

1. Kinds of dentifrice

According to "The Guidelines for Health Guidance of Oral Cleaning" published from the Dental Health Division of the Japanese Ministry of Health, Labour and Welfare, tooth paste is referred as "a material for increasing effects of tooth cleaning with a toothbrush. The material is usually compounded with chemical substances that have effects on not only tooth cleaning, but also preventing and controlling dental diseases and on eliminating bad breath". The Pharmaceutical Affairs Act of Japan classifies toothpaste into the following two categories:

1) Standard toothpaste (Cosmetic toothpaste): comprising basic ingredients alone
2) Medicinal toothpaste (Quasidrug toothpaste): comprising basic ingredients with therapeutic ingredients showing pharmacological and biochemical effects.

Table 1 shows ingredients and actions of toothpaste.

Table 1 Ingredients and actions of toothpaste

Ingredients			Actions
Therapeutic ingredients	Fluoride Anti-inflammatory agent Antibacterial agent Enzyme etc.		Each therapeutic ingredient shows efficacy and effects based on the function.
Basic ingredients	Abrasives	Calcium hydrogen phosphate Aluminum hydroxide Silicic anhydride, Calcium carbonate, etc.	Abrasives can remove dirty stuffs such as tooth plaque and stains from teeth surfaces without damaging teeth surfaces.
	Wetting agent	Glycerin Sorbitol, etc.	Wetting agents give proper moisture and plasticity to toothpaste.
	Expanding agent	Sodium lauryl sulfate, etc.	Expanding agents help toothpaste spread throughout the mouth and washing the dirt off from the mouth.
	Binder	Carboxymethylcellulose Sodium alginate Carrageenan, etc.	Binders bind powder with ingredients of liquid to retain a shape of toothpaste or to add proper viscosity to toothpaste.
	Flavor	Saccharin sodium Menthol A group of Mint, etc.	Flavor creates harmony between odors. It adds freshness and fragrance to toothpaste so that toothpaste can be used without distaste.
	Coloring agent Preservative	Legal dyestuff A group of Paraben Sodium benzoate, etc.	Coloring agent beautifies appearance of toothpaste. Preservative protects against deterioration.

Dentifrices are classified into six forms: a) toothpaste; b) gel dentifrice; c) liquid dentifrice; d) mouthwash; e) wet powder; and f) powder. The most commonly used dentifrice is toothpaste. Except for mouthwash, these dentifrices are put onto a toothbrush to clean the teeth and massage the gums. Mouthwash is used for "rinsing" the mouth without using a toothbrush (Table 2).

Table 2 Kinds, forms, and usage of dentifrice

Kind			Usage	
Form	Property	Container	Whether it is used with a toothbrush	Purposes
Kneaded	Paste	Tube, pomp, others	Yes	Cleaning teeth and the gums, and massaging the gums
Gel	Viscous liquid	Bottle, others	Yes	Cleaning teeth and the gums, and massaging the gums
Liquid	Liquid	Bottle, jar, others	Yes	Cleaning teeth and the gums, and massaging the gums
Water (Mouth wash)	Liquid	Bottle, jar, others	No	Rinsing the mouth
Wet powder	Wet powder	Can, bag, jar, others	Yes	Cleaning teeth and the gums, and massaging the gums
Powder	Powder	Can, bag, jar, others	Yes	Cleaning teeth and the gums, and massaging the gums

2. Effects and usage of dentifrices

The effects of the basic ingredients of dentifrices are included in Table 1 The next important subject is thus the therapeutic ingredients. MEMO 1 shows the commonly used therapeutic ingredients and their effects.

MEMO 1 Therapeutic ingredients of dentifrice and their effects

- Fluoride (sodium fluoride, sodium monofluorophosphate, stannous fluoride): Prevention of dental caries, promotion of enamel recalcification
- Dextranase: Enzyme promoting decomposition of dental plaque
- Chlorhexidine: disinfection of oral surfaces and prevention of plaque formation
- Allantoin: Convergence of the gums and anti-inflammatory agent
- Tranexamic acid: Anti-inflammatory agent and antiplasmin
- Strontium chloride: Control of tooth sensitivity.
- Sodium chloride: Strengthening blood circulation, convergence, and prevention of edema
- Lysozyme chloride: Anti-inflamatory agent of the gums.
- Tocophenol acetate: Strengthening resistance of blood vessels and maintaining good blood circulation
- Pyro (poly) phosphate: Prevention of tartar build-up

The kinds of toothpaste users should select differ depending on what diseases need to be prevented. Toothpastes with fluoride and dextranase are appropriate for preventing dental caries. To minimize the development of periodontal diseases, toothpastes compounded with chlorhexidine and tranexamic acid should be selected. Labels showing the ingredients should be referred to when purchasing toothpaste. Effects of toothpaste are shown in Table 3 and Fig. 1 and 2.

A key issue is the quantity of toothpaste that should be used each time. A common recommendation is about 1/3 to 2/3 the length of the toothbrush head, although this varies depending on the length of the toothbrush. An insufficient amount of toothpaste will obviously not provide sufficient effects, but too much toothpaste fills the mouth with foam and a refreshing taste that may create the false impression that the teeth have been sufficiently cleaned.

Table 3 Performances or effects of toothpaste

A group of toothpaste* (Cosmetic toothpaste)	A group of medicinal toothpaste** (Quasi-drug toothpaste)
Removing dental plaque	Preventing periodontitis and gingivitis
Preventing tartar	
Preventing dental caries	Preventing tartar
Preventing bad breath	Preventing dental caries
Removing tar from the surface of teeth	Preventing bad breath
Whitening teeth	Removing tar of tobacco from the surface of teeth
Cleaning the mouth	■ Preventing and removing dental plaque
	■ Preventing bleeding
	■ Controlling a pain in decayed tooth

* Manufacturing companies must get examination of and obtain an approval for the toothpaste concerning kinds, standards, and the compounded quantity of row materials from the competent authority.
** Manufacturing companies must obtain an approval for the medicinal toothpaste concerning performances and effects, usage, dosage, standards, and methods of tests in addition to the above items from the competent authority.
■ Manufacturing companies must get examination of and obtain an approval for these performances of the medicinal toothpaste from the Investigation Committee on Dental Drugs and the Investigation Committee on Safety of Cosmetics and Quasi-drugs at the Central Pharmaceutical Affairs Council.

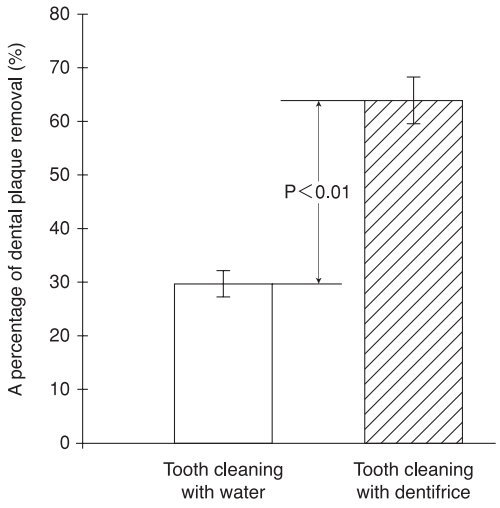


Fig. 1 An effect of dentifrice on dental plaque removal. Dentifrice has a higher percentage in removing dental plaque than water alone

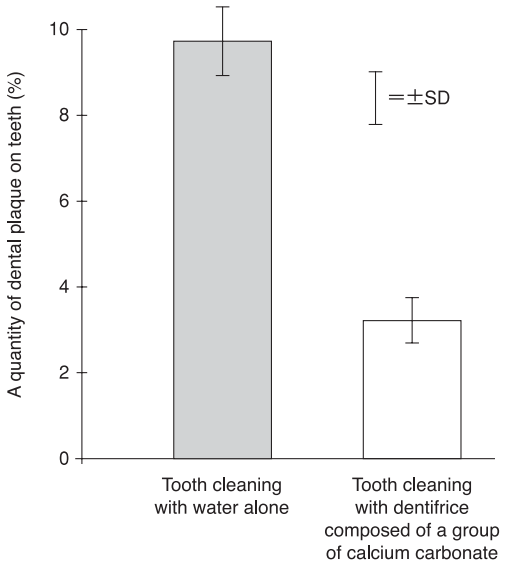


Fig. 2 Efficacy of dentifrice with a group of calcium carbonate for preventing dental plaque. Dentifrice composed of calcium carbonate has higher efficacy in preventing dental plaque than water alone

(Toshikazu Yasui, Yoshiaki Shimizu)

23. Interdental brush

1. Types

Interdental brushes are generally wire with a nylon brush, resembling a pipe cleaner. There are differences in standardization among manufacturers. Brushes are categorized into five size classes (SSS, SS, S, M, and L)

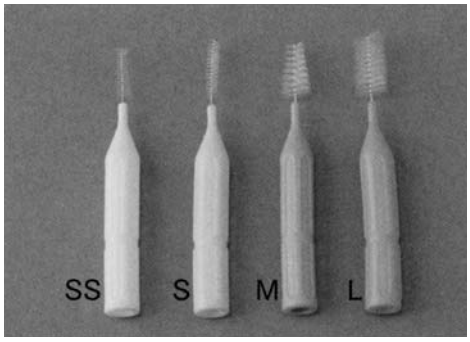


Photo. 1 Type of inter dental brush
① minim passage: SS (0.8mm), S (1.2mm), M (1.8mm), L (2.3mm)
② thickness of brush: SS (2.6mm), S (3.2mm), M (4.5mm), L (5.9mm)
③ diamitar of wire: SS (0.5mm), S (0.5mm), M (0.7mm), L (0.7mm)
④ the quality of the matenal of wire: ultra hardness stenless
⑤ A heat-resistance test: 80℃
⑥ the quality of the matenal of brush: nylon

2. Effect

Cleaning between the teeth is useful. A comparison of tooth cleaning between a standard toothbrush and an interdental brush showed dental plaque extraction ratios of 58% and 95%, respectively. Separation of teeth was improved and tooth mobility was reduced in patients using interdental brushes.

3. Method of use

The space between teeth and bridges is often teeming with bacteria and food fragments. Interdental brushes allow cleaning in these spaces, removing plaque that can't be reached with a normal toothbrush.

The interdental brush is inserted at the front of the teeth where the gingiva begin, using slow movements to clean. The interdental brush needs to remain parallel with the gingiva between the teeth with the stress at the tip of brush. The back side of the teeth can also be cleaned.

Though the root of interdental brush is easy to break, you do not break it if you hold little to the base of wire in the way of holding a pencil.

The average interdental space is 0.80±.22 mm, and is the same for the top and bottom of the teeth, and for the premolar, anterior and molar teeth. However, poor interdental condition of the gingiva and gingival retraction result in a widened interdental space.

When first using an interdental brush, patients with no gingival retraction should use the SS size. Patients with moderate gingival retraction should use a larger M or L size.

Selection of a good interdental brush requires consultation with the dentist and dental hygienist. Use of an incorrect interdental brush can lead to gingival retraction.

Misuse of an interdental brush can result in injury to the interdental gingiva. After use, the interdental brush should be washed and dried.

(Yoshitaka Toyama, Tomoki Kato)

24. Electric toothbrushes and water current-type oral washing

1. Electric toothbrushes

Plaque control is important for preventing caries and periodontitis. However, adequate brushing pressure and brush strokes are needed for effective brushing by hand. This requires a certain degree of manual dexterity and an understanding about how to brush. The electric toothbrush came into use in the 1960s as an instrument allowing anyone to brush correctly.

The handle of the electric toothbrush contains a small motor, which can be turned on using a switch. Initially, electric toothbrushes used the vibration and rotation of the brush to remove plaque. Electric toothbrushes using sonic or supersonic waves have recently been developed and are becoming widespread.

Table 1 tyep of electric toothbrush

type	trade name	maker	price(JPY)	price of spare brush	Exchange time
electric toothbrush	Brown 3D	Brown	14,000 yen	1,000 yen	change the color
sonic toothbrush	Sonicare	Mitsui & co., Ltd	16,000 yen	3,000 yen	6 month
	Doltz	National	open pricing	500 yen	3 month
	PRINIA	GC	9,500 yen	900 yen	3 month
supersonic toothbrush	Ulnima	TORAY	18,000 yen	1,200 yen	every month
	DENT EX	Lion	15,800 yen	1,100 yen	

1) Various kinds of electric toothbrush have entered the market (Table 1). Speed of rotation and strength of vibration can often be adjusted. Other features can include:

Timer function
Washable main body
Small brush is attached

Table 2 kind of toothbrush

type		effect	how to use
moving brush	electric brush	rotary and vibration	touch the brush to the surface of tooth
	sonic brush	vibration and sonic wave	touch the brush to the surface of tooth
no-moving brush	supersonic brush	supersonic wave	moves by the hand

(1) Moving brushes

① Electric toothbrush (Photo. 1: conventional electric toothbrush)

Many types of movement are used, including whole brush-head rotation, brush-bundle rotation, and horizontal and vertical movements. Bristles move at 3,000-7,000 rpm to mechanically remove plaque.

② Sonic toothbrush (Photo. 2)

The brush vibrates at high velocity, at about 30,000 oscillations/min, and plaque is removed mechanically. Energy from the vibration is absorbed by bacteria, and the effect reportedly reaches 2-3

mm ahead of the brush head. Few investigations have examined this kind of brush, but the mechanical actions seem about as effective against plaque as those from electric toothbrushes.

(2) Non-moving brushes

① Supersonic brush (Photo. 3)

A supersonic wave at a frequency of 1.6 million Hertz is generated from inside the brush. This kind of brush was developed to promote the recovery of periodontal tissue. The supersonic wave acts to separate clumps of bacteria, and making plaque easier to remove from teeth. However, because little vibration is created by the supersonic wave toothbrush, plaque may remain difficult to remove. Manual movement of the brush as for a normal toothbrush is needed to optimize use (Photo. 1-3).

Photo. 1 conventional electric toothbrush

Photo. 2 sonic toothbrush

Photo. 3 supersonic brush

2) Adaptation

(1) Moving brush

Conventional electric and sonic toothbrushes require less time than standard toothbrushes, and the removal effect against plaque is also high. These brushes are easy, although the main body is heavy. The electric toothbrush is suitable for busy or clumsy individuals, children, senior citizens, and those with physical conditions affecting the hands. As the vibrations are strong, individuals who cannot grip the toothbrush cannot use it. An ability to understand the usage of a basic electric toothbrush (how to turn on the switch, etc.) is necessary.

(2) Non-moving brush

A person who can use a standard toothbrush can use the supersonic wave toothbrush. For instance, patients who have finished treatment for periodontitis are suitable.

(3) Stimulation training using the electric toothbrush

Use of an electric toothbrush is more effective for patients with sensation disorders of the tongue and buccal mucosa. Rehabilitation can be achieved by vibratory stimulation of the soft tissues. The salivary glands are also stimulated, promoting salivary flow in patients with dry mouth (Photo. 4, 5).

Photo. 4 how to contact the brush on the buccal mucosa

Photo. 5 how to contact the brush on the tongue

3) Method of use

Guidance from the dentist and dental hygienist is needed.

(1) Moving brush

① How to hold the toothbrush: Grip the handle of the toothbrush and turn on the switch after putting the toothbrush into the mouth. The vibration and sound are strong, transmitting even to the handle. Until the patient becomes accustomed to using an electric toothbrush, the sensations associated with use, may be disconcerting.

② How to place the head in contact with the tooth: The bristle end of the toothbrush is appropriate for application to the teeth. The boundary and interdental areas of teeth and gums are watched.

③ How to move the toothbrush: The head of the toothbrush is lightly touched on the tooth, and is moved to another tooth after an interval of 4-5 seconds. The vibrations are disturbed when turning the head too suddenly, and the bristles shift from contact with the teeth. The hard back of the toothbrush head might then knock against the teeth, potentially causing damage. When using it for nursing, we need to be cautious if frail elderly feels uncomfortable.

④ Duration of brushing: No specific recommendations have been made regarding the amount of time to brush the teeth. It is important to polish every tooth, but it should be cautious not to be brushed as much as the gums damaged. Tooth wear and gingival retraction can result from polishing for a long time, as the electric toothbrush vibrates at high speed.

⑤ Toothpaste: Use of toothpaste with an electric toothbrush is basically unnecessary. The brush only needs to contain water. Toothpaste containing abrasive components may readily damage the teeth due to the high-speed vibrations and rotation. If using toothpaste, avoid those with abrasive components. Liquid and gel-type toothpastes are thus preferable.

⑥ Stimulation of the tongue and buccal mucosa: To avoid damaging the tongue and mucosa, stimulation is given using the hard back of the toothbrush head.

(2) Non-moving brush

The supersonic toothbrush does not remove plaque by vibration. The toothbrush thus needs to be moved manually to remove plaque.

4) Notes

① Patients with implantation of a cardiac pacemaker should consult with the doctor, because electromagnetic radiation is generated by the supersonic toothbrush.

② Do not use the supersonic toothbrush which is an electronic in the bathroom, where it is a shock hazard.

③ You may use the interdental brush and dental floss, as the supersonic toothbrush cannot clean the interdental spaces.
④ Brushes need to be exchanged regularly. Confirm the price and place of purchase to allow easy exchange.
⑤ Choose the supersonic toothbrush carefully when using it for a person who needs nursing.

2. Water jet oral irrigator

Water in the tank is released from the nozzle as a jet of water, washing the mouth. Plaque and food can both be removed by this water jet (Photo. 6, Table 1). In addition, stimulation effects of massaging the gingiva can be expected. However, dental plaque attached to the teeth firmly is not removed. Pleasant stimulation and cleaning of the mouth can be obtained by patients requiring long-term care who cannot gargle by flushing the mouth with the jet of water.

Confirmation is needed regarding swallowing function, to prevent aspiration. The irrigator should be used in the bathroom or with a bowl to spit water into. An easy posture to take for gargling is to sit and bend forward. Close attention must be paid to the direction of the nozzle, to avoid choking the patient with water. Wrapping a towel around the patient's neck can keep the patient dry. Using the irrigator with an aspirator is advisable for bedridden patients.

Photo. 6 Jet brush (BRAUN corporation)

Table 3

trade name	maker	price(JPY)	Feature
Oral B oxijet irrigator MD18	Brawn	18,000 yen	It's possible to change the rotation current and the direct current. It occur the micro bubble
HYDROFLOSS	Weltec	15,800 yen	1,200 rpm/min pulsation of water jet and ion water
Doltz jet washer	National	13,900 yen	1,600 rpm/min water beat
Elepick HT-J202	Omron	15,000 yen	tank has 750ml capacity
Porutadent G-1	RICOH ELEMEX	13,800 yen	1,800 rpm/min pulsation of water and brush nozzle

Photo. 7 The position to using the jet oral brush

(Yoshiko Namba, Hidemi Yoshimasu)

25. Tooth Cleaning Aids

Two major oral diseases, cavities and gingivitis are caused from adhesion of dental plaque. When plague is left at occlusal surface, interdental space and neck of the teeth, cavities and gingivitis can develop. To prevent caries and inflammation of the gums, efficient removal of plaque from the teeth needs mechanical and chemical devices. Plaque is usually removed mechanically with a common toothbrush. However, complete removal of plaque only with a toothbrush may be difficult, as plaque can be present in the interdental spaces, on isolated teeth, and on prosthetic appliances. Using a toothbrush together with tooth-cleaning aids (Photo. 1) can thus be recommended.

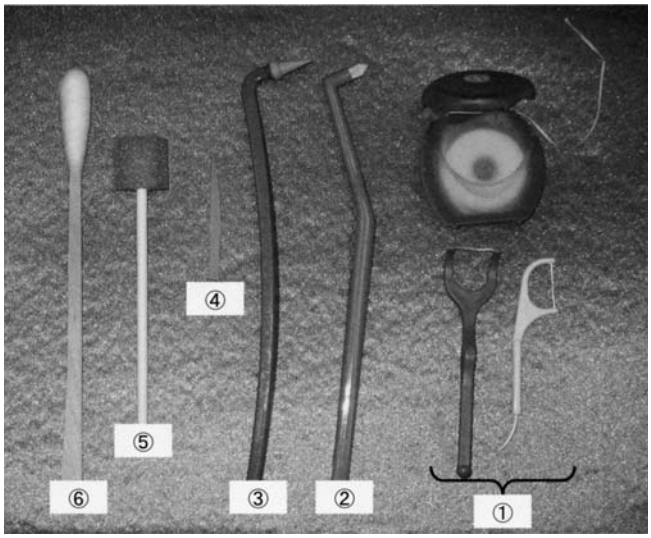


Photo. 1 Variety of tooth cleaning aids from the right to left
① dental floss ② point brush ③ rubber tip
④ interdental stimulator ⑤ sponge brush
⑥ cotton swab

Various dental cleaning aids can be used as mechanical tools for plaque control.

1) Purpose

These are used to remove plaque from locations that a toothbrush cannot access.

2) Remark

Choosing a tool suitable for the individual oral state, understanding how to use the tool, and knowing the risks and benefits of each tool.

3) Variety of tooth cleaning aids

① Dental floss
② Interdental brush
③ Point brush (Interspace brush, One-tuft brush)
④ Rubber tip
⑤ Interdental stimulator (wooden interdental stimulator (stimulator), dental toothpick)
⑥ Oral irrigation device (jet spray, jet stream irrigation device)
⑦ Others (sponge brush, cotton swab)

1. Dental floss

1) Types

* Waxed type
* Unwaxed type

2) Features

Various types of dental floss are commercially available, such as:

flavored nylon floss;
fluoridized floss;
floss with whitening agents;
floss with differing thickness, number of fibers or twisting;
floss that swells with absorption of water

3) Purpose

Floss is used when an interdental brush cannot remove plaque adhering to the surface of teeth, in the gingival sulcus, or in periodontal pockets. Floss is also used for cleaning the basal surface of a pontic. Cleaning teeth with floss is difficult, however, in case that the tooth surface is not smooth.

4) Use

Waxed floss is used for tight spaces between teeth. Unwaxed floss is used for examination of caries at the sides of teeth and for application of fluoride to teeth.

5) Risks

If teeth are rubbed strongly with floss, the interdental papilla can be cut with the floss. A sharp downward thrust into the gingival sulcus or periodontal pockets may damage the periodontium.

6) Three methods for using floss

① Spool method, wrapping the end of dental floss around the middle finger of each hand (Photo. 2)
② Circle method, tying the ends of the dental floss together, forming a loop (Photo. 3)
③ Holder method, using a ready-made holder (Photo. 4)

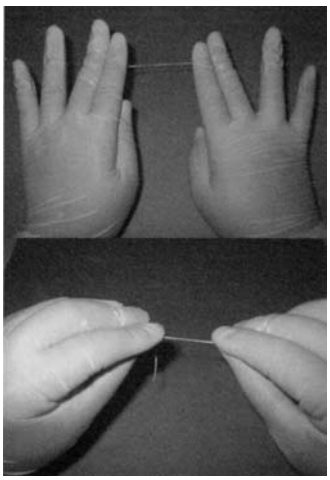


Photo. 2 Spool method

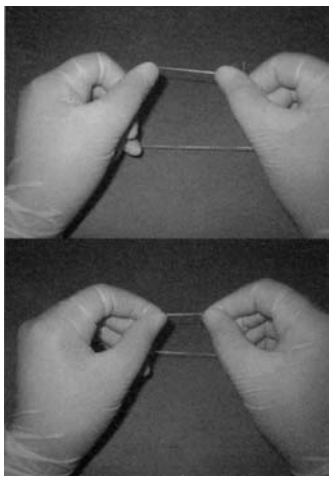


Photo. 3 Circle method

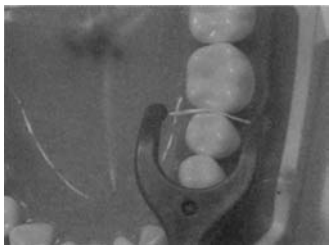


Photo. 4 Holder method

7) How to manipulate floss (Photo. 5)

(1) Spool method

Cut off the necessary length (about 40-60 cm) of floss. Wrap each end of the floss around the

right and left middle fingers, and grip the floss with the thumb and forefinger of each hand. The length of floss between the hands is 2-3 cm. Guide the floss into an interdental space.

(2) Circle method

Tie each end of the floss to form a loop about 10 cm in diameter. Grip the loop with the middle, the ring finger, and little fingers, and hold the floss with the thumb and forefinger. Distance between the hands is the same as in the spool method.

① In principle, floss is manipulated in the same manner for the spool, circle, and holder methods.

② Move the floss up from the subgingival to supragingival margin, scrubbing plaque off the side of the teeth.

③ Curve the floss around the proximal surface of a tooth to scrape plaque off. Next, repeat this procedure for the distal side. Clean corners between the tooth and gum.

④ After removing the floss from the interdental space, wind the used section of the floss up and repeat the above procedures using a clean section of floss. When the floss has a holder, wipe the plaque from the floss using cotton or gauze before using again.

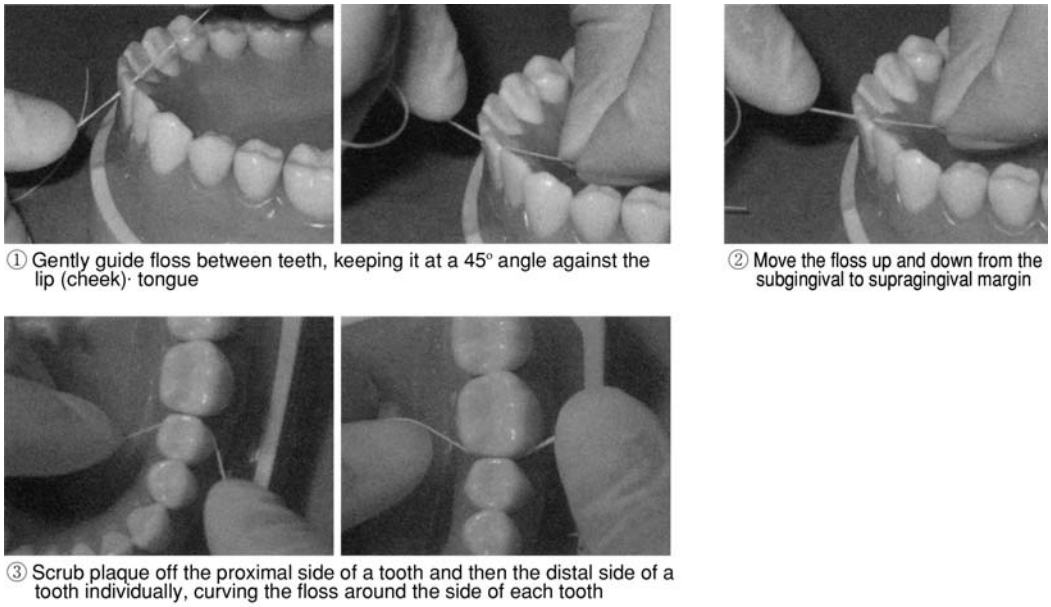


Photo. 5 How to manipulate floss

2. Point brush (interspace brush, one-tuft brush) (Photo. 6)

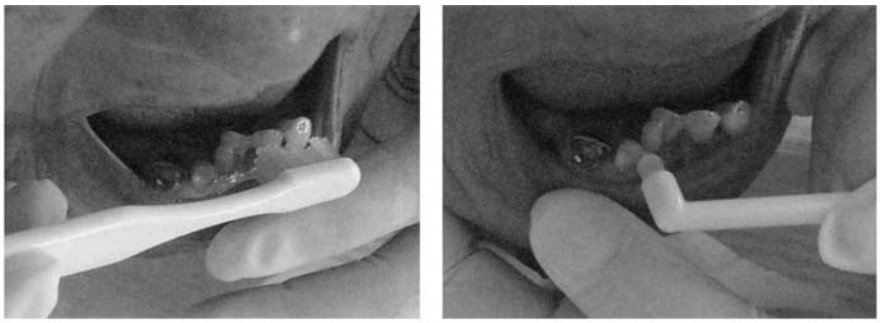
1) Features

Point brushes are used for surfaces that are difficult to reach with a common toothbrush, such as teeth in malalignment, isolated teeth, morphologically abnormal crowns, erupting adult teeth, areas around orthodontic and prosthetic appliances, and reparative appliances.

2) How to manipulate a point brush

① Press the tuft of bristles on the surface of the side of the tooth and papillary region, and move up and down 2-3 times, to remove plaque.

② Brush with small vibratory movements on the surface of the side of tooth, to provide effective massage to the papillary region.



Point brushes are suited for surfaces of teeth where a tip of common toothbrush is difficult to reach

① Move a point brush up and down repeatedly with bristles moving along the surface of a tooth

② Massage the papillary region with small vibratory movements

Photo. 6 How to manipulate a point brush

3. Rubber tip

1) Features

A rubber tip is a piece of small conical rubber used for massaging the interdental papilla and for correcting gingival morphology. A rubber tip is not useful for cleaning interdental spaces.

2) Risks

Too much pressure against the gums or improper manipulation may damage the gum.

3) How to manipulate a rubber tip

Ease the rubber tip into the interdental space and vibrate the papillary region for several minutes, pressing the tip at a an angle of 45° to the tooth axis.

4. Interdental stimulator (stimulator, dental toothpick)

1) Features

Interdental stimulators are wooden or plastic products like a toothpick with a cross-section in the shape of an isosceles triangle. The stimulator is inserted between teeth to clean the interdental spaces.

2) Risks

Inserting with too much force or at an incorrect angle makes a concavity or excoriation on the gum in the interdental space. Improper manipulation may push plaque from the supragingival margin into a pocket.

3) How to manipulate an interdental stimulator

Like the rubber tip, insert the tip of the stimulator between the teeth, keeping at angle of 45° to tooth axis, and remove plaque and trapped food, while gently vibrating the papillary region.

5. Others (sponge brush, cotton swab)

1) Features

These tools are used for disabled individuals and children. They are suitable for removing trapped food and cleaning the mucous membranes. A cotton swab is a disposable wooden stick with cotton

wrapped around the end. This tool is used for removing relatively large food residual. A sponge brush is suitable for removing small material and for cleaning the tongue and palate. There are different type of sponge. Some sponge brushes have a plastic handle, while others have a toughened cardboard handle.

2) Risks

The sponge brush or cotton swab soaks up water. Care should be taken not to pool in the oral cavity.

3) How to manipulate the sponge brush (Photo. 7, 8)

① Soak the sponge in water until it softens, then squeeze to remove excess water.

② Absorb the water still in the sponge with a paper towel.

③ Insert the sponge brush until reaching the back of the oral cavity, keeping soft tissues out of the way with the fingers, then clean the oral cavity.

④ Wipe the waste material from the sponge with a paper towel.

⑤ Repeat steps ②-⑤. If dried secretions or other materials remain stuck to the tongue and palate, moisten these substances well with the sponge, then remove once loosening is achieved.

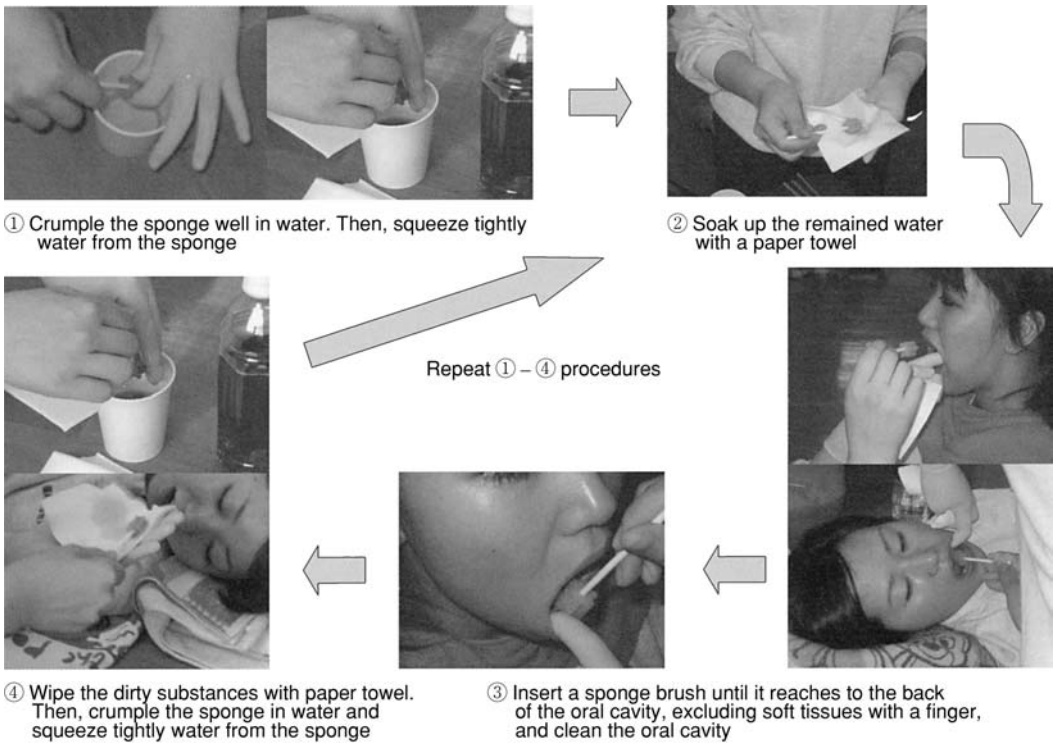


Photo. 7 How to manipulate sponge brushes

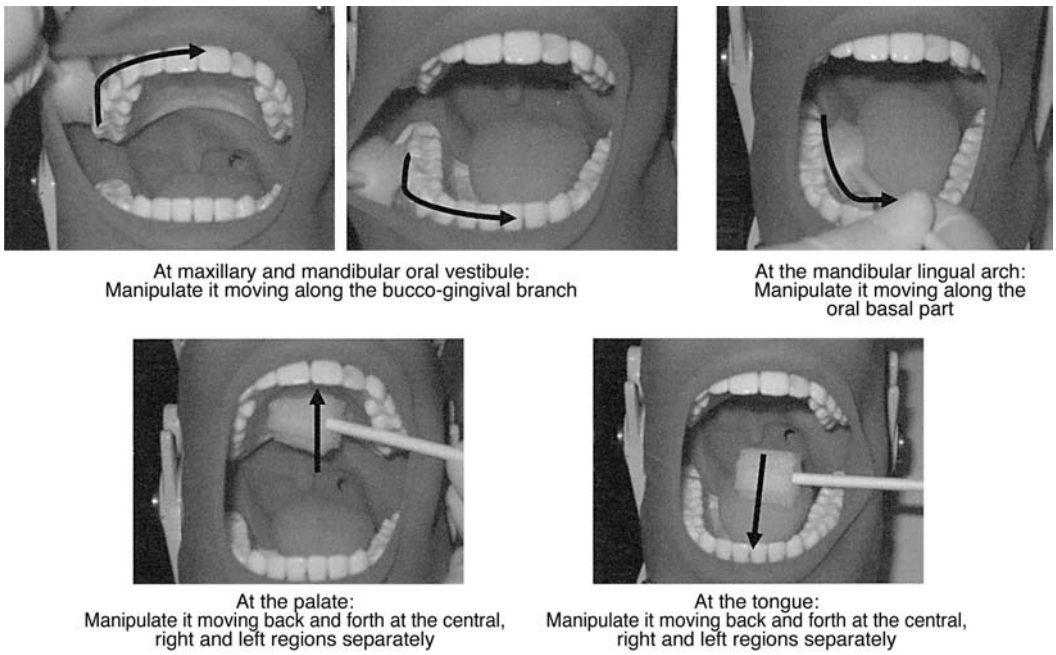


Photo. 8 How to manipulate sponge brushes

(Ichro Masui, Harumi Horibe)

26. Dyes

1. Reasons for using dyes

Around 70-80% of dental plaque consists of microorganisms, and about 10^{11} microorganisms exist in 1 gram of plaque. Areas where microorganisms exist can be identified using dyes. This helps to clarify areas in need of cleaning and facilitates the development of effective tooth-cleaning techniques. Interdental areas and gums often show large accumulations of microorganisms. Such results confirm that plaque cannot be fully removed using toothbrushing alone. Application of the bristles of the toothbrush to the gums may be useful, to both polish the teeth and massage and clean the gums. Dental caries and periodontitis can be considered as infectious diseases due to the involvement of microorganisms. Cleaning the teeth after using dye may be effective in preventing these conditions.

2. Methods for using dyes

Even when present on teeth, plaque is not readily discernible because the plaque has a similar color to the teeth. However, the area and amount adhering to teeth can be readily clarified by making the plaque an obvious color (typically red) using a dye. Since the dye is used in the mouth, stimulatory and toxic effects must be avoided. One kind of dye shows new plaque as red and established plaque as blue, by mixing phloxine dye (red No. 104) and brilliant blue (blue No. 1). The dye in liquid form is spread to the tooth plane with a cotton bud or tampon, and gargled only once lightly. Care must be taken not to get the dye on the face or clothes. The dye in tablet form is dissolved in saliva after chewing, spread to the tooth plane, and gargled only once. This form has the drawback of also dyeing the tongue and buccal mucosa.

(Kazumi Hukudome)

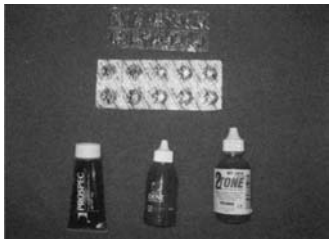


Photo. 1 A type of dyeing liquids

Photo. 2
Put a drop of dyeing liquid on the dish and spread on tooth using by absorbent cotton or cotton swab

Photo. 3 before dye

Photo. 4 spread on tooth

Photo. 5 after dye

Photo. 6 after washing mouth

27. Assistance of oral care

Self-care in general, and oral care in particular, can be difficult for individuals who need nursing care following cerebrovascular disorder, due to factors such as hemiplegia and tube feeding. If oral care becomes poor, caries and periodontal disease readily progress and diseases of the oral mucosa often arise.

When immune function decreases, the risk of oral candidiasis and aspiration pneumonitis is increased and may be life-threatening. Individuals who cannot achieve sufficient oral care for themselves thus require oral care from helpers.

1. Features of oral care assistance

1) Check general, mental, and oral condition. In particular, swallowing ability must be confirmed using the videofluorography (VF test).

2) Use a safe and comfortable position.

3) Perform mechanical cleaning with a toothbrush. followed by chemical cleaning .

4) Check swallowing function every time and use an aspirator. Use the minimum amount of water, to prevent aspiration. Check for dysphagia using a simple bedside test (MEMO1).

5) Oral care should take around 15 minutes.

6) Oral care needs both organic and functional care. Organic care includes cleaning of tooth, denture, tongue and oral mucosa. Functional care includes exercises of tongue and swallowing for preventing oral hypofunction.

MEMO 1 Simple test for dysphagia

There are four methods as follows;

① Repetitive saliva swallowing test: Count the number of swallows the patient can perform in 30 seconds.

② Water swallowing test, food test: Have the patient swallow a small amount of water (3-5ml) or food that is easy to eat.

③ Cervical auscultation: Ask the patient to swallow water, and confirm the presence or absence of any change in the neck. Confirm swallowing and breath sounds with a stethoscope during the test.

④ Simple swallowing provocation test: Inject a small quantity of distilled water into the pharynx. Confirm induction of swallowing and note any choking.

2. How to perform brushing assistance

1) Informed consent

We explain the necessity and method of mouth cleaning to the patient or a caregiver and obtain their consent. Particular respect must be given to the wishes of the patient.

2) Aspiration and positions to reduce fatigue

(1) Sitting position

This is a useful position for performing oral care, but can be a little tiring for patients. Aspiration is unlikely to occur in this position, as the patient is bent slightly forward. When a patient shows paralysis, the body can easily sway toward the paralyzed side. A cushion can be used to prop up the patient and prevent such movement.

(2) Fowler's position

When a sitting position cannot be used, the Fowler position is often useful. This position is not fatiguing and aspiration is also unlikely occurred. However, the body may slip down. We therefore place a cushion under the patients' knee for this position. It may be also used as a position for eating.

(3) Semi-Fowler's position

When most of the body is unresponsive, this position is used. Aspiration is unlikely occurred,

and the position is comfortable. When performing oral care, aspiration is easy to prevent when the patient lies on his side.

(4) Lateral position

When hemiplegia is present, the paralyzed side is positioned uppermost in a lateral position. This position is used when disturbance of consciousness is present. With oral care, the head should be lifted slightly.

(5) Spinal position

This position is unsuitable for oral care. When this is the only position that can be used, the face is turned to the side.

3) Oral care

① The oral cavity can be observed easily using a light and a tongue depressor.

② Mechanical cleaning with a toothbrush, interdental brush, dental floss, tongue brush, and sponge brush is effective.

③ Chemical cleaning is performed as a secondary treatment (e.g., mouth rinsing, tea (catechin effect), lemon water). This can offer effective oral care in a short time. However, care must be taken with regard to aspiration. As a risk of pneumonia occurs if mouth rinse is aspirated, attention is needed.

④ A soft toothbrush is used for patients with gingivitis or periodontitis. Care is taken to gently brush every corner.

⑤ As reflexive vomiting and aspiration can readily occur, the depths of the mouth and the tongue require attention. These areas should thus be cleaned carefully with a small-sized instrument.

⑥ Stimulation and massage of the gingiva, tongue and cheeks promote salivary self-purification. This is important for improving and maintaining oral cavity functions.

4) After treatment

The condition of the oral cavity and lips of the patient must be confirmed. The towels used for oral care are removed and the patient is made comfortable.

(Masako Fujisawa)

Glossary:

VF test: The VF test is regarded as an important swallowing function test. The patient drinks water or eats jelly that has been mixed with contrast medium while undergoing radiography. Oral, pharyngeal and esophageal movements can be estimated and food position identified. This can aid in understanding swallowing function and determining the presence of aspiration.

Catechin effect: catechins in tea has bactericidal and anti-viral effects.

28. Effective oral hygiene techniques for the elderly

1. Oral hygiene behaviors and lifelong health

Oral cleaning is performed as a daily activity from infancy, and it is important for lifelong disease prevention as well as maintenance of personal appearance. According to a survey by the Japanese Ministry of Health, Labour and Welfare, 96.2% of people brush their teeth every day.

In infancy, brushing is performed by a parent or guardian. This assistance helps children make toothbrushing a daily habit. In later childhood, specific sites such as the first molar and anterior maxillary teeth are highly susceptible to caries. Therefore oral health instruction and gingivitis prevention measures for these specific sites are incorporated into school health education programs. Mouth cleaning habits are usually firmly established by the time an individual comes of age, but oral hygiene instruction from a specialist continues to be needed as oral health status changes throughout life. If mouth cleaning cannot be performed independently in old age, assistance from a caregiver may be needed.

Mouth cleaning is thought to be effective not only for prevention of oral disease, but also for improvement of oral function and prevention of aspiration pneumonia. The degree of independence in mouth cleaning varies with the age and psychosomatic state of the individual. Throughout life, mouth cleaning intervention by caregivers and specialists helps with disease prevention.

2. Evaluation of the degree of independence in oral hygiene maintenance

Many elderly people and people requiring nursing care have disabilities and/or show decreased activity in daily life (ADL). Therefore, even when daily brushing is being performed by the individual, it may not be done thoroughly enough to remove plaque sufficiently and prevent aspiration pneumonia. And although there will likely be a decrease in the quantity of food ingested, the self-cleaning function of saliva production and chewing also decreases. This, combined with an increase in morbific bacteria in the mouth, means that more assistance from a caregiver is required.

According to one report, about 10% of patients in Care Level 1 of the nursing care insurance system require partial or total toothbrushing assistance. About 30% of those in Care Level 2 and about 70% of those in Care Level 3 need such assistance. An index has been devised for the evaluation of an individual's degree of independence in oral cleaning, specifically in terms of three behaviors: brushing, denture wearing, and mouth rinsing (BDR). This BDR index (Table 1), which is recommended by the Japanese Ministry of Health, Labour and Welfare, sets forth three levels of independence, as follows:

1) Support is unnecessary (independent for BDR): The patient can independently perform toothbrushing that reaches all tooth surfaces, including the back sides of the molars.
2) Partial support is necessary (dependent for BDR): The patient can only brush teeth that are easy to reach, or the patient does not spend sufficient time on toothbrushing, or the patient can put the toothbrush in his/her mouth but cannot move it around, or the patient cannot prepare or move the toothbrush.
3) Total support is necessary (completely dependent for BDR): The patient is unable to independently perform toothbrushing.

Table 1 BDR index[1)]

Support	Brushing	Removing and setting, cleaning of denture	Rinsing	evaluation	Total evaluation
Not necessary	You can brush well.	You can do it by yourself.	You can it.		You can do it by yourself.
Partly necessary	You brush only the teeth which are easiest to brush. You brush for a short time. You put a toothbrush in your mouth, but do not move it around. You cannot prepare or move the toothbrush.	You do not put off and polish your denture.	You cant it. You can take water in a mouth only.		You need a person to assist you in performing it.
Necessary	You cannot brush by yourself.	You cannot do it by yourself.	You cannot do it.		An assistant performs it primarily.

1) Ministry of Health, Labour and welfare, Japan, 2006

3. Mouth-cleaning techniques using a toothbrush

Elderly patients requiring nursing care need mouth-cleaning assistance from caregivers. Mouth-cleaning processes can be classified as follows:

1) Oral self-cleaning: saliva and chewing
2) Mechanical cleaning: toothbrushes, interdental cleaning instruments, electric toothbrushes
3) Chemical cleaning: mouth rinses and/or tooth pastes
4) Professional cleaning: mouth cleaning by a dentist or dental hygienist

When chewing and swallowing functions decrease, so do the natural self-cleaning functions. In the elderly and others requiring nursing care, physical and mental functions are also likely to decrease. For these reasons, these patients require mouth-cleaning assistance from a caregiver or dental professional.

Guidelines for providing toothbrushing assistance to an elderly patient:

1) Do not infringe on the independence and volition of the patient.

The wishes of the individual receiving the care need to be respected.

2) Identify areas of plaque accumulation.

Position the patient and provide illumination in a way that enables identification of plaque accumulation on the teeth, oral mucosa, and prostheses.

3) Toothbrush grip and positioning

The toothbrush should be held in a relaxed palm grip or pen grip. Avoid gripping the brush too tightly. When positioning the toothbrush, be sure that the bristles make contact with the surface of the teeth and also that the tips of the bristles reach into the crevices between the teeth and gums. Normal brushing pressure is around 200–500 grams.

4) Toothbrush movement

Toothbrush movements include the horizontal brushing method, the vertical brushing method, the rolling-stroke brushing method, the circular brushing method, and the vibration method. In addition, there are various methods that healthcare professionals use when instructing large groups or in clinical settings.

Some examples of these are Fone's method, the Bass method, a scrubbing method using the side of the toothbrush, the modified Stillman's method, Charter's method, and the rolling method.

The caregiver should take into consideration the age and oral condition of the patient when choosing the method that will be most effective in removing plaque. Caregivers must learn which toothbrushing methods are best for a variety of different situations. The toothbrushing instruction that caregivers receive from specialists is essential for ensuring that patients obtain optimal oral care.

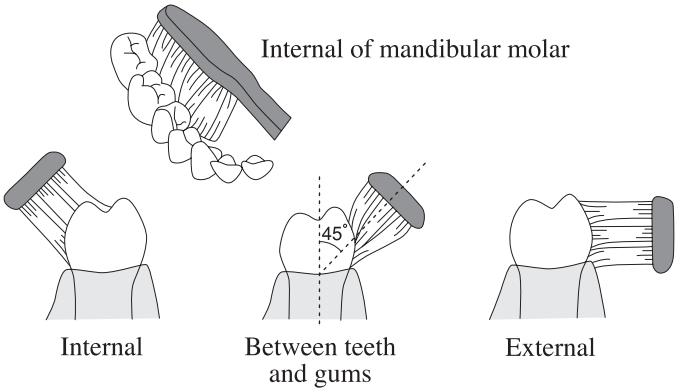


Fig. 1 How to angle the toothbrush properly

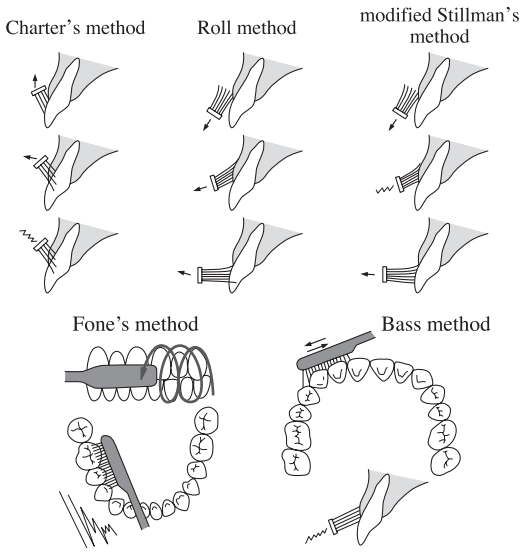


Fig. 2 Effective toothbrushing methods

5) Toothbrushing order and body positioning

If the teeth are simply brushed in a roughly upper to lower, left to right order, plaque is likely to remain in many places. In order to ensure thorough plaque removal, the brushing order should be decided in advance. The following order is recommended: 1) removal of food particles in the cheek mucosa, 2) right side to left side, 3) tooth surfaces, from maxilla to mandible, 4) removal of fur from the tongue, and 5) cleaning the tongue. The caregiver should use his/her free hand to set the position of the mandible and manipulate the cheeks and lips. Brushing is easier when the patient's mouth is closed, because the cheek mucosa can be pulled outwards with the finger, providing sufficient space to insert the toothbrush and move it around.

If possible, toothbrushing should take place in a washroom in order to facilitate the formation and maintenance of a good daily hygiene routine. If toothbrushing must be performed while the patient is in bed, the patient should be in a sitting position or in Fowler's position, and the caretaker should maintain communication with the patient to ensure that the patient stays awake. If the patient cannot sit up, toothbrushing can be performed with the patient in a lateral position, or in a supine position with the head turned to one side. When paralysis is present, the patient should be positioned so that the paralyzed side is up, in order to prevent aspiration. The risk of aspiration can also be reduced, in either the sitting or Fowler position, by bending the neck forward.

6) Assessment after brushing

After brushing, the caregiver should look for any remaining food residue or plaque as well as checking for gingival bleeding and halitosis.

(Kakuhiro Fukai)

29. Devices for oral cavity care in handicapped patients

For oral cavity care in handicapped patients, the toothbrush is the main tool. The need for brushing the teeth may not be understood by patients with mental retardation. In addition, brushing is often poorly performed if motor deficits are present. The kind and degree of disability differ widely among individuals. Outlining methods of oral cavity care for a manual is thus difficult. Plans for oral health care need to be determined on a patient-by-patient basis.

1. Designs of toothbrushes for patients with mental retardation

Mental retardation can often be seen as a complication of various disabilities. Understanding the basic characteristics of mental retardation is important. Mental retardation refers not only to intellectual developmental disorder, but also to disability in various domains, such as cognition, thought processes and emotions. Providing health care for patients with mental retardation and developmental delays can be difficult. However, good results can be obtained by families and healthcare workers depending on the situation.

1) Oral care in patients with mental retardation

Patients with mental retardation can experience difficulty maintaining hygiene and performing self-care. They may not understand the meaning of brushing the teeth or be able to brush the teeth independently. In addition, a feeling of unpleasantness may not be noticed even if the oral cavity is unclean, leading to a susceptibility to large accumulations of plaques on teeth, dental caries, periodontal disease, and tooth loss. (Photo. 1) Even if the patient is able to perform suitable motions for brushing the teeth, weak brushing will remove insufficient plaque, while overly strong brushing will damage the gums and increase wear on the tooth. Where possible, instruction needs to be provided to improve brushing technique.

MEMO 1

Diagnosis of AAMR (American Association on Mental Retardation) DSM-IV（1994）
①an IQ of approximately 70 or below on an individually administered IQ test ②Concurrent deficits or impairments in present adaptive functioning (i.e., the person's effectiveness in meeting the standards expected for his or her age by his or her cultural group) in at least two of the following areas: communication, self-care, home living, social/interpersonal skills, use of community resources, Self-direction, functional academic skills, work, leisure, health, and safety. ③The onset is before age 18 years.

* Mental retardation and IQ (Intelligence quotient) Mild Mental Retardation: IQ level 50-55 to approximately 70, Moderate Mental Retardation: IQ level 35-40 to 50-55, Severe Mental Retardation: IQ level 20-25 to 35-40, Profound Mental Retardation: IQ level below 20 or 25

Photo. 1 oral finding of the patients with mental retardation (34 years old man)
A large quantity of plaques on a tooth is recognized in whole oral cavity. And food residue is recognized at right maxillary molar. Missing right mandibular molar

2) Instructions regarding brushing teeth.

(1) Degree of mental retardation

The degree of disability varies widely in patients with mental retardation. When the degree of disability is mild, good toothbrushing technique may be obtained with practice. However, with moderate to severe disability, patients are typically unable to perform toothbrushing adequately. Assistance is therefore often necessary. As for patients with profound mental retardation, assistance is needed all activities. Therefore individual evaluation on activities and guidance of brushing teeth according to individuals' abilities are required. It is the easiest toothbrush guidance that the instructor brush teeth together with a patient and lead him/her to imitate instructor's way of brushing. Evaluating the adhesion of plaque to teeth and the effects of providing instruction is important. Parts that have not been cleaned can be indicated using a finger, and should then be cleaned (Photo. 2). Patients with mild mental retardation can easily understand why brushing is needed, when instruction is provided using a model of the tooth.

(2) Memory

Regarding memory of patients with mental retardation is generally said that short-term memory is bad, but long-term memory is kept comparatively good. Brushing instruction that is performed repeatedly may become committed to memory. Likewise, frequently repeated actions can become largely automated, out of habit. The family needs to urge the patient to brush their teeth. Approaches by people surrounding a patient control the state of oral hygiene in patients with mental retardation. Guidance and assistance for brushing the teeth are thus necessary at institutions, schools, dental offices, and various other key situations in life.

3) Limitations to toothbrushing by the patient

Toothbrushing by the patient is important, but the limits must be understood. According to one report, the rate of plaque removal by patients with mental retardation is about 24%, compared to about 55-75% for physically unimpaired individuals. Cleaning by the patient alone is thus unlikely to prove sufficient for keeping the oral cavity clean, so brushing by a family member or caregiver is warranted. Various kinds of toothbrushes are available, but a small toothbrush is suitable for assisted brushing. (Photo. 3) Morbidity rates may be below those of a normal child when brushing is continuously performed by a dental hygienist, indicating the early professional care is very useful.

4) Environment for performing toothbrushing

Concentration for extended periods of time can be difficult for patients with mental retardation. Tooth brushing should therefore be performed in a distraction-free environment. Maintaining a happy frame of mind in the patient and providing positive reinforcement of good brushing technique is also important, and will help to promote better brushing.

Photo. 2 A child of the Down's syndrome brushes her teeth hard

Photo. 3 A toothbrush different from form in size

2. Instructions for toothbrushing in patients with autism

The matters requiring attention in toothbrushing for patients with autism are similar to those for patients with mental retardation. Patients with autism display communication disorders and strong emotions. The following issues therefore need to be considered.

1) Instructions for toothbrushing

Patients with autism may not understand instructions, due to the underlying communication disorder. Furthermore, the patient may not understand directions even if provided using gestures and hand gestures for communication. Getting the autistic patient to imitate brushing actions is rare and should not be expected. When teaching methods of brushing, instructions need to be as simple and brief as possible. Repeated use of detailed instructions is needed. Patients more readily understand visual information than verbal information. Use of picture cards depicting the techniques and order of brushing may thus be helpful. (Fig. 1) Autistic patients may not be able to brush specific areas by themselves, due to developmental disability or out of habit. (Photo. 4) The reasons for inability to brush specific areas thus need to be determined on a case-by-case basis.

Photo. 4 Oral findings of autism
The patient can brush his teeth comparatively neatly. But he can not brush maxillary teeth comparatively neatly

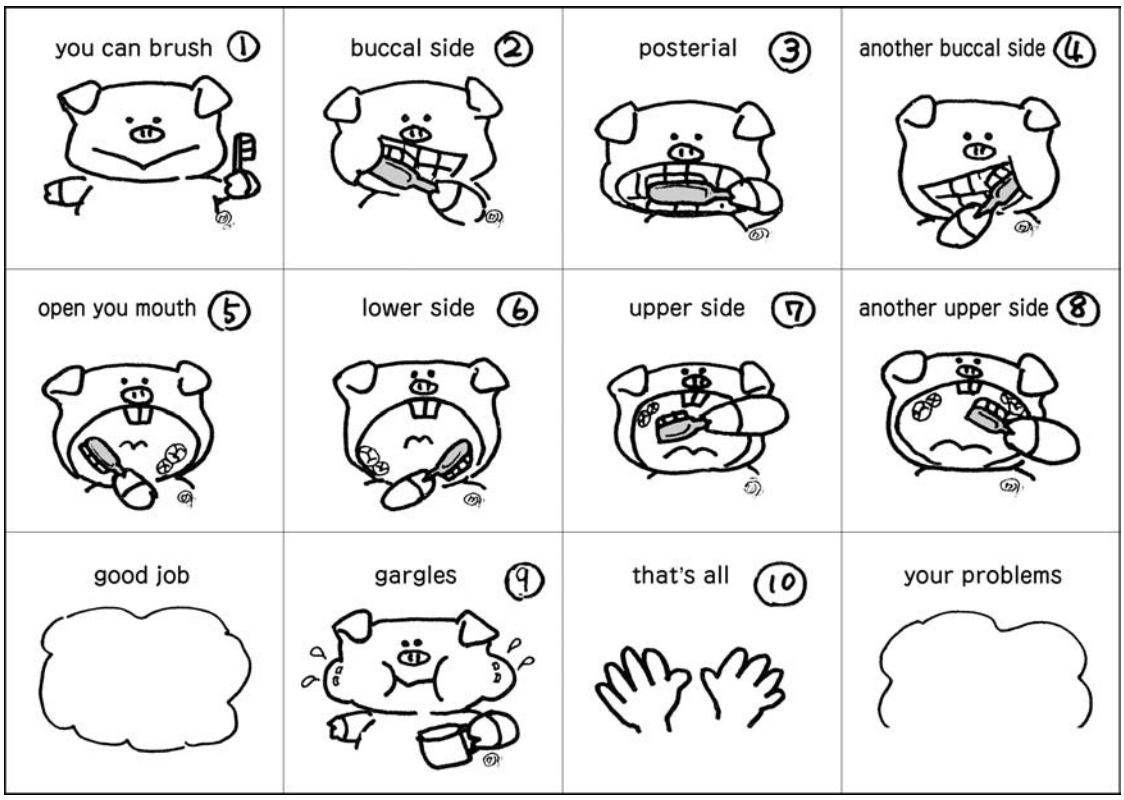


Fig. 1 Picture cards brushing teeth for children with autism (Illustrated by K. Yamada)

2) Brushing habits

Patients with autism brush only specific areas due to strong habits. In maintaining a highly pattern-based life, the patient feels secure and emotions are stable. Incorporating brushing after meals into this daily pattern will thus help to achieve a clean oral cavity.

3) Findings and considerations in the oral cavity

Autistic patients do not display any specifically characteristic oral findings. Abnormal oral habits cause abrasion and attrition. Deliberate self-harm can cause oral trauma, such as lacerations of the lips and buccal mucosa, and bite wounds. Autistic patients often like specific foods. When the patient likes sweet foods, caries easily result. Autistic patients also readily react to specific stimulations, and may refuse to participate in toothbrushing. The hands and shoulders are less sensitive to stimulation than other parts of the body, so physical contact should start at these areas. The highly sensitive oral cavity should only be touched after touching the cheeks and lips.

MEMO 2 What is mental retardation?

With onset prior to age 3 years: qualitative impairment in social interaction, qualitative impairments in communication, restricted repetitive and stereotyped patterns of behavior, interests, and activities. It seemed that the autism was caused by the nurture method of the parent before. However, It seemed that the autism was caused by congenital brain disorder now. The autism is different in a symptom by the degree of the mental retardation.

3. Toothbrush devices for patients with motor disorder

As a disease causing movement disorders, cerebral palsy must be considered. The etiology of cerebral palsy is a change in the brain during the fetal period or early after birth. Characteristics of cerebral palsy include abnormalities of movement and posture, with gradually progressive symptoms. Patients with cerebral palsy show eating and swallowing disorders due to paralysis, involuntary movements, and abnormal muscle tone. Adequate toothbrushing can be difficult due to upper extremity motor disorders, (Photo. 5) involuntary movements and abnormal tone of the perioral muscles, and primitive reflexes (MEMO 3). Stabilizing the arm and movements can thus be helpful for the patient. Sequelae of cerebral vascular accidents, Parkinson's disease, and rheumatism can cause similar motor deficits in elderly patients.

2) Choosing a toothbrush

(1) Choose a toothbrush with a thick, light handle, to make brushing easier. (Photo. 6)

MEMO 3 Primitive reflex

Primitive reflex is special reflex that find postembryonic from infant initial stage. Primitive reflex usually disappear after life in six months from three months. There is rooting reflex, sucking reflex, biting reflex, tongue protrusion reflex for a primitive reflex related to the oral cavity. Therefore this reflection disturbs eating, deglutition, oral cavity care.
Asymmetrical tonic neck reflex
This is one of the primitive reflex. The upper and lower extremity of the side where they turned a face to extend, and the opposite upper and lower extremity do flexion. When the patients whom this reflex is remain does flexure of one arm, a face turns to the objection. When the patients whom this reflex is remain does flexure of one arm, a face turns to the opposite side when I bring a hand close to a face. It is difficult for the patients to eat food by there hand and to brush there teeth.

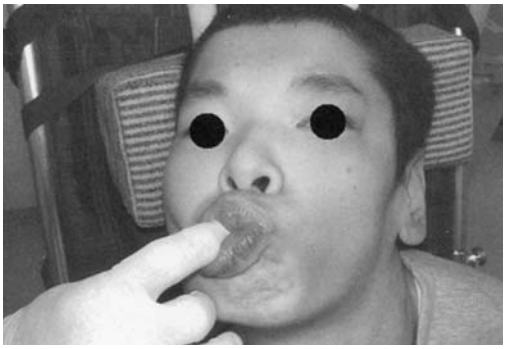


Photo. 5 Patient with cerebral palsy (32 years old man) Lip tone disturbs toothbrush

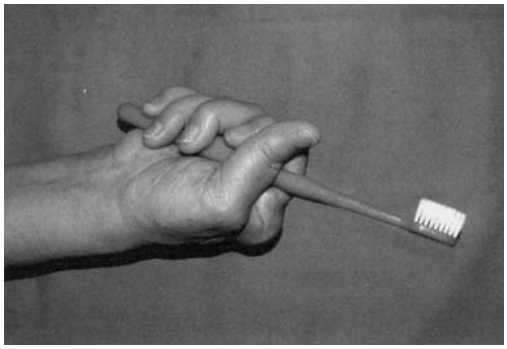


Photo. 6 Patient with rheumatism (68 years old woman) The patient with hand disability should use big handle

(2) Choose a 360∞ toothbrush, so the patient does not need to change the direction of the head when brushing right and left. Such brushes also reduce the risk of injury to the gingival and buccal mucosae. Patients with strong perioral muscle tone may not be able to put a brush into the oral cavity, and so cannot adequately brush the cervical region and approximal and occlusal surfaces.

(3) Electric toothbrush

Using an electric toothbrush may be easier for some patients with motor disorders. Cleaning ability is increased with an electric toothbrush, because less movement is required. However, electric toothbrushes are also heavier than normal toothbrushes, and can thus be harder to handle. If the hard back surface of the head comes in contact with the teeth, rather than the bristles, damage to the tooth can also occur.

3) Assistance and position

Motor disorders can be seen in patients with cerebral palsy and sequelae of cerebral vascular accidents. Some toothbrushes may be unsuitable for such patients, and assistance with brushing may be needed. When assisting with brushing, the patient should use a sitting position if possible, with the assistant standing in front of the patient to access the oral cavity. The assists stand behind the patient, and can help to stabilize the patient's head if needed. In the case of patients with strong muscle tone and reflexes, we can remove sensitive reaction by desensitization.

4) Caution

Care must be taken to avoid suffocation and aspiration in patients with swallowing disorders. When a patient cannot assume a sitting position, the bed should be raised as much as possible. In addition, the face should be turned to the side. When a patient has hemiplegia, we position the paralyzed side uppermost. Saliva and water retained in the oral cavity also needs to be completely removed by suctioning.

(Masaki Ito, Osamu Fukuta, Kazuyo Yamada)

Glossary:

Systematic desensitization therapy: Systematic desensitization therapy is one of the behavioral therapy to relieve anxiety. When we are relaxed, we give weak stress and remove uneasiness. It is a method to give strong stress in turn, and finally remove uneasiness. In the dental treatment, we should change it to a strong thing of the stimulation. For example, we should begin with the toothpaste which a patient is used to.

Ⅲ *Gargling*

30. Gargling

1. Purpose

Holding liquid in the oral cavity and rinsing the oropharynx is called “gargling”. The general purpose of gargling is to wash the oral cavity and prevent infection. However, this activity is also effective in enhancing the strength of the perioral muscles.

2. Varieties

There are two varieties of gargling: “bubbling”; and “rattling”.

1) Bubbled gargling

The purpose of “bubbled gargling” is to eliminate food residues in the oral cavity. This is achieved by closing the lips while elevating the posterior of the tongue, thereby isolating the oral cavity and pharynx (Fig. 2). If these actions fail, holding liquid in the oral cavity is difficult and swallowing movement occurs before gargling. Liquid is also likely to leak into the nasal cavity.

Washing a bottle may be mentioned as a good example of bubbled gargling. Shaking a bottle strongly and making bubbles with half quantity of water is a knack to rinse off dirt. Moving water and mixing it with air is important. Bubbled gargling is completely the same way. Gargling with full-mouthed water is an equal situation that just letting water out of the bottle after pouring water to its edge.

2) Rattled gargling

The purpose of “rattled gargling” is to eliminate dust and bacteria adherent to the posterior oral cavity. This technique is employed by tilting the head backwards and opening the mouth. The liquid is kept in the posterior part of oral cavity and bubbling up is made by exhalation through out the oral cavity.

The nasal cavity and pharynx should be isolated while employing the rattled gargling technique. Air needs to be let out slowly as bubbles (Fig. 3). As when these activities do not proceed together smoothly in a coordinated manner, the patient may swallow or aspirate liquid.

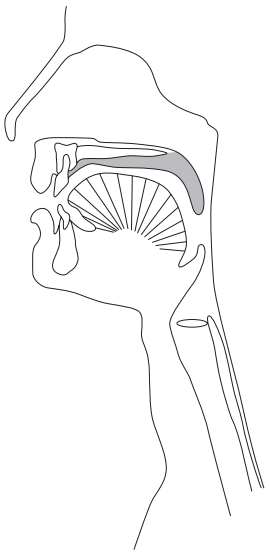


Fig. 1 Prior to gargling

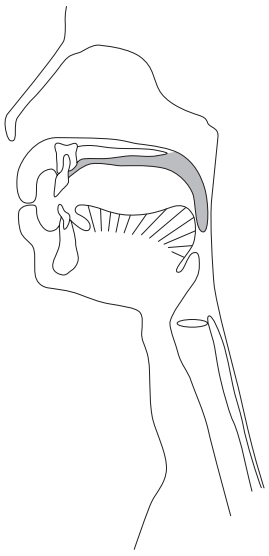


Fig. 2 Bubbied gargling

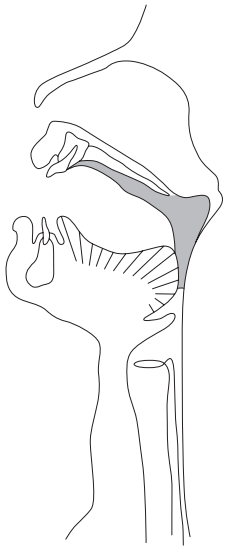


Fig. 3 Rattle gargling

3. Conditions necessary for gargling

To achieve gargling correctly, the following conditions must be met in addition to the above conditions:

1) Conscious level
2) Lips must be able to be closed firmly, and water must be able to be held in the oral cavity
3) Muscles of the cheeks and tongue must not be paralyzed
4) The patient must be able to spit liquid from the oral cavity
5) The patient must be able to tilt head backwards

4. Effective bubbled gargling

The desired procedure for bubbled gargling is as follows:

1) Half-fill the mouth with water (Photo. 1)
2) Push the water into one-side cheek and rinse around (Photo. 2), then push the water into the other-side cheek and rinse around (Photo. 3)
3) Push the water forward between the upper lips and teeth to rinse around (Photo. 4), then do the same with lower lips (Photo. 5)
4) Finally, rinse the water around the whole mouth (Photo. 6)

Photo. 1 Fill the mouth with water

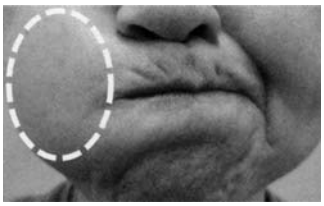


Photo. 2 Puff out the right cheek and bubble up

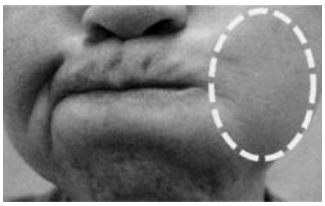


Photo. 3 Puff out the left cheek and bubble up

Photo. 4 Puff out upper lips and bubble up

Photo. 5 Puff out lower lips and bubble up

Photo. 6 Bubble up in the whole mouth

To investigate the effective gargling, frequency of gargling was counted until spitted water turned transparent after eating sticky foods (a chocolate cookie). One gargle was defined as 10 repetitious rinses around each cheek, the upper and lower lips, and the whole mouth. Our results indicated that at least five gargles were required to make the spitted water from the oral cavity clear after eating sticky foods.

Meanwhile, another examination was performed as the same way by using fibrous foods (cucumber) after eating sticky foods before rinsing oral cavity. In this examination, only three gargles were required to make spitted water transparent (Photo. 8). These results show that more than five gargles can be expected to clear the oral cavity (Photo. 7).

Photo. 7 Transition of spitted out water after eating a chocolate cookie

Photo. 8 Transition of spitted out water after eating a chocolate cookie and a cucumber.

5. Gargling for keeping and restoring oral function

Gargling is an elaborate action by using various muscles throughout the face and neck. Therefore, when a patient undergoes appropriate training for oral function, gargling may “prevent disusesyndrome of perioral muscles” and may be “a most easy rehabilitation for perioral muscles”.

Gargling may therefore be considered not only as a general hygienic behavior for washing out the oral cavity, but also as a “medical behavior” given the therapeutic roles mentioned above.

(Kumiko Hara, Takane Maruyama)

31. Kinds and ingredient of gargles

1. Classification by directions for use

Medical material used for gargling is called “a gargle”. Since the purpose of “rattled gargling” is to rinse out the throat, a gargle used for rattled gargling is expected to be effective in the area from the mouth to the pharyngeal. Such a gargle is prescribed by a doctor. The purpose of a gargle used in “bubbled gargling” is mainly to wash out the mouth and clean material from the tooth.

1) Rattled gargling

In rattled gargling, the head should be turned upward and the mouth should be open while holding a proper quantity of gargle. This is performed in the similar way of breathing from the mouth. As children can experience difficulties with rattled gargling, it is better that parents let them to practice with water in the bathroom.

2) Bubbled gargling

Typical gargles for preventing caries are ORA-BLISS and Miranol 11% (sodium fluoride), which are fluoride compounds. Non-medical supplies generally labeled as a “gargle” or “dental rinse” are also available for bubbled gargling. “Dental rinse” also includes liquid tooth paste. Bubbled gargling should be performed rapidly by puffing the cheeks alternately while holding a suitable quantity of gargle in the mouth. Supplies used for gargling are expected to be ejected from the mouth, not swallowed. Since little children may swallow or aspirate gargles, care should be taken with the ingredients of gargles. Gargles such as FloridOral gel used for oral candidiasis are to be aspirated after gargling.

2. Legal classifications

Under the pharmaceutical law in Japan, medical supplies are classified as “medical drugs”, “non-medical drugs” and “cosmetics” (Fig. 1). Drugs provided with prescription are generally called “medical drugs”, and those that can be purchased at drug stores are called “general medical drugs”. Under medical insurance law, the availability of medical drugs is limited according to prescription by insurance doctors, while general medical drugs, non-medical drugs and cosmetics are not prescribed by doctors.

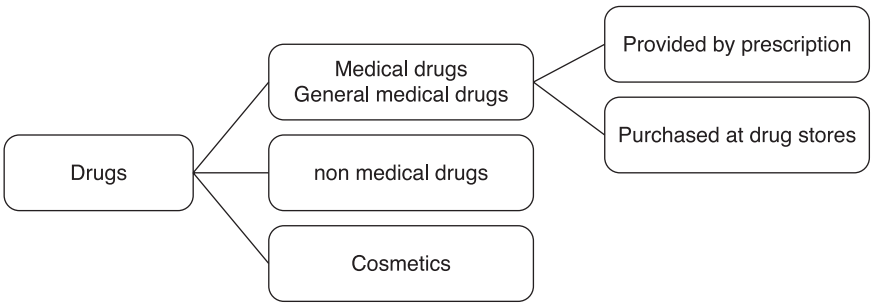


Fig. 1 Classification by the pharmaceutical law

Medical gargles are shown in Table 2 General gargles are shown in Table 3 Health insurance is applied to gagled containing fluoride at the first time of “guidance for washing mouth with gargles containing fluoride for patients with multiple caries”. In many cases, health insurance does not apply. These legal classification can be confusing to individuals needing oral care when they go to purchase gargles, as “medical” gargles

Table 1 gargles and mouthwash classified medical supplies

General name	Products	Purpose	Direction	Notice and prescription	Side effect
Acrinol	Acrinol	Disinfection of festered region in a mouth.	Gargling with 0.05~0.1% diluted solution	*external use only *it should be washed immediately when liquid is adhered to clothe and sink because it stains in yellow	Ache, flare, boil, sore, mortification, hypersensitivity, eruption etc.
Povidone iodine	Isodine etc.	Pharyngitis, tonsillitis, gingivostomatitis, infection control after exodontias, disinfection of oral cavity.	2~4ml diluted with 60ml water and gargle 2~3 times a day with it.	Contraindication: patients with hypersensitivity to the products or iodine in the past. *Wash well when liquid is adhered to eyes. *The color of prosthesis containing silver may be changeable. When liquid is adhered to clothe, it can be washed out easily. Sodium thiosulfate can be effective to decolonization. *It should be diluted.	Shock, anaphylaxis, eruption, irritation in oral and pharyngeal cavity, oral mucous sore, nausea, indisposition etc.
Benzethonium chloride	Neostelin Green	Disinfection of oral cavity, infection control after exodontias.	Washing mouth with 0.004% (diluted 50 times) for disinfection of oral cavity. For infection control after exodontias, washing mouth with 0.01~0.02% (diluted 10~20 times) diluted solution.	Should be diluted.	Hypersensitivity, irritation.
Fradiomycin sulfate	Dentargle F	Infection control for oral wound.	Washing mouth with 60mg of Fradiomycin sulfate diluted with 500ml of water or lukewarm water. A mouth washing should be divided into a few times.	Contraindication: patients with hypersensitivity to amino-glycoside antibiotics such as streptomycin, kanamycin, gentamicin, fradiomycin and bacitracin, Benzethonium chloride in the past. When it is not melted in cold place, put a cup directly in the lukewarm water and warm it.	Eruption and else
Oxydol	Oxydol Oxyfull etc.	Disinfection of oral mucous, carious orifice and root canal orifice and tooth.	For washing tooth, with original density or diluted solution twotimes weaker. For washing gingivostomatitis, with diluted solution which is diluted ten times weaker	External use only. Internal use of more than 10% may cause inflammation of digestive tract such as gingivostomatitis and esophagitis. When the liquid is adhered at eyes, it may cause sore or fenestration of the cornea so that eyes should be washed with running water for more than 15 munites.	Continuous use may cause an irritation.
Azulene sulfonate sodium	Azunol Azunol gargle Azulen 4% for gargling	Pharyngitis, tonsillitis, gingivostomatitis, acute gingivitis, glossitis, oral wound	4~6 mg for one time (5~7 drops) melted with 100 ml water or lukewarm water, gargling with it a few times a day.	Avoid fire	Irritation in oral and pharyngeal cavity.
Azulene sulfonate sodium and sodium hydrogen carbonate mixed	Hachiazule etc.		2g for one time melted with 100 mL water or lukewarm water, gargling with it a few times a day.		
Sodium hydrogen carbonate	sodium hydrogen carbonate etc.	Gargling and aspiration: sub treatment for upper respiratory infection(melting mucus)	Gargling and aspiration: 100mL of 1~2 % liquid. A few times a day	Contraindication: patients requiring a control of taking sodium	Alkalosis, dropsy by accumulated sodium. reactionary stomach acid secretion, flatulence
Aluminum potassium sulfate	Alum	Astiriction of Inflammation or sore on Oral mucous and skin.	Washing mouth for Pharyngitis and gingivostomatitis with 0.3~1% of it as a gargle		Eruption, erythema, pruritus and irritation etc.

Notice: in the case of existence of wound after extraction, it may be possible that dried socket is occurred. Hard gargling should be avoided which may obstruct and omit a formation of clot.
To spread liquid through tooth, oral mucous and wound, bubbled gargling is appropriate. How to gargle should be guided along the purpose and the area needed to be effected.

Table 2 Gargles classified as general medical supplies

Product	Shape	Ingredient	Effect	merchandize
Glebell	Granule	Azulene sulfonate sodium, Sodium Hydrogen Carbonate	Washing mouth and of pharyngeal and oral cavity	Nippo Pharmaceutical
Alpen	Liquid	Cetylpyridinium Chloride,dipotassium glycyrrhizate, menthol, eucalyptus oil, fennel oil	Disinfection of oral and pharyngeal cavity. Elimination of halitosis.	Chugai Pharmaceutical
Isodine	Liquid	Povidone iodine	Disinfection of oral and pharyngeal cavity. Elimination of halitosis.	Meiji Seika Kaisha
Laryngol	Liquid	Tincture of Myrrh, Tincture of Rathania, Phenyl salicylate, Thymol	Horsness from a pharyngeal inflammation, irritation, ache, Disinfection of oral and pharyngeal cavity. Elimination of halitosis.	Sato Healthcare Innovation

additives are not included in ingredents.

Table 3 Fluorine mouth wash

General name	Product	direction	notice
sodium fluoride	Miranol	Generally 5~10mL of 0.05%~0.1% sodium fluoride concentrated solution for a gargle after the meal a day or a gargle before bedtime with it. How to gargle; ① Brushing teeth or rinse mouth before washing mouth ② Hold the liquid in a mouth and then do the bubbled gargling for 30 seconds for the purpose of filling the oral cavity with the liquid. For avoiding aspiration, the head is guided to face downwards. The quantity of liquid held in mouth depends on the patients' ages, 5mL for preschool children and 7~10mL for school children are appropriate. ③ After washing mouth, liquid should be spitted out, and also if salvia stayed in a mouth are spitted out, there is no need to rinse the mouth with water. ④ The quantity of the liquid for one time should not be taken in 2 times (if some are left, they should be dumped).	Hypersensitivity. No use of glassware for deterioration of liquid. Need of guidance for avoiding aspiration of liquid. No use for children with the possibility of aspiration.

cannot be purchased without prescription, “non-medical” gargles can be purchased at the drugstore without prescription and “cosmetic” gargles can be purchased at the supermarket or convenience store. Wholesale suppliers are generally different from those for dentists and medical hospitals. Since scales of wholesalers for dentists are usually smaller in comparison with those for medical hospitals, getting information about dental supplies is much more difficult than getting information about medical supplies.

In some cases, prescribed gargles are dispensed with medical supplies which are not shown in Table 1. For example, gargles containing allopurinol are used for preventing gingivostomatitis resulting from chemotherapy, and gargles containing lidocaine are used in controlling ache for patients with gingivostomatitis. The purpose of the prescription by the doctor therefore needs to be understood and directions by doctors and pharmacists should be strictly observed.

3. Classification by function

As shown in Table 1, some medical gargles are used for disinfection, and may include substances such as acrinol, povidone iodine, benzethonium chloride, and fradiomycin sulfate. For disinfection, povidone iodine and benzethonium chloride are usually in wide use, but benzethonium chloride is ineffective for disinfecting tuberculosis bacilli and many viruses. Attention is also required for gargles containing povidone iodine, which corrodes prostheses containing silver.

Fradiomycin sulfate is an antibacterial agent, and the antibacterial spectrum should be noted. Other ingredients may also be present, such as bicarbonate (sodium bicarbonate) for breaking up mucous, azulene sulfonate sodium to activate wound healing, and alum (aluminum potassium sulfate) as an astringent. Oxydol is also used as a neutralizer, such as with accidental ingestion of sodium hypochlorite.

Gargles classified as general medical supplies are shown in Table 2. Aside from the ingredients mentioned above, cetylpyridinium chloride, thymol, and chlorhexidine gluconate are also included in some gargles. General medical supplies often include additional compounds.

As mentioned above, some kinds of gargles can be purchased at the drug store or supermarket, while others cannot be purchased without prescription. In some cases, gargles available without prescription contain the same ingredients and have the same effects as those requiring prescription. Even if a gargle from the supermarket and one prescribed by a doctor are basically the same, the name and shape of the container will differ.

A wide range of supplies are available for oral care, from medical supplies to foods. Although obtaining sufficient information about the various supplies is difficult, asking the pharmacist about the legal classifications and ingredients can be useful. Some self-governments have established “Nursing Insurance Town Consulting Drug Store” to provide information relevant to nursing. These kinds of systems are useful.

(Ikuo Wada)

Glossary:

Pharmaceutical Affairs Act: it is the law establishing the necessary rules and usage to ensure quality, efficacy and safety of drugs, quasi drugs and medical instrument.

Medical drug: Medical drug by pharmaceutical law are Products listed on the Japan Pharmacopeia. Medical drugs are Products used for the diagnosis, treatment and prevention of disease of human and animal (excluding medical equipment and cosmetics).

Quasi drug: quasi drugs by pharmaceutical law are for preventing nausea, foul body odor and breath control, hair removal, body pests extermination, and as not equipment or instruments having no more than a mild effect on the human body assigned by Japanese Health Minister.

Cosmetic: Under the Pharmaceutical Affairs Act, "cosmetic" refers to any item having mild effects on the human body that is rubbed, spread, or otherwise applied in a similar manner for the purpose of cleansing, beautifying, or enhancing the attractiveness of the human body, to change physical appearance, or to maintain skin or hair in a healthy condition.

Pharmaceutical price: In Japan, the treatments by health insurance is called health insurance treatment. Retainer is established by Japanese Health Minister as medical service fee. Medical service fee is based on pharmaceutical price, medical instrument and the body of medical service fee. Insurance dispensing fee is based on the body of dispending fee and pharmaceutical price.

Prescription-only drug: It is available only with written instructions from a doctor or dentist to a pharmacist, and it should not be sold or given to a patient without any due cause.

32. Oral care for patients who are unable to gargle (not elderly patients, but patients with disturbance of consciousness)

1. Disturbance of consciousness and gargling

Disturbance of consciousness includes “syncope” and “coma”, although these events are not discussed here. Patients with disturbance of consciousness who are unable to gargle may not be able to use the lips, tongue and soft palate to achieve mouth, velopharyngeal and laryngeal closure. Therefore, while it is clearly inappropriate to discuss how to make a patient in a coma gargle, we should discuss methods for achieving the goals of gargling. For that, we need to be familiar with states such as coma and be able to consider and estimate remnant abilities.

1) Coma scales

Coma scales are shown in Fig. 1 and 2. The Glasgow Coma Scale (GCS) scores categories of eye opening (E), verbal response (V) and best motor response. A lower score indicates higher severity of disturbance. The GCS score ranges from 3 to 15, and a score below 8 is generally considered severe. In the Japan Coma Scale (JCS), the total score is determined as the sum of three categories of reactive, with a higher score indicating more severe coma.

Table 1 Glasgow Coma Scale (GCS)

Glasgow Coma Scale (GCS)		
E. Eye Opening		
V. Verbal Response		
M. Best Motor Response		
Eye Opening Response	Spontaneous--open with blinking at baseline	E4
	Opens to verbal command, speech, or shout	3
	Opens to pain, not applied to face	2
	None	1
Verbal Response	Oriented	V5
	Confused conversation, but able to answer questions	4
	Inappropriate responses, words discernible	3
	Incomprehensible speech	2
	None	1
Best Motor Response	Obeys commands for movement	M6
	Purposeful movement to painful stimulus	5
	Withdraws from pain	4
	Abnormal(spastic)flexion, decorticate posture	3
	Extensor(rigid)response, decerebrate posture	2
	None	1

Table 2 Japan Coma Scale (JCS)

Japan Coma Scale (JCS)		
Ⅲ. Invigil with stimuli		
Ⅱ. Vigil with stimuli		
I. Vigilz		
Ⅲ	Invigil with stimuli	
	3 None	300
	2 Moves little or grimaces	200
	1 Sweeps off stimuli	100
Ⅱ	Vigil gith stimuli	
	3 Narrowly opens eyes	30
	2 Opens eyes to pain	20
	1 Easily opens eyes to verbal stimuli	10
I	Vigil	
	3 Disables to tell name and date of birth	3
	2 Disorientated	2
	1 Not lucidity	1

2) Risk management

The swallowing reflex and cough reflex are usually dysfunctional in comatose patients and aspiration is thus a serious risk. Special attention to airway management is highly required. Items that need to be confirmed before and after oral care are as follows:

① Confirm vital sign and airway management.

② Confirm airway condition and respiration by measuring SpO_2 and performing auscultation of the neck region.

③ Confirm situation around mouth, such as position and cuffing pressure of intubation, and oral, pharyngeal and laryngeal function.

2. Oral irrigation

As mentioned previously, patients in a coma require irrigation and cleaning of the oral cavity using methods other than gargling.

The cuffing pressure for intubation needs to be high before irrigation. About 200 ml of gargle is squired into the mouth from the syringe. This should be performed in parallel with suction. If suction is available at the upper region of cuffing, the wash should be suctioned up.

If the patient has not been intubated and body position is able to be changed, the position should be changed before irrigation to avoid aspiration. Use of a sitting or Fahrer position is good to avoid aspiration, but is difficult for patients in a coma, so a semi-Fahrer position may be a suitable option.

Eliminating waste material originating from the teeth and oral mucosa is also necessary. Generally, such material should be suctioned up with an aspirator. When an aspirator is not available, irrigation should be performed using the following procedure as long as the general condition of the patient is stable:

1) Take a lateral recumbent position with the healthy side downward and turn the face downward.

2) Place a gargle basin under the face.

3) Place the tip of a feeding cup or syringe at the side of the mouth facing upwards and irrigate the oral cavity. Then pull the angle of the mouth facing downward and let the water run out of the mouth. Placing gauze in the mouth can help to prevent water entering into the pharynx and being aspirated. A small amount of wash is usually left in the mouth, and should be eliminated using soft gauze or a sponge brush, which are gentle enough not prevent damage to the oral mucosa.

3. Notices on oral care for patients in a coma

1) Airway obstruction

Patients who are intubated show reduced swallowing function and a higher risk of aspiration. At the region of the airway mucosa where the cuff is present, the internal pressure of the cuff is transmitted directly to the mucoasa. High cuff pressure may thus cause necrosis of the mucosa, as the pressure may obstruct the blood supply to the mucosa.

MEMO 1 Airway obstruction

1) Tracheal intubation

Attentions must be paid to patients with tracheal intubation, regardless of whether it is via the nose or mouth. This is because intubation reduces swallowing function. If available, suction should be performed at the upper region of the cuff at the end of procedures. Even if only small amounts of wash and saliva enter the tube, infection may result if the material reaches the trachea.

2) Tracheotomy

Some kinds of tracheotomy tubes allow suction at the upper region of the cuff. Irrigation for such patients in a coma should generally not be performed, as the trachea retainer does not have a cuff.

2) Oral dryness

Patients in a coma are not ingesting organic material through the mouth, and thus secrete less saliva. Usage of certain medicines, dehydration, intubation via the mouth and long-term opening of the mouth due to appliances such as a bite block can cause oral dryness. Irrigation of the oral cavity must be performed more frequently when the oral cavity is exposed to greater drying.

3) Lower swallowing function

Oral functions may decrease after extended periods without intake via the mouth, resulting in a relatively high risk of aspiration. Oral function thus needs to be checked before starting oral care, and indirect functional training for improving and maintaining oral function should be initiated parallel to irrigation of the oral cavity.

(Shigeki Morisaki, Satoko Komine)

33. Avoiding choking during oral care

1. What is “choking”?

Choking is a defense mechanism that occurs when saliva, water or food enter the trachea instead of the esophagus. Aspiration should be suspected when choking occurs. Swallowing requires the individual to meet the following five conditions:

1) The patient should be aware enough to recognize liquids and foods
2) The lips, tongue and teeth should allow sufficient function to form a bolus and move the bolus to the posterior tongue
3) Occlusion needs to be stable and patients can breathe through the nose
4) Laryngeal elevation should be sufficient and the arytenoid cartilage and epiglottis should work correctly to move the bolus to the esophagus
5) The entrance to the esophagus needs to be sufficiently open

When these motions are inadequate or occur in the wrong sequence, aspiration may occur

2. Notice for oral care

1) Avoid keeping water in the oral cavity as much as possible

Water flows fast, and thus easily reaches the pharyngeal region. Swallowing function is often reduced in elderly patients who need nursing, and such individuals often show difficulties holding water in the mouth. As a result, “choking” is relatively frequent. For this reason, water should not be kept in the oral cavity. When the patient shows a dry mouth, prior to starting oral care, the lips and oral mucosa should be moistened using a sponge brush to absorbed excess liquid. The sponge brush should be wrung to remove excess water from the oral cavity.

3) Confirm level of consciousness prior to initiating oral care

If the patient is not sufficiently awake, the risk of aspiration is markedly increased. Steps should therefore be taken to ensure the patient is as awake and alert as possible before starting oral care.

3. Performing oral care

1) Position

A sitting position is preferable, although Fowler’s position is comparatively safe for patients who show difficulty keeping a sitting position. In either position, the head should be leaning forward to preventing liquid entering the pharynx incorrectly.

If Fowler’s position cannot be used, a semi-Fowler position, supine position or lateral decubitus position should be used, taking care to avoid aspiration and liquid entering the larynx. In particular, when performing oral care for a patient with hemiplegia in a supine position, the paralyzed side should be uppermost.

2) Moistening the oral cavity

When a dry mouth is recognized, the oral cavity should be moistened before proceeding any further with oral care. If oral care is provided with a sponge and tooth brush while the oral cavity is dry, the oral mucous membranes may be damaged. As mentioned above, care should be taken to avoid leaving excess water in the oral cavity. Therefore, after moistening the mouth, excess water and saliva should be removed using a sponge (after wringing any excess water from the sponge) or suctioning.

3) Gargling

Gargling should be performed if the patient can raise the upper half of the body. Care must be taken to prevent liquid entering the pharynx. This can be largely avoided by leaning the patients head forward. If the upper half of the body cannot be raised, the oral cavity can be washed out with the patient in a supine or lateral decubitus position. Place a towel and gargle basin under the face to receive any liquid spilling from the mouth and pull down the angle of the mouth, then wash the mouth out slowly. Again, excess liquid in the oral cavity needs to be removed by suctioning.

(Yoshiaki Shimizu)

Glossary:

Laryngeal penetration: The term means that the food or liquid enter into the entrance of laryngeal but do not pass the glottis.

34. Gargling and the elderly

1. Overall issues in the elderly

Elderly people have had a wide variety of experiences in their lives and the symptoms that present thus vary widely. Socioeconomic status, emotional state, medical history and traumatic experiences can all exert long-lasting effects on the individual. As a result, oral care for the elderly needs to be performed with a sense of respect for the patient and their experiences. Caregivers should take an interest in the patient's life and need to understand overall issues such as degrees of disease, medical history, daily habits in terms of oral function and care, and family background (Fig. 1).

In addition, caregivers should try to understand the situation of the patient's disease and personality, and within those relationships with the patient, caregivers should help the elderly patient to understand the importance of gargling and act to improve QOL in a safe, easy and effective manner (Fig. 2).

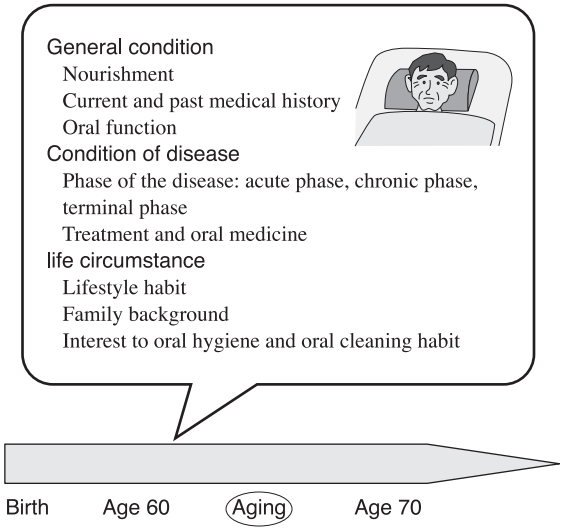


Fig. 1 Whole picture of elderly people

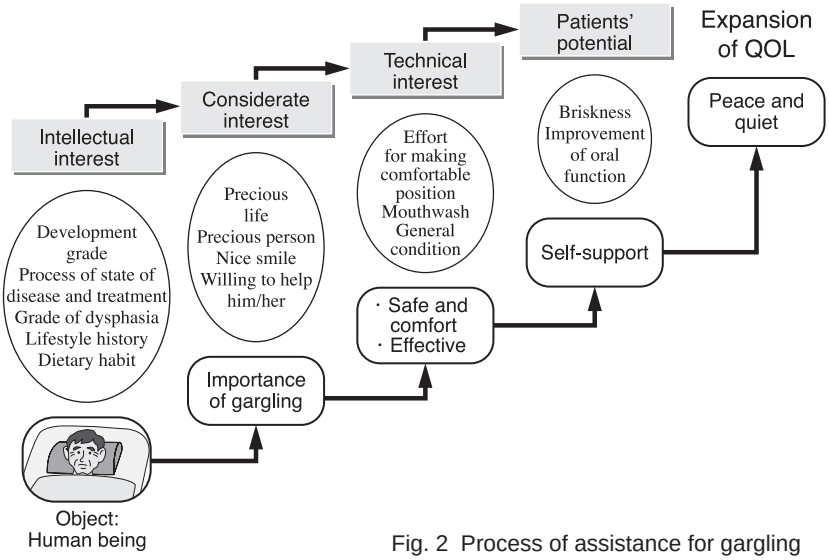


Fig. 2 Process of assistance for gargling

2. Conditions required for gargling in the elderly

Before getting an elderly patient to attempt gargling, oral function and condition need to be checked. The following conditions need to be met:

1) Condition of oral function

Ability to close the lips and hold water in the mouth

Ability to maintain oral pressure

Ability to spit out water

No aspiration with the position used

2) Body condition

Ability to understand instructions for gargling

Settled body condition (fever, aches or nausea are absent)

Ability to communicate lucidly with others

Ability to maintain comfortable positioning

No change in vital signs after gargling in comparison with the vital condition before gargling

3. Important issues in gargling

1) Positioning

Elderly people often require help with gargling, and may experience difficulty with holding a suitable posture due to reduced muscle tone and palsy, so that even on a bed or wheelchair they may collapse or fall forward. In preparation for gargling, a pillow placed at the back in the lateral position or on the paralyzed side in a sitting position may be useful. Help may also be needed in maintaining left-right balance.

Patients in wheelchairs should wear slippers that cover the foot (shoe-type) and the bottom of the foot should rest on the pedal or floor. Depending on the patient's condition, use of a safety belt may be worth considering (however, consent must be obtained from the patient or their family/guardians before implementing such procedures).

2) Issues to check

A small quantity of water should be held in the mouth, to check if gargling can be executed safely and easily. If stirring water enough in mouth is difficult, hold larger quantity of water in mouth and increase duration of gargling.

In addition, 1: get the patient to perform gargling slowly; 2: get the patient to take a breath after each gargle, and avoid gargling continuously; 3: get the patient to breathe through the nose while gargling; and 4: notice the patient's breathing and make it stable after gargling.

(1) Executing gargling in a lateral position

For holding water in mouth, a rakunomi (a kind of drinking vessel with a spout) is often used. Adjusting the angle for pouring water into the mouth can be difficult with a rakunomi, and it is easy to accidentally pour too much water into the mouth. Caution is therefore required. When aspiration is severe and a patient requires adjustment of the amount of water, an injector may be used.

(2) Gargling in patients with dementia or dysphagia

Gargling may be achieved with rehabilitation and repeated training. As an example, one patient with dementia who had undergone surgical resection of oral cancer and showed hypoactivity of lip closure and tongue function was able to use a waterpik which is structured with the tap and the plastic tube. With practice, this patient was able to make gargling a daily habit (Photo. 1).

Photo. 1 Basic waterpik made with injection kid connecting to plastic hose pipe

(3) Patients with visual disturbance

Patients with a long history of visual disturbance may be quite adept at not only gargling, but also using the toothbrush and interdental papilla brush. Some help may be required, but usually just watching the patient will be sufficient. Patients with recent visual disturbance may initially be very reliant on caregivers for oral care, such patients need to become self-reliant in the early stage.

3) Other issues

Checking the vital signs of elderly patients is important, as the patient may be suffering from a number of different conditions and experience lower strength stock after gargling. In particular, elderly patients with circulatory problems need rest after gargling, and breathing should be observed in patients with respiratory problems (noting respiratory rate or sustained breathing effort as suggested by actions such as nasal flaring).

(Chihoko Tabata)

Glossary:

Vital signs: Signs or findings indicating the patient is alive. Heart rate, respiratory rate, temperature and blood pressure are all important vital signs.
Normal heart rate: 60-70 beats/minute in the elderly
Normal respiratory rate: 16-20 breaths/minute in adults
Normal temperature: 36-37℃ (axilla, or armpit), showing circadian variations of within about 1℃
Normal blood pressure: maximum systolic, 110-130 mmHg; minimum systolic 60-90 mmHg

35. Instruction of gargling for children

1. When should children start learning to gargle?

Gargling requires coordination of the lips, tongue, cheeks, pharyngeal and laryngeal muscles, muscle of the neck and associated nerves. Practice is therefore needed. Children are generally considered able to drink water from a cup from about 18 months old. Childhood development varies widely between individuals, but practice with bubbled gargling (rinsing a mouth) can often be started from around 2 years old. Research has shown that percentages of children able to rinse liquid inside the mouth without drinking it were 20.3% at 24 months, 57.5% at 30 months and 92.2% at 36 months.

Rattled gargling (gargling a throat) is more difficult in comparison with bubbled gargling and thus requires more time to learn.

2. How to teach gargling

When teaching gargling to children, it is important to stimulate their curiosity and make them interested in gargling, and repeated practice and any improvements should be encouraged with praise. Adults should demonstrate the technique and emphasize comments like “swishing and rinsing the water around helps clean the mouth clean and make us feel good, doesn’t it?” and encourage practice.

Practice can involve holding a little water in the mouth for a few seconds before spitting it out. On the very first try, children often have difficulty holding the water in the mouth and may drink it. Since spitting water from the mouth is also a learned skill, water may instead trickle from the mouth (Photo. 1). After many repetitions, the child may be able to hold water in the mouth and spit it out. Subsequent practice can involve closing the lips firmly while holding water in the mouth, then puffing out the cheeks on alternate sides (Photo. 2) before spitting the water out (Photo. 3). Again, the technique can be demonstrated by an adult. Since gargling practice is likely to result in water spilling on the floor, practice may be best performed in a bathroom.

For practicing rattled gargling, an adult should demonstrate the technique with the head looking upward. Children are often able to learn this method by around 5 years old.

If children learn how to gargle early, the activity may become a daily habit. The rates of improvements in the techniques depend on the individual, so adults should be patient even if children do not succeed with the task they are practicing, and encouragement should be given with each step forward. Learning patience and commitment to practicing is as significant as learning the actual skills being practiced.

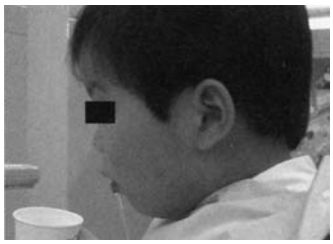


Photo. 1
It is difficult for children to spit out water, it spills out of the mouth at early times

Photo. 2
Practice with holding water and to puff out children’s cheeks and return to the former position mutually

Photo. 3
Practice for spitting water from the mouth

(Nobuko Atsumi)

IV Dentures

36. Types of artificial denture

Artificial teeth allow the recovery of function and esthetics following tooth loss. The following classification can be used according to the number of teeth lost:

1) Artificial denture for the entire arch: this is what is commonly thought of when we use the term "dentures", and is used when all teeth from the arch have been lost.
2) Removable partial dentures: also called "partial artificial teeth", used in the wide range of numbers of teeth, both when only one teeth is remaining and when only one teeth is missing.
3) Bridge artificial denture: also called a "bridge", a special set of artificial teeth used to cover the loss of a small number of teeth.

Complete dentures and removable partial dentures can be removed by the patient, whereas some types of bridges can removed, and other cannot.

1. Artificial denture for the entire arch (Photo. 1)

These dentures are used in the absence of existing teeth in the arch. The load is therefore placed entirely on the mucosal surface, and the dentures provide neither maintenance nor support of dentures. The fit with the mucosal surface thus greatly influences the safety of these dentures. Regular examination and adjustment is needed to maintain the fit.

As patients requiring such dentures have no teeth remaining in the arch, use of these dentures can achieve a large advance in QOL, not only allowing chewing function, but also offering a marked esthetic improvement.

Resin is used for the floor part of the denture, while a harder resin or ceramic is used for the artificial teeth. Some artificial dentures use metal in the part corresponding to the mucous membranes. However, because adjustment of such dentures to fit the mucosal surface is difficult, such materials are becoming less common.

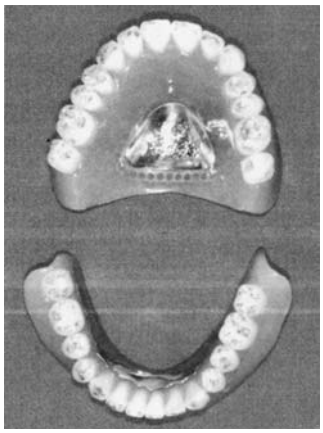


Photo. 1 Entire floor artificial denture
Sometimes metal is also used for the palatal region in maxillary dentures and sublingual region in mandibular dentures. If a good fit can be obtained, the feeling after installation is excellent

2. Removable partial denture (Photo. 2)

The removable partial denture is frequently used, and is a plate denture with a wide range of applications. A high load is placed on the mucosal surface if only few teeth are present. When a small number of teeth are lost, the load of maintaining the denture rests on these remaining teeth. In any case, the remaining teeth are used to maintain the removable partial denture. The design of the denture therefore changes according to which teeth are present. In addition, many designs and forms of denture are available to improve maintaining the denture.

The esthetic value of the artificial denture depends on the tooth loss being covered. For instance, the influence of losing

Photo. 2 Removable partial denture in metal base.
Degree of freedom is a high design. The installation feeling is good, and the design that thinks about how of the occlusal force to the existing tooth to join enough is possible

molars on esthetics is minimal. Conversely, the esthetic impact of a maintenance device covering a loss of front teeth is high, and the esthetics of the artificial teeth must then be considered carefully. In such cases, the maintenance device might include the form of a tooth crown.

As for materials, metal is used for the maintenance device, with hard resin used for artificial teeth. The same resin is usually used for the floor, although metal dentures can also offer excellent feeling and strength.

3. Bridge artificial denture (Photo. 3)

Bridge artificial dentures cover the loss of only a small number of teeth. The denture usually uses anchor teeth on either side of the area of tooth loss, with metal bringing the anchor teeth and the defective part together.

A wide variety of methods is available for attaching to the anchor. The installation feeling does not have much discomfort and patients do not feel much differences between being with own teeth and being with bridge artificial denture.

A fixed bridge artificial denture is designed by considering the of the existing teeth and the defective part. A removable bridge artificial denture is made when the area of tooth loss is large, and cleaning of a fixed bridge may prove difficult. Care must be taken when handling a removable bridge, as the production of such dentures is very complex and precise. Again, use of this device offers excellent feelings on installation and can markedly enhance the esthetics of the mouth. The ability to detach and clean the denture is also excellent.

Photo. 3 Artificial denture of removable (The left: Uninstallation The right: Installation)
This is excellent in the installation feeling and appreciation of the beautiful. Making is complex. The user can detach and the cleaning is also excellent

(Akizumi Araki)

37. Method of insertion and detaching of dentures

There are two kinds of removable dentures. One is the complete denture applying to edentulous patients and the other is the partial denture applying to partially edentulous patients. The retention of the complete denture is achieved by the adhesive power of saliva and the absorptive power by border seal. Retention is the quality inherent in the dental prosthesis acting to resist the forces of dislodgment along the path of placement. In complete dentures, the adhesive power is generated by saliva existing between denture base and residual mucous membrane. On the other side, the border seal can be achieved by the contact of the denture border with the underlying or adjacent tissues to prevent the passage of air. It is the same principle as the suction disk comes unstuck from the board easily when the air enters into the inside. When air gradually enters in the disk and it comes unstuck, the adsorptive power is enhanced by applying the small quantity of water to the suction disk and by pressing the disk. However a complete denture constructed by the precision impression is in close contact with the foundation tissue of residual ridge, there is a minute space between the denture base and residual ridge. The intervention of saliva in the minute space enhances the denture retention. In addition, saliva acts to lubricate the denture base and residual mucous membranes, and reduce friction of the denture originating in occlusal force.

1. How to insert and/or detach complete dentures

1) Method of inserting

① The denture is wet with water.

② The denture is inserted in the mouth while rotating, because the width of the denture is larger than that of the mouth

③ When the denture is seated at the proper position, it is pushed toward residual ridge at the artificial molar teeth in order to push out the air.

④ The lower denture should be seated earlier than the upper denture. The reason is that when the denture is set up the cheek is extended, and the air invades between the denture base and residual mucous membrane, and the retention of the upper denture becomes lost.

2) Method of detaching

① To detach the denture, it is necessary to break the border seal. For that purpose, patients pick up or pull down lips or cheeks of one side with finger tips. After that, patients pull down or lift up artificial anterior teeth of the denture with finger tips of the other side.

② When the border seal is strong, patients are made to contain water or tea in the mouth, and to direct to puff out their cheeks. As a result, the border seal of the denture are broken, and the denture is detached easily.

③ Patients rotate the denture in the mouth and take it out.

2. How to insert and/or detach removable partial dentures

1) Method of inserting

In partial dentures, there are some retainers and rests in addition to the denture base and artificial teeth. The retainer is a component part applied to resist movements away from the teeth and/or tissue provides retention for the denture (Photo. 1). The rest is a small projection of metallic that projects from clasp or denture base, and adapts to the rest seat of abutment tooth in removable partial denture. The rest seat is a prepared recess in a tooth to receive the occlusal, incisal or lingual rest. The rest prevents movement toward the mucosa and transmits functional forces to the teeth.

① A large partial denture is inserted by rotating the denture, as with complete dentures (Photo. 2). In this case, it is recommended to seat the partial denture to the abutment tooth covering the tip of retainer with the finger tip so as not to damage the mucous membrane of the lip and/or the cheek.

② Once the denture is inserted to the required position, the pressure by fingers is applied along the axis of the abutment teeth until the rest is seated to the rest seat (Photo. 3, 4). Then, it is confirmed by tapping movements of mandible whether the denture can be seated the proper place or not. Patients should be noted that biting force should not be applied when a partial denture is inserted.

2) Removal method

When the upper partial denture is removed, a right and left forefinger is hung on the clasp, and the denture is pulled down toward the parallel direction to the tooth axis. When the lower denture is removed, it is lifted up with the tip of thumbs oppositely. When taking out of the mouth, the patient should note that the denture damages the soft tissue in the mouth.

Photo. 1 A removable partial denture
Retainers, rests and a lingual plate which is one of major connectors contacting the lingual surfaces of the natural teeth are designed

Photo. 2 A large removable partial denture is inserted while rotating

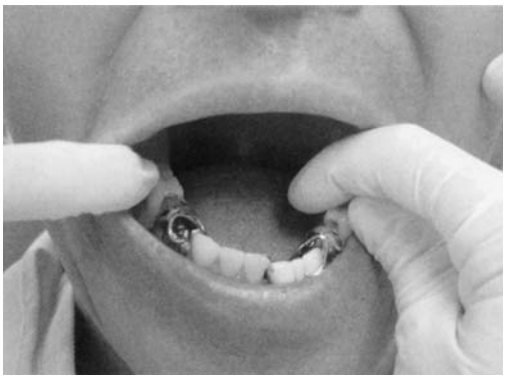


Photo. 3 The denture is put in mouth

Photo. 4 The denture is seated at the fixed position by the pressure of finger tips until the rests are adopted to rest seats

(Toshihiro Hirai, Hisashi Koshino)

Glossary:

Residual ridge: The portion of the alveolar ridge that remains after the alveoli have disappeared from the alveolar process after extraction of the teeth.

38. Management of artificial dentures

1. Cleaning of artificial dentures

As artificial teeth have various shapes, places in which bacteria and food residue may accumulate varies. After ingesting meals or medicines, minute particles may become trapped between the denture and the mucosa. Moreover, because the artificial denture is made based on the loss of individual teeth, the structure is complex. Therefore, even though the device may appear extremely smooth, many rough areas or irregularities may be present (Photo. 1). As a result, the following points need to be kept in mind for cleaning:

1) As residual materials may not be easily removed from the inside of the artificial tooth floor, the inside of the clasp, and the surfaces adjoining existing teeth should be gently polished.
2) To avoid damage to artificial teeth during cleaning, a washbowl should be prepared.
3) A toothbrush can be used, even if not specifically designed for use on artificial teeth. In case of crippled patients a toothbrush specifically designed for artificial teeth should be used. When a sense of incompatibility and chewing pain are reported by the patient, the dentures should be adjusted by a dentist. Neither the oral care professional nor the family should make adjustments without permission from the dentist.

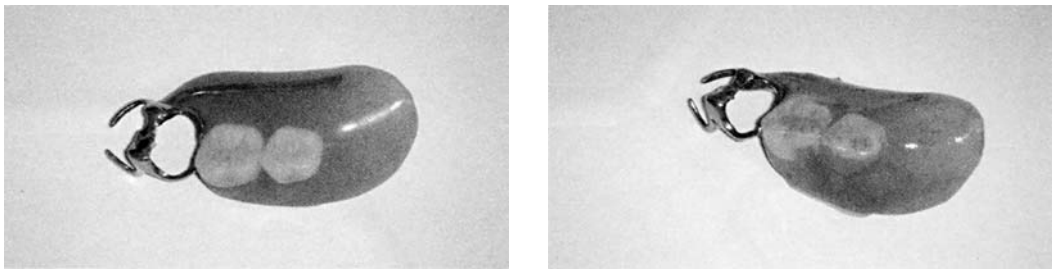


Photo. 1 It is not polished though it seemingly looks beautiful
The left: Before dyeing the dental plaque The right: After dyeing the dental plaque

2. Storage

1) As the detached artificial tooth may develop cracks and other changes with drying, the device should be soaked in water and kept in a suitable container. The water should be exchanged every day.
2) Do not risk attempting to decontaminate the device using hot water or chemicals, as these may damage the artificial teeth.
3) Patients (particularly those with dementia) may accidentally insert artificial teeth belonging to others, and may occasionally misplace their artificial teeth. These devices should therefore be labeled with the name of the patient (Photo. 2).

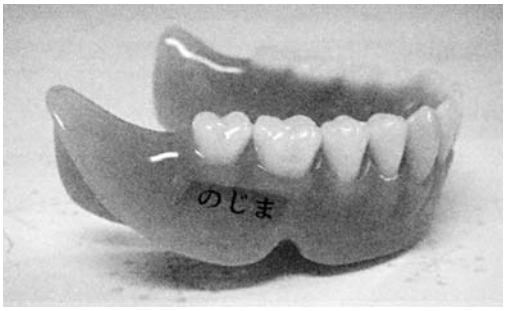


Photo. 2 To prevent the loss, the name is put in the denture

3. Handling dentures at night

1) Wash artificial teeth in flowing water from the tap.
2) Remove artificial teeth before going to bed. This is particularly important for small artificial teeth, which might be swallowed or aspirated. Removing artificial teeth will also allow the tissues in the region of the denture to remain healthy and will help prevent a sore mouth.
3) When going to bed, cleaning agents specifically designed for artificial teeth can be used overnight. The teeth can then be used the next morning.

Artificial teeth might need to be removed following problems with general status such as a decrease in weight.

During oral care, the state of artificial teeth should be examined.

When patients report problems with artificial teeth and the oral mucosa, examination by a dentist is warranted. Even if no abnormality is found, strain in the temporomandibular joint is likely. Correct knowledge about the timing of regular consultations with the dentist and methods for handling and management are required.

(Hatsumi Nojima, Masaru Miyata)

39. Oral care after removal of artificial teeth

First, observe the process used to remove the artificial teeth.

Next, examine the detached artificial teeth and the mouth.

Finally, provide care for the inside of the mouth and the artificial teeth.

1. Observation of artificial teeth

Confirm whether the patient can correctly remove the artificial teeth without assistance.

Confirm the time required for denture removal, and confirm if duration for dental removal is not prolonged in comparison with that at last time.

For patients requiring assistance, a care plan can be extremely helpful.

When removing the denture, note whether the patient reports any pain.

Next, the detached artificial tooth is observed. Key features to look for include accumulations of foreign material on the artificial teeth, damage, use of stabilizer for artificial teeth, and the characteristic smell of artificial teeth (Photo. 1).

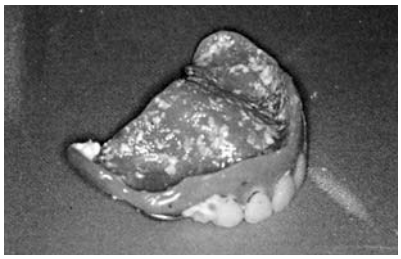


Photo. 1 Artificial tooth detached from mouth.
The observation point is presence of the presence of the dirt of the artificial tooth, the level, disrepair, and the artificial tooth stabilizer use, and the presence of the smell

2. Observation in mouth

1) Examined whether any food residue is present in the mouth after the artificial tooth is detached. Specific sites of accumulation should be noted. Food residues are common on the affected side when the patient shows paralysis involving the mouth.

2) Observe whether wounds are present on the mucous membranes (e.g., residual ridge) covered by the artificial teeth and mucosa of the cheek and tongue. Biting function may be impaired if artificial teeth dig into the lining of the mouth, causing painful wounds. Remaining teeth might also cause wounds in the gums.

3) When teeth are remaining, the state of teeth should be observed. Key points to observe are swelling and accumulations of plaque or residual food, tooth decay, and the surrounding gingiva.

4) Determine whether the mouth is dry. Dry conditions can affect the adsorption of artificial teeth, and may reduce the stability of artificial teeth in the mouth.

3. Oral care

Cleans the teeth using a toothbrush when teeth are still present. In particular, teeth used as anchor points for clasps or wires from dentures are often dirty, and require thorough brushing. Supplementary cleaning between the teeth is also recommended, and the buccal mucosa should be cleaned using a sponge brush.

When the patient is edentulous, wipe all the oral surfaces with a sponge brush, and remove any tongue coat using a tongue brush.

4. Caring for artificial dentures

After removal, artificial dentures can be cleaned using a toothbrush. Particular attention should be given to the clasps for attachment to the teeth, which can become very dirty. After carefully removing all plaque adhering to the inside (mucosal surface) of the artificial teeth and the surfaces are clean, rinse with clean water.

When the dentures should massive accumulation of plaque, artificial tooth cleaning agents and an ultrasonic cleaner can be used.

(Kimio Aoyagi)

40. Types and components of adhesives for dentures

1. Types

"Adhesives for dentures" and "stabilizers for dentures" are terms with the same meaning, also commonly referred to as denture adhesive.

If the denture does not fit the alveolar ridges for some reason, and use is compromised by wobbling in the oral cavity, a denture adhesive is needed to improve stability.

The qualities of denture adhesive are described by the Pharmaceutical Affairs Law.

Such adhesives can be classified as adhesive-type paste for denture base stability and cohesive-type paste for denture base stability. On the other hand, marketed denture adhesives can be variously classified as cream type, tape type (seal type, seat type), cushion type and powder type according to the properties demonstrated.

We can also classify adhesive into two kinds according to the method of fixing the denture base to the oral cavity: denture adhesive; and the Home reliner (Fig. 1, Photo. 1-4).

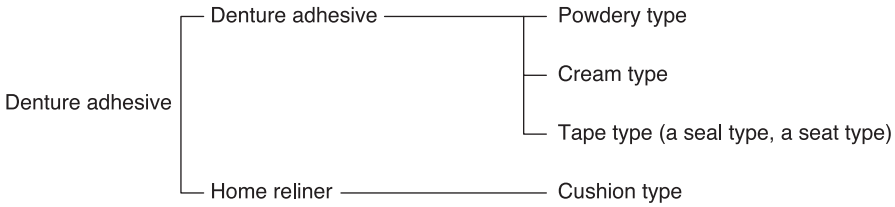


Fig. 1 Classification of the denture adhesive

Denture adhesive increases to maintain dentures by becoming hydrated in the mouth, increasing the viscosity of saliva between the dentures and the mucosal surface.

Three kinds of adhesive are used: tape type (seal type or seat type); cream type; and powder type.

The Home reliner is gummy and has cushion characteristics. This adhesive immobilizes the denture by filling the gap between the denture base and mucosa.

Below are directions for using denture adhesives, according to the specific properties.

1) Powder type

Sprinkle on the wettened denture, then remove surplus powder and insert the denture. Advantages of this type include the simplicity of use and the thinness of the layer formed by the highly adsorptive powder. Disadvantages include the low durability of the adhesion, as the particles are readily washed away in the oral cavity, and the need to re-apply the

Photo. 1 Powdery type

Photo. 2 Cream type

powder with every insertion, as the powder is washed off with every rinse.

2) Cream type

Squeeze the cream from the tube and apply to the mucosal side of the denture base, then spread evenly in a thin layer over the base surface. The cream is durable and provides strong adhesion, as saliva does not wash the cream away as readily as the powder. Also, we can use it to the severely unsettled denture.

3) Tape type (seal or sheet type)

As the tape itself has a certain thickness, the contours of the denture base may show minor mismatches with the oral mucosa. After dampening the denture base, the tape is applied to the mucosal side of the denture base. The tape is extremely simple to use, but requires frequent exchange to prevent the tape becoming fouled with waste material.

Also, residues often remain attached to the mucosa after removing the denture, and elimination can be difficult as well as powder and cream type.

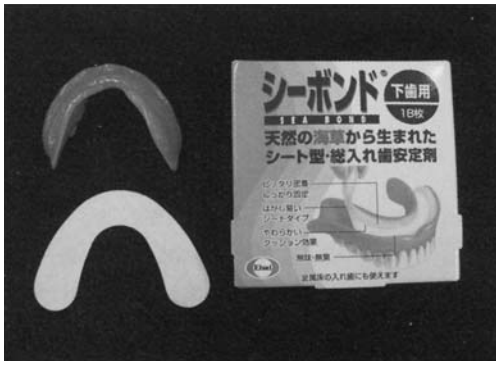


Photo. 3 Tape type

Photo. 4 Cushion type

4) Cushion type

This type of adhesive shows elasticity and resistance to staining compared with other adhesives, allowing repeated use. After wiping off excess water from the mucosal side of the denture base, locate the home reliner held in the shape of a 2- to 3-cm ball whether it is several places and occlude 2-3 times to cover the whole surface of the mucosal side of the denture base. Any protruding home reliner should be trimmed.

The cushioning effects of this adhesive can mitigate occlusal forces and prevent pain on the residual ridge and mucosa from the denture base during chewing and articulation. However, occlusal position and occlusal vertical dimension may be variable change, and one key drawback is that absorption of the alveolar ridge may occur because the home reliner is prone to thickening.

In addition, the Home reliner shows strong adhesion to the denture base, and removing the stabilizer is thus difficult.

2. Component of denture adhesives

Chief ingredients of marketed denture adhesives are shown according to the type, as follows.

l) Powder type

Powder-type adhesives typically contain powdered water-soluble polymer (carboxymethylcellulose sodium), powdered natural rubber (including karaya gum and gum arabic). These powders absorb intraoral moisture to swell and form a hyperviscous liquid that increases denture retention.

2) Cream type

Cream-type adhesives include polyethylene glycol and white petrolatum in addition to carboxymethylcellulose sodium, in a cream form.

3) Tape type (seal type, seat type)

Tape-type adhesives are in the form of a non-woven sheet containing carboxymethylcellulose sodium, polyethylene glycol and sodium alginate.

4) Cushion type

Cushion-type adhesives add ethanol with vinyl acetate in the non-water soluble polymer and show a degree of plasticity. A separate detachment accelerator is also included, containing polypropylene glycol.

As noted above, these products need to be distinguished according to the required use, because very different characteristics are seen between denture adhesives and home reliner. In particular, when a denture shows a gap with the mucosa that is accommodated using the home reliner, adjustment by a dentist should be attempted before using the home reliner.

Talking with a dentist is also recommended when denture retention isues include a component of anxiety.

As incorrect usage of adhesives risks causing abnormal absorption of the alreolar ridge and abnormal occlusal relationship, use these materials only under the direction of the dentist.

(Masami Hattori, Tatsuya Mizuno)

Glossary:

Mucosal side of the denture base: The surface of the denture base in contact with the residual ridge and palatal mucosa. We are involved in the support/maintenance/stability of the denture.

41. The purpose of denture cleaners

1. Contaminants peculiar to artificial dentures — Candida —

Around 600 kinds of bacilli exist in the mouth, forming the bacillus bush (MEMO1). In particular, three times the number of bacilli are confirmed in the dental plaque and glucan that adheres to the mucous surface. Moreover, bacilli and fungi in the mouth change according to factors such as the specific oral environment, age, lifestyle, contents of meals, and presence of underlying disease.

Bacilli and food residues adhere to artificial teeth in the mouth.

MEMO 1 Bacilli known to be present

1. Streptococcus
2. Staphylococcus
3. Diplococcus
4. Corynebacterium
5. Actinomycetes
6. Lactobacillus
7. Bacillus
8. Clostridium
9. Neisseria
10. Fusobacterium
11. Selenomonas
12. Porufiromonas
13. Spirochete

Candida is a kind of fungus, and is rarely detected in healthy individuals. However, candida readily colonizes the mouth when immunodeficiency develops and immune defenses are low. Candida can then become a pathogen, forming accretions on the mucous membranes and tongue, and causing inflammation.

Candida shows a particular tendency to adhere to resins in the denture base. Furthermore, minute irregularities and the wound on the surface of the resin, the wound and joint parts with the maintenance device allow candida to enter in and proliferate.

Bacilli such as staphylococci also readily adhere to the surface of artificial teeth.

The risks of ulcer formation around artificial teeth and aspiration pneumonia both increase markedly when artificial tooth accumulate contaminants. As the vast majority of individuals with artificial teeth are elderly who are already at risk of these problems, artificial teeth need to be kept clean.

Appropriate cleaning agent to remove candida, cleaning methods, and methods of storing cleaned artificial teeth are needed, as decreased immune function, underlying pathologies and use of various medications may all contribute to constant replacement of contaminating bacteria.

Candida removal has recently gained attention and sales of specific cleaning agents targeting these fungi have increased.

2. Components and use of denture cleaners

Basic components of artificial tooth cleaning agents sold in dental clinics and pharmacies include surfactant to reduce plaque accumulation and saburra on the denture surface, foaming agent, and enzymes with antibacterial effects, and active oxygen.

MEMO 2 Main components in denture cleaner and their roles

1. Peroxysulfuric acid, salicylate: Sterilization and disinfection
2. Sodium perborate, sodium percarbonate: Non-chlorine chlorine
3. Protein dialytic ferment: Contaminant (saburra) resolution
4. Alkylbenzene sulfonic acid, fatty acid ester: Surfactant (cleaning ingredient)
5. Flavonoid, alkali metal silicate salt: Disinfectant and deodorant

Blowing agents, colors, food additives, etc. are also included, in addition to the above.

Directions for using artificial tooth cleaning agents require the initial removal of large accumulations of contaminants, residual food and solids with a toothbrush before soaking the artificial denture in the cleaner, then resolve and disinfect the dirt on the maintenance part of the artificial denture.

The main components in denture cleaners and their roles are shown in MEMO2.

3. Notes on denture cleaner use

1) Care must be taken to avoid accidental ingestion or contact with skin and clothes, as denture cleaners contain the surface-active agents and bleach.
2) As these cleaning agents painted directly on the artificial denture may increase a fine grain grinder, wear on the denture base with frequent use may increase roughening of the surface, facilitating adhesion of contaminants.
3) The resin in the denture base will become bleached with increased duration and frequency of soaking in cleaning agents, resulting in whitening/translucency and thinning with current artificial tooth cleaning agents.
4) Do not use the toothpaste medicine for cleaning the artificial tooth, because it causes the surface of the artificial tooth worn down and due to wearing down, morphological incompatibility changes with denture dimensions may be caused. Furthermore damaged surface for artificial tooth may affect mucosa touching to the artificial tooth.

(Sumito Konishi)

42. Changes in taste and discoloration with denture use

1. Changes in taste with denture use

Taste disorder is a physiological phenomenon that occurs with aging regardless of the presence of dentures. While a diminished sense of taste occurs with age, the extent differs between individuals.

Moreover, a person who has not previously used dentures may experience taste disorder due to psychological factors such as disgust or discomfort with the foreign-body sensation when first using the denture.

Factors associated with changes in taste after wearing dentures include a material factor and a prosthetics factor.

1) Material factor

As high-polymer plastic(resin) is the major component in dentures, moisture can be absorbed. As a result, chemicals present in saliva, foods, colorant, and bacilli are absorbed along with moisture into the denture. This can lead to tastes remaining present in the mouth for an extended period after swallowing. The denture base can also give a metallic taste if metal is used in the construction.

2) Prosthetic factor

The palate or residual mucous membrane are covered with the denture, and this can result in temporary taste disorder and functional disorder of pronunciation. This is because the tactile stimulus of the tongue to the palate and the pressure stimulus during bolus formation are disturbed by the denture. Sensations of texture and temperature can also be decreased.

In addition, because the denture narrows the oral cavity and limits tongue movement, taste is diminished. Patients usually become accustomed to these changes after some period of time.

2. Discoloration of dentures

1) Causes of discoloration

High-polymer plastic is the major component of dentures, with other parts (hook, floor, etc.) made of metal. The metallic portions might deteriorate with long-term use, and become discolored by exposure to acidic foods and formation of oxides and sulfides.

Moreover, discoloration occurs not only at the surface of the denture as “denture plaque” and food debris, but also penetrates the material because the plastic is water permeable, so colorants from food,

Photo. 1 Discoloration of denture by long-term use of chloric denture cleaning agent. It discolors in white

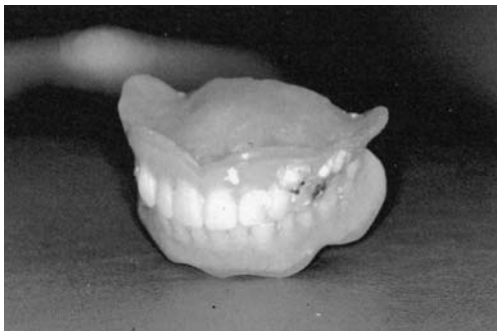


Photo. 2 Senior citizen’s post-meal denture. Here is food debris

bacteria, medicines and other materials soak into the resin.

Denture cleaning agents using hypochloride have a discoloring effect along with a strong bactericidal effect. The metal and plastic of the denture might also become discolored with frequent or extended use of such agents (Photo. 1).

2) Prevention of discoloration

After meals, cleaning with a brush is important to maintain the appearance of dentures (Photo. 2). Use of a denture cleaning agent every few days is also helpful, along with use of an ultrasonic cleaner.

(Hiroshi Murakami)

43. Notes on meals for patients using dentures

After confirming the oral situation, the patient with dentures should be encouraged to eat meals matching the situation of the existing teeth.

If an denture falls out or fragments, aspiration may occur. First, whether the prosthetic appliance (denture, bridge, crown) is at risk of falling out is confirmed. When an denture shows poor condition or a crown is unstable, a dentist should be consulted, and a physician should be seen regularly.

If bite function is poor because of dentures, food intake might be decreased, and the mucous membrane could be damaged. In such cases, changing cooking methods may be helpful.

1. Device of form and cooking method of food

The size of the ingredient should be considered. For instance, ingredients that are cut into smaller pieces may be easier to eat. However, slicing ingredients too thinly may make biting and chewing unnecessary, and would thus reduce the positive benefits obtained by chewing. Trial and error should be used to identify the optimal thickness.

Total arch dentures may be readily dislodged when biting on hard objects with the front teeth. The mucous membranes are easily damaged when dentures are displaced, so hard foods should be avoided, particularly when dentures have just been installed.

When the mucous membrane has been damaged, strong pain can result from stimulation, so soft boiled foods are recommended.

Foods such as mince are readily dispersed throughout the mouth, rather than remaining together. Moreover, grainy foods like sesame seeds might cause pain during chewing if they get between the denture and the mucous membrane. Such foods should be avoided.

If food intake is decreased, a liquid diet may be considered. However, this does not give the patient the opportunity to quickly become accustomed to the denture, as the patient has no opportunity to chew.

Great care is required when eating foods that may stick strongly to the dentures, as these may easily cause displacement of dentures.

2. Other notes

1) Food temperature

When total arch dentures are installed, temperature sensitivity may be reduced with the upper jaw.

2) Moisture replenishment

Chew may be facilitated in patients with low salivary flow if accompanied by moderate amounts of liquid, such as soup.

3) Consideration to good appetite with smile

Patients are often not happy eating alone. Enjoyment while eating is improved by the surrounding atmosphere, such as watching television, listening to music, or simply talking with the family.

(Kazuko Yamada)

44. Odors from dentures

1. Cause of odors from dentures

High-polymer plastic is the major component of dentures. Various substances can thus permeate the prosthesis with moisture such as saliva. The odors that result depend on the component materials.

In addition, plaque and the products of microbe metabolism adhere to the dentures surfaces.

The principal causes of the odor from dentures are volatile sulfur compounds (VSCs) produced by microbes. VSCs include hydrogen sulfide [H_2S], methyl mercaptan [CH_3SH], and dimethyl surfide [$(CH_3)_2S$].

Several kinds of organic acids, ammonia, pyridine, and acetones have been detected. These compounds are also thought to contribute to the odors associated with denture use.

2. Removal of odors from dentures

Concentrations of VSCs must be decreased to remove the odors from dentures. Cleaning is therefore important. However, suitable daily cleaning can be difficult.

Use of a denture cleaning agent after brushing is recommended. When accidental ingestion of a cleaning agent is a concern, a denture washing machine is recommended.

The ozone denture washing machine (Photo. 1) is an ultrasonic cleaner that produces ozone, which has strong anti-bacterial and deodorizing powers. Tap water becomes ozonated water, which is effective for deodorization. No other medicines are necessary. In addition, ozone becomes water in upon wearing the dentures, and is not harmful at all.

Cleaning of dentures and continued oral care including tongue cleaning is needed to prevent the odor from dentures.

Photo. 1 Ultrasonic ozonic cleaner

(Hiroshi Murakami)

45. Preventive of denture sore mouth

1. What causes denture sore mouth?

The first reaction occurs with pressure and friction on the mucous membranes below with the artificial denture. Circulatory failure then occurs in the part of flare, the mucous membrane sloughs off, and ulceration occurs. The resulting ulcer shows an irregular shape, but is shallow and smooth. The ulcer base shows an ash grey coloration.

Moreover, plaque adheres to the artificial denture. Sore mouth can arise due to stimulation by *Candida albicans* in the plaque. About 100 billion microorganisms exist in 1 gram of plaque, and artificial teeth often display accumulations of plaque.

Denture sore mouth can develop due to physical irritation with ill-fitting dentures, loss of bite diameter, vitamin B deficiency, and other factors. Soreness readily develops on the palatine mucosa or mucous membranes at the corners of the mouth.

Candida works as endogenous infectious toxin where the primary cause of bacterial infection is damage to the barrier formed by the mucosa due to chronic physical irritation.

2. Classification of denture sore mouth

1) Simple inflammation or congestion of spot (Photo. 1-3)

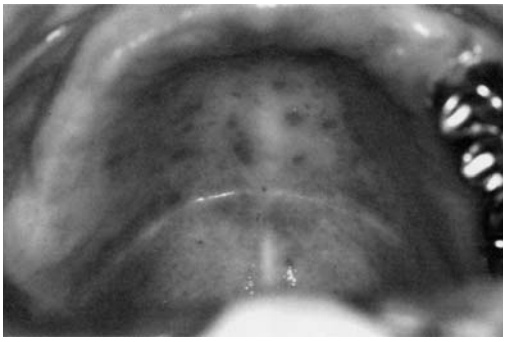


Photo. 1 The point is congested in the palatine mucosa in the artificial tooth below the floor level

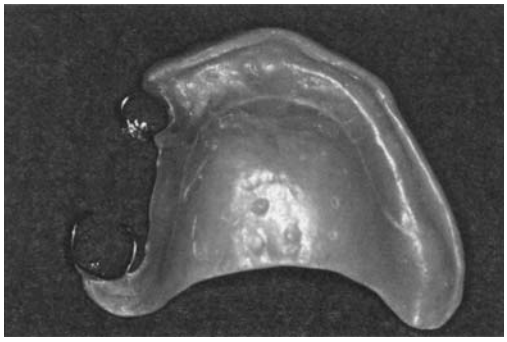


Photo. 2 Installed artificial denture

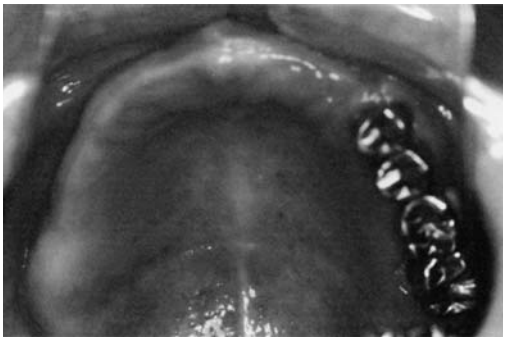


Photo. 3 After treating photo. 1. It recovers by the artificial denture adjustment and gargle

2) Mucous membrane from which partial or whole area is covered by the denture base, showing diffuse red spots (Photo. 4-5)

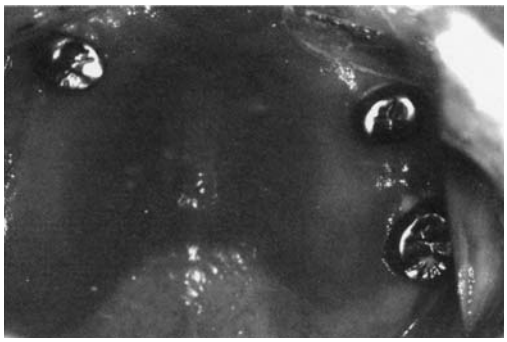


Photo. 4 There is pervaded diffuse red spot in the palatine mucosa in the artificial denture base

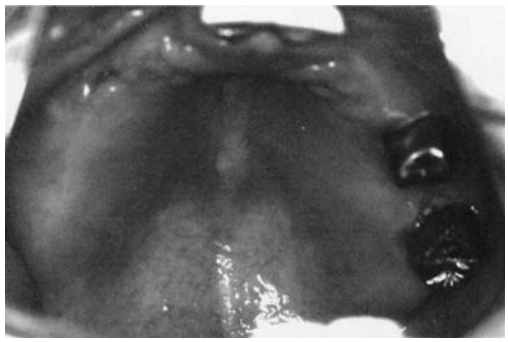


Photo. 5 After treating photo. 4. It recovers by the artificial denture adjustment and the mouth caring

3) The granulation (papillary hyperplasia), the center of the palate and the tooth ridges are usually contained.

3. Symptoms of denture sore mouth

Patients with denture sore mouth show pain on contact and burning sensation. Erosions develop as long as use of the artificial denture is continued.

The palatine mucosa shows a velvet-like or overripe strawberry-like appearance when chronic atrophic candidiasis and papillary hyperplasia of the palate occur under ill-fitting dentures. The palatine mucosa shows a tendency to bleed with slight pressure.

Chronic atrophic candidiasis of the palate is common in patients with denture sore mouth. However, this condition is not detected as often as acute candidiasis.

4. Candidiasis

Candida is not the only cause of denture sore mouth. However, many patients using dentures develop candidiasis. This seems related to an increase in the number of fungi present.

Candida is detected from gums and saliva, not only at the focus with increased numbers of fungi, but also on the tongue, buccal mucosa, and pairwise tooth.

In particular, dye staining shows positive results for candida adhering to the denture base. Infection can often be prevented with saliva. Conversely, patients with mycotic stomatitis also often display mouth dryness syndrome.

5. Prevention and treatment

1) Caring for the mouth and artificial dentures

In the beginning, adjustments should be considered if incompatibility of the artificial dentures is noted.

Next, caring for the mouth after removal of the artificial dentures is important. In particular, the person installing the removable partial dentures should brush the tooth and gums. Accumulated residues and microbes adhere to the gums and palatine mucosa in contact with the artificial dentures even when no teeth are present. This will cause stomatitis if left intact.

Brushing greatly improves the appearances of gums and the gingival circulation due to the massage effects.

Removing artificial dentures is important, allowing the gums to rest during the night. The artificial dentures should also be cleaned using a special brush after every meal to remove residual food and microbes. Special attention should be given to parts in contact with the mucous membranes and areas surrounding the clasp. If an artificial tooth cleaning agent is used once every two or three days, suitable cleaning will be achieved.

2) Gargles

Mouth rinses can improve inflammation of oral mucosa and prevent the build-up of dental plaque. Moreover, gargling is effective for purification of the mouth.

Benzethonium chloride and chlorhexidine gluconate and else are representative chemicals.

Listerine is a gargle containing four chemicals for oral sterilization with a natural herbal origin (thymol, 1.8-cineole methyl salicylate, 1-menthol). Listerine can be used for the long term because with the long time usage, it does neither color or oral mucosa nor form tarter, and also it can infiltrate “Biofilm” in which the antimicrobial does not act easily.

The isodine 7% acts to sterilize to oral cavity, killing bacteria and viruses. However, the appearance of candida might be promoted by creating sterile regions available for colonization with prolonged use.

When candida syndrome develops, itraconazole(Itrizole) is often administered at a daily dose of 20 ml (10 mg/ml of itraconazole) on an empty stomach. After rinsing around the mouth for a few seconds, the medicine is swallowed. The patient then refrains drinking or eating for 1 hour afterwards. This is continued for 1-2 weeks.

(Mikio Kusama)

46. Wastes cannot be easily removed easily with denture cleaning agent

1. Waste material on dentures

The denture base is typically made of high-polymer acrylic resin. This material can contain numerous microscopic flaws and holes. Food residues and materials such as from cigarette smoke can accumulate in these imperfections to cause discoloration and creating a haven for microbes. Moreover, plaque readily adheres to denture. Hard, stone-like tartar can then form on the surface of the denture, and this will become putrid if left intact. Removal of such material using a standard toothbrush and denture cleaning agents is difficult.

2. How to remove those wastes

1) Physical cleaning

Superficial coloring can be removed using a melamine system resin sponge, which is readily available on the market. The resin material of dentures can also be shaved or ground by dental technicians to remove discoloration and tartar.

2) Other cleaning methods

Discoloring materials can be removed using a special denture cleaning agent with titanium dioxide as a photocatalyst. Irradiation with light from a special machine is then necessary.

Tartar on the denture can be removed by ultrasonic cleaning using an acidic denture cleaner (Photo. 1).

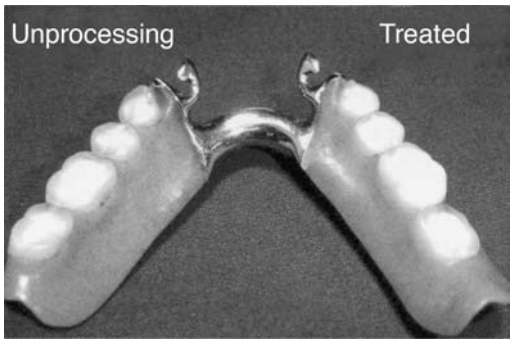


Photo. 1 Denture before and after a scientific cleaning

(Hideo Mori)

47. Aspiration of prosthetic appliances

1. Introduction

The number of senior citizens who have trouble with swallowing and the vomiting reflex continues to increase. As a result, the number of senior citizens with aspiration of foreign body is also increasing. In particular, cases involving complex-shaped and potentially sharp dental foreign bodies have been reported. Such events risk death from suffocation or esophageal perforation. Knowing the symptoms, signs, and required actions following suspected aspiration of foreign bodies is very important. However, the most important action that can be taken is to prevent such accidents. The following points should be considered for patients with artificial dentures:

1) Confirm general status, including concomitant diseases and symptoms connected with vomiting and swallowing disorders such as dementia or cerebrovascular accidents.

2) When an artificial denture is used, note the design.

3) Explains the methods for installing and removing the artificial tooth to the patient and their family. Emphasize the need for removing the artificial denture before going to bed at night.

4) Regularly check that the denture base and clasp are in good condition.

5) During taking impression, the patient should take seating position, because aspiration does not occur easily. Material of impression should not be much fluid and should be instantly dryable.

2. Symptoms, diagnosis, and treatment

1) Diagnosis and symptoms

First, whether the object entered the airway or the gastrointestinal tract needs to be determined. Examination and an interview with the patient are thus important. Symptoms can be elicited from the patient and the family and the medic can provide information on signs.

When the patient could swallow a total arch denture, the fact should be explained to the patient and family.

Do not try to hide information from the patient.

Symptom will differ according to the path traveled by the foreign body. The biggest risk is seen with involvement of the airways (MEMO 1).

MEMO 1 Symptom when foreign body in airway or esophagus

1. airway : Dyspnea, Cyanosis, Asthma, Hoarseness, Bloody sputum
2. esophagus : Adynophagia, Dysphagia, Obstruction to the passage, Emesis, Sore throat

2) Measure and treatment

With artificial dentures, if there no breathing difficulties are seen and no sharp edges are present, the object should move from the stomach to the intestines, and the majority will be excreted naturally within 48-72 hours. The passage of the object can be tracked by radiography while confirming the condition of the patient. In such cases, do not administer purgative agents.

In the case of aspiration, treatment needs to be provided without panicking. First, observe the mouth. If the object can be seen, get the patient to rest their head on the side and attempt to remove the object using otolaryngological tweezers or a dental vacuum. Care should be taken to keep the patient calm, as the object might be inhaled or fall deeper if the patient gasps or shouts in surprise.

If aspiration is confirmed, the patient should be taken to a specialist facility as soon as possible.

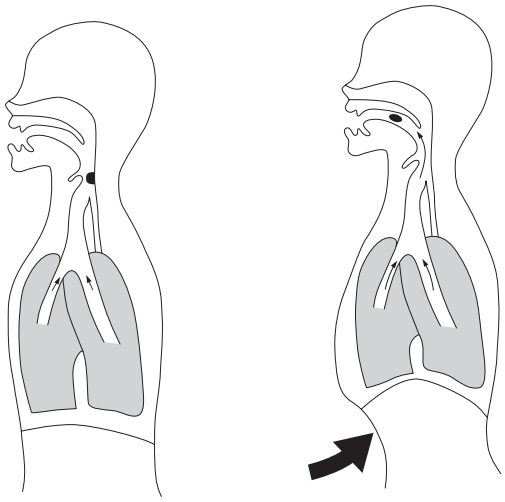


Fig. 1 A basis of Heimlich maneuver

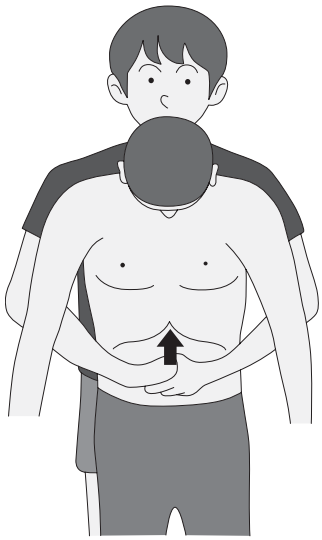


Fig. 2 Heimlich maneuver
You make a fist with one hand and, the clenched fist is gripped by an opposite hand. The gripped hand is put on patient's abdomen, and it pulls it in the direction of my sternum strongly and rhythmically

If the location of the object can be confirmed on radiography, removal may be possible using a bronchial mirror or a gullet mirror.

A blockage caused by a large artificial denture or spasm high in the bronchial tree requires immediate emergency attention, as cardiac arrest is likely to occur within a few minutes of airway blockade, resulting from hypoxia.

The emergency procedure is as follows:

① Bend the upper body forward, lower the head, and get the patient to try cough strongly. At the same time, provide 4-5 dorsal thrusts in an attempt to dislodge to object.

② The Heimlich maneuver is used if the object remains in place. This involves thrusting up into the diaphragm, pushing air up from the lungs against the object from below, with the aim of causing the object to be dislodged and ejected from the airway (Fig. 1). The patient sits upright or stands, with the head bent forward. The person performing the Heimlich maneuver stands behind the patient with arms around the patient on either side, under the patient's arms. A fist is made with one hand positioned over the stomach and gripped by the other hand, then a sudden contraction of the arms is used to push up against the diaphragm (Fig. 2).

③ When Methods ① and ② do not prove successful, the trachea can be incised as a last resort, to try provide air flow past the blockage as the emergency measures until emergency services arrive.

(Souichiro Asanami)

48. Problems when dentures are unsuitable for long-term use

1. Causes of unsuitable dentures

Space between the denture intaglio surface and the basal seat mucosa may result in the denture coming off easily when talking or eating, or causing pain while chewing.

1) Change in residual ridge due to bone resorption

The stability of dentures requires maintenance of the residual ridge. Changes in the underlying bone will thus influence stability. Physiological bone resorption is likely with long-term use of denture, and this tendency is particularly strong in the elderly. In addition, bone resorption progresses earlier than usual in patients with metabolic disturbances such as diabetes.

One report (Carlsson & Persson) noted decreases in bone height on radiography following extraction of a mandibular anterior tooth and wearing of complete denture, by about 7 mm after 2 months, 5 mm after 2 years and 7 mm after 5 years. However, the quotation above is only an example, the amount of change varies considerably among individuals. According to the report by Tallgren, the bone resorption in the mandible progresses 4 times as much in comparison with that in maxilla.

2) Wear of dentures

If used for a long time, dentures also undergo changes. Decreases in occlusal vertical dimension and a loss of the occlusal relationship are caused by wear on artificial teeth. This can result in pain caused by dentures on the basal seat mucosa.

3) Tartar-like precipitates

Food debris and plaque adhere to the denture during use. Candida invades the denture base material. In addition, calcium from saliva is precipitated on the surface of denture. As a result, tartar extends to the denture intaglio surface, and adaptability of the surface decreases.

2. Adverse effects of unsuitable dentures

The distribution of pressure from the denture during chewing is different from the distribution of pressure during chewing right after wearing of denture. Pressure is thus seen on specific areas. Flare, distortion of denture shape, and decubitus ulcer frequently occur, and pain results (Photo. 1, 2). Moreover, denture fibrosis might occur if mechanical stimulation by the denture border becomes chronic. This syndrome is generated in

Photo. 1 Mandibular complete denture

Photo. 2
When chewing, the patient is appealing for the pain to the mandibular residual ridge. The chew pressure to the basal seat mucosa is not even. The right and left crunching the equivalent part of the below the basal seat mucosa that pressure joins in excess is white

the anterior maxillary mucolabial fold. In addition, absorption of bone is promoted in areas under pressure if use of an ill-fitting denture is continued, exacerbating symptoms. Chewing efficiency deteriorates because the load-bearing ability of the basal seat mucosa below the artificial denture under chewing pressure also decreases. In some cases, the jaw position shifts to avoid a pain, and the match between the natural oral structures and the denture is reduced.

As for the ill-fitting denture, the bend joins the center of the denture during function. In addition, the resin comprising the denture base deteriorates due to long-term absorption of water. As a result, the dentures become increasingly prone to cracking and breakage.

3. Countermeasures for unsuitable dentures

Giving the appropriate and sufficient direction of handling the denture to the patient and caregiver and regular follow-up is initiated. Routine health checkups are usually performed every 6 months when the symptoms are stable. However, intervals differ depending on the individual case.

To prevent precipitates and plaque from adhering, mechanical cleaning with a denture brush and chemical cleaning with denture cleansers are used. The denture cleanser is selected depending on the specific cleansing properties of the agent and the materials used in the denture.

In a regular medical examination, occlusion and condition of the basal seat mucosa under the denture base are examined. Various methods are available for examining adaptability of denture. The method by white silicone is frequently used. The fitness test material is placed on the denture intaglio surface, then the denture is inserted into the mouth, and the patient bites down. When the silicone sets, the film is distributed within a considerable range at a thickness of 130 μm or more, reline by the denture liner. The aim is to improve the adaptability between denture and mucosa. The denture is then adjusted on the fitting surface that corresponds to the regions showing a silicone thickness of 30 μm or less, representing the areas at risk of decubitus ulcer.

The elderly show decreased adaptability to new dentures. Maintaining the denture in good condition and using it for as long as possible is thus the best method to avoid problems with new dentures.

(Hiroshi Murata, Hideyuki Wada)

Glossary:

Basal seat mucosa: Mucous membrane covered by the denture base, playing an important role in support and retention of the denture.
Denture fibrosis: Inflammatory reaction of mucous membrane caused by chronic mechanical stimulation from the denture base.
Jaw position: Relative positions of upper and lower jaws.
Reline: The denture intaglio surface is replaced with a new denture base material, to improve morphological agreement with the basal seat mucosa. Resin material is used to achieve such improvements when agreement with the denture base worsens.
Deture lining material: Resin system material is applied to the denture intaglio surface when fitness of denture base worsens.

49. Advantages and disadvantages of metal denture bases

The complete denture is composed of an artificial main body (denture base) made of resin, and the dentures. A denture in which the entire denture base is made from resin is called a resin floor total denture. A denture that partially replaces the denture base with metal is called a metal base total denture (Photo. 1, 2).

Correct positions of the dentures need to be able to withstand occlusal forces, and the denture base thus needs to have sufficient strength. Moreover, the form of the teeth needs to allow functional chewing, swallowing, and pronunciation.

A denture base using metal can be thinner and stronger than a resin base. This can reduce the sense of incompatibility (Fig. 1). The metals used can be gold-platinum alloy, cobalt-chrome alloy, and titanium. The color tone, weight, and cost differ according to the specific metals used.

1. Advantages of metal dentures

1) Structural deformation is unlikely, as metals are stronger than plastics.
2) Thickness of the palate is about 2 mm for resin bases, compared to as little as 0.5 mm for metal bases. Moreover, because the bulk of the denture can be reduced, the sense of incompatibility is minimized.
3) The sense of incompatibility is also decreased, and taste may also be less affected if a metal denture is used for the maxillary palate. Pronunciation is also likely to be smoother than with a resin denture.
4) Thermal conductivity is excellent, so temperature sensitivity with meals is maintained.
5) Issues with a precipitate and odors are not encountered and sanitation is improved, as the denture body is not water-permeable.
6) Adaptability is comparatively good and the design of the denture is also less constrained.

2. Disadvantages of metal dentures

1) Processing by the change in the addition of the repairs and adjustments to add dentures and improve fit with changes in teeth and residual ridges are more difficult than with resin bases.
2) Insurance will not cover the greater costs of adjustments, which are related to both the costs of materials and the actual production of the metal base.

(Taizo Sugimoto)

Photo. 1 Resin floor total denture

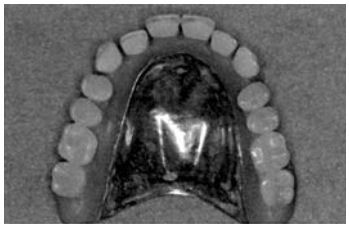


Photo. 2 Metal base total denture

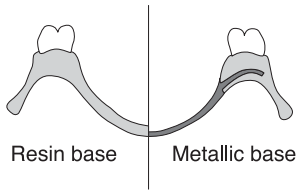


Fig. 1 Comparison of thickness of denture floor palate

50. Problem when toothless state continues

1. Introduction

There might be a reason why the state to have toothed comes out continues. For instance, you might not feel the pain, or discomfort, and you might hate odontology department treatment. Some other reasons might exist. But the oral environment might deteriorate according to the age, place of toothless, and the hygienic condition when toothless state continues.

When treatment starts in the odontology department after being left for a long time, there is a possibility that an excellent dental occlusion is not obtained. It is necessary to treat not only a toothless place but also teeth and opposing teeth on both sides.

This chapter explains problems encountered before, during and after treatment in the odontology department.

2. General problem before treatment in the odontology department

Teeth move when it is toothless. This can be divided into physical problems such as positional movement, and functional problems. These are described as follows:

1) Physical problem and Influence on body

(1) Teeth movement

The buccinator muscle mechanism works when teeth grow straight and display a regular arrangement. The teeth may be inclined, but are not twisted. The buccinator muscle mechanism involves the orbicularis oris and buccinator muscles providing force pushing internally, as these muscles are outside the row of teeth, while the tongue provides force pushing externally and keeping a balance. These forces act in opposition to maintain the regular arrangement of the teeth and dental articulation. However, when toothless, teeth on both sides incline, and it twists, so it tips the balance. These changes occur rapidly in the young (Photo. 1).

Photo. 1 Teeth move when leaving it while toothing comes out, it inclines, and the god match worsens

(2) Absorption of the residual ridge

The teeth in the opposing dental arch lose the contact relationship when a tooth is extracted. The resulting absence of force on the tooth results in thinning of fibers attached to the tooth root of a tooth film fiber and reductions in surrounding alveolar bone density. As a result, absorption of the residual ridge occurs not only around the socket of the extracted tooth, but also around the opposing tooth.

(3) Influence on whole body

When teeth move and engaging worsens, the cuspal interference and premature contact happens. Moreover, adverse effects can be seen on the organization around teeth, causing periodontal disorder. This cause changes to the normal movement of the mandible, resulting in temporomandibular joint disorders. Temporomandibular joint disease is thought to contribute to a wide variety of whole-body diseases (Fig. 1).

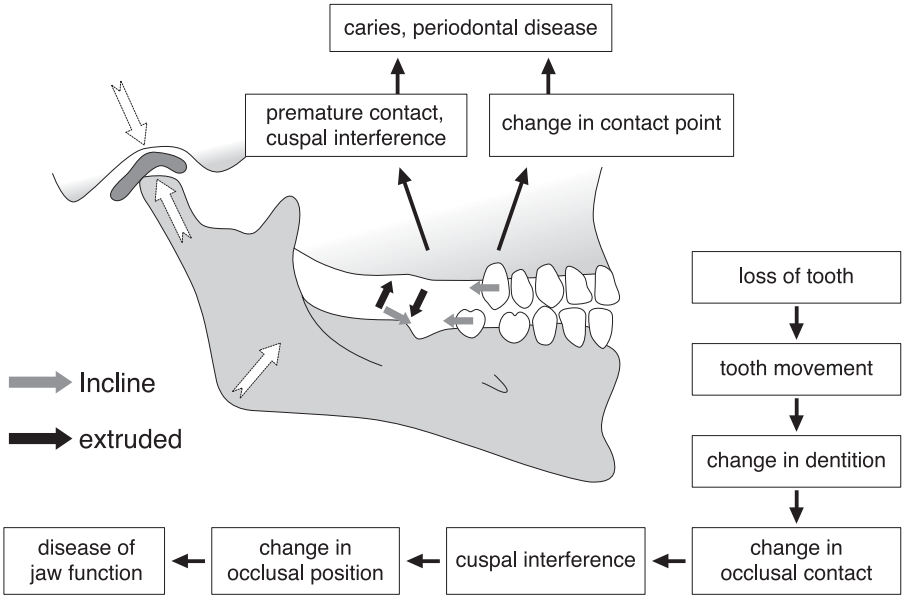


Fig. 1 It becomes easy to cause when leaving it while toothing comes out decay and the periodontal disease. Moreover, it becomes easy to cause temporomandibular disorders

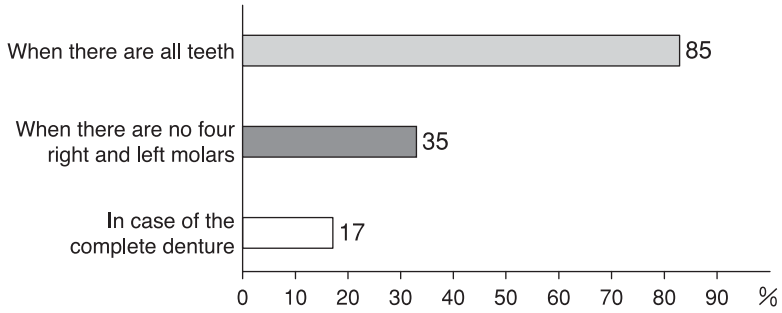


Fig. 2 Comparison of masticatory efficiencies when it is dentate and when it is not.
Teeth grew, the person with the person who became complete, the person who did not have four right and left molars of the tongue, and dentures crunched the peanut, and the efficiency of chew was compared
It is clear that the masticatory efficiency of the person who lost his right and left molar below is below the half of the person where teeth become complete, and the masticatory efficiency falls

2) Functional problems

Tooth loss results in decreased chewing efficiency, residible ridge trouble when chewing, pronunciation difficulties, esthetic issues and adverse effects on mental health.

These effects differ according to the teeth involved.

(1) Decreased chewing efficiency

Chewing efficiency decreases when teeth are lost (Fig. 2). As a result, maximum function as a digestive organ declines, and nutrient uptake may be decreased.

(2) Mandible bank trouble when chewing

As the residual ridge in the affected area might be damaged when chewing using the remaining teeth, attention is required.

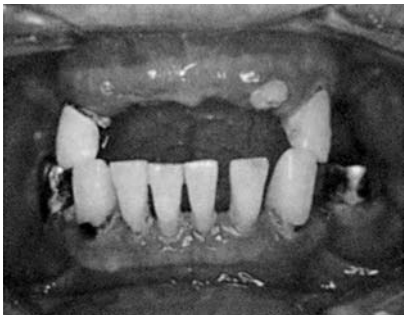


Photo. 2 The trouble goes out to pronounce the [sa], the [ta], the [ha], and the [ra] when the upper jaw front tooth comes off

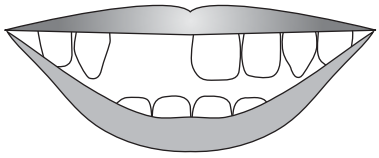


Fig. 3 The change and the appreciation of the beautiful trouble of the facial configuration occur when toothing comes out

(3) Pronunciation trouble

Especially, it is influenced “sa-gyo”,”ta-gyo”,”ha-gyo”,and”ra-gyo” of the pronunciation of words in Japanese by there are no upper anterior teeth (Photo. 2).

(4) Esthetic issues

The esthetics of the face can clearly be affected by tooth loss (Fig. 3).

(5) Adverse effects on mental health

Some adverse effects on mental health might be seen in edentulous patients.

3. Problems during and after treatment in the odontology department treatment

Loss of teeth causes various problems in treatment by the odontology department treatment. These problems differ depending on the kind of treatment, which can be divided into three (prosthodontics; dental bridges; and implants). The descriptions given here assume standard treatment without complications requiring orthodontic therapy.

1) For prosthodontics

Generally, even if both adjacent teeth have inclined, prosthodontic treatment can be performed. However, the spring of the artificial denture (hook and clasp) will need to be attached to the inclining teeth. As a result, the longevity of these teeth will be reduced. Daily care for the inclined teeth is also very difficult.

Tooth decay and periodontitis can become even more problematic under these circumstances, and are more likely to require extraction. Oral care after installation of the artificial denture is thus crucial.

2) For dental bridges

Because the dental bridge need not be detaches, it is often used. It is necessary that abutment tooth is parallel. So the odontology department treatment might be serious. Moreover, when opposing teeth are missing, further treatment of the opposite arch is required.

Even if the bridge is installed, the load on inclining teeth is increased and problems with oral care are substantial. Daily oral care is therefore as important as for prosthodontics.

3) For implants

The cost of implants is currently high because of the specialist treatment required. However, because there are no adverse impacts on teeth adjacent to the extracted tooth, outcomes are much better than with other methods.

Loads on the inclining teeth are the same as the original loads. However, It is necessary to prior treatment prominent antagonist, as for the other treatment methods.

Oral care for inclining and implanted teeth is important.

4. Oral care for inclining existing teeth

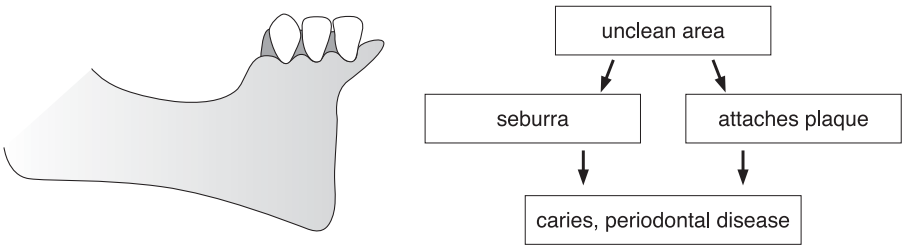


Fig. 4 It becomes difficult to maintain if teeth incline, and it is easy to become dirty.It polishes politely with the toothbrush, interproximal brush and onetaft brush

To maintain a healthy mouth, oral care is important for teeth remaining after extraction. Especially, the sides of inclining teeth are easy to get a cavity. So it is necessary perform oral care. Cleaning tools need to be used appropriately and with care, paying attention to the gingival sulcus (Fig. 4).

(Sinpei Toumatsu, Syuhei Toumatsu)

Glossary:

Inclination: An abnormal position. Teeth must rotate with an axis centrifugal.
Torsiversion: An abnormal position. It rotates centering on one with long teeth.
Extrusion: Teeth project from an original position due to the loss of opposing teeth.
occlusion: Teeth of both jaws must come in contact
Residual ridge: Rise of alveolar bone after teeth are lost
Disuse atrophy: The capacity of the organization internal organs must reduce.
Prematurity: Occlusal contact that happens before it reaches the relation between mandibles that were able to take balance in centric occlusal position.
Cuspal interference: Cuspal contact to obstruct normal movement of lower jaw, and and lower jaw downward.

V *Halitosis*

51. Causes of halitosis

Halitosis is often neglected, because the individual is likely to be unaware that they suffer from it until someone else alerts them to the fact. However, causes of halitosis should be eliminated to create a comfortable atmosphere in which the healthcare professional can work while providing services in close proximity to the patient.

Bad breath can be recognized when odor-inducing substances in the breath stimulate the olfactory nerve terminals. Expired air does not generally pass through the upper nasal meatus and seldom stimulates olfaction, which makes it difficult for individuals to perceive the smell of their own breath.

Causes of halitosis are usually situated in the mouth. Substances such as plaque, residual food, blood, pus and dead cells, in particular, can be the prime culprits producing odor problems. Agents contributing to foul smells include hydrogen sulfide, ammonia, indole, amines, methyl mercaptan, dimethyl sulfide, and hydrogen sulfide methyl mercaptan.

Causes of halitosis are listed in MEMO 1.

MEMO 1 Causes of halitosis

1. Oral and pharyngeal disease: caries; gingivitis; periodontitis; tonsillitis; maxillary sinusitis; oral and pharyngeal abscess; tongue coating; oral and pharyngeal cancer.
2. Residual food: swallowing disorder.
3. Dentures: Old and unclean dentures can show large accumulations of tartar and dental plaque. Substances that have permeated into the resin base may also lead to odor problems.
4. Food, drink and smoking: Odors can be evident after intake of alcohol, tobacco products, and foods such as garlic, leek, and onion.
5. Physiological bad breath: The intensity of bad breath can differ throughout the day. In particular, bad breath can be worse on waking in the morning and may be exacerbated by physiological conditions such as hunger, stress, dry mouth, and fatigue.
6. Extraoral disorders of the respiratory system (lung cancer, lung tumor, bronchiectasis, pyogenic bronchitis, oral cancer), upper gastrointestinal tract (esophageal diverticulum, esophageal cancer, stomach cancer), chronic diseases (diabetes showing characteristic acetone odor, uremia showing characteristic ammonia odor, liver disease showing indole odor or “mousy” odor).

(Shigetaka Yanagisawa)

52. Mouth deodorants

Halitosis can be classified into three categories: ① physiological halitosis; ② extrinsic halitosis (smells of certain foods and drinks may contribute to halitosis); and ③ pathological halitosis (including intraoral causes such as periodontitis and caries, and extraoral causes such as pathologies involving the stomach). Certain agents in the body can trigger bad breath. For example, hydrogen sulfide results in a smell of rotten eggs and is often encountered in people with physiological halitosis, dry mouth and tongue coating, while methyl mercaptan causes patients with periodontitis to have halitosis smelling of rotten fish and vegetables. Associations between acetone and diabetes and between methyl sulfide and leukemia are also known. However, specific remedies for each symptom are not currently known.

Mouth deodorants are commercially available and can be categorized as follows, based on their function:

1) products that kill the bacteria causing halitosis
2) products that dissolve the odorants
3) products that temporarily mask odors with a more pleasant fragrance

These agents have different forms:

1) liquids and sprays
2) paste products, like toothpaste
3) solid products, like tablets and lozenges
4) viscous and elastic product such as a chewing gum

Furthermore, these agents can be categorized into:

1) cosmetics
2) quasi-drugs
3) foods (health foods, beauty foods, etiquette foods)
4) mouth fresheners

(Taizo Hamada, Shinsuke Sadamori)

53. Oral care for elderly individuals with halitosis

1. Causes

Elderly patients needing nursing care are particularly prone to inadequately cleaning their dentures, which can result in large accumulations of plaque and residual food on and between teeth. This can lead to serious halitosis in combination with other factors, such as worsening of periodontal disease, reductions in masseter and mimetic muscle function, and weakened self-cleaning function of the mouth resulting from the reduced production of saliva. Bad breath found in elderly individuals also requires examinations for missing teeth, caries, gingivitis, periodontitis, and presence of dentures, metal crowns and bridges. In addition, tongue coating, drying of the palatal and buccal mucosa, and accumulation of remnant scabs can contribute to halitosis. Halitosis is closely linked to oral disorders, and is frequently caused by methyl mercaptan that is produced by oral bacterias.

However, bear in mind the fact that advanced conditions of oral cancers such as tongue and gingival cancer, pharyngeal cancer, esophageal cancer and stomach cancer show distinctive odors deriving from swollen tumors and necrotic tissue.

The possibility of respiratory system pathologies should also be considered if oral causes of halitosis have been ruled out.

2. Oral care

For patients with removable dentures, the dentures need to be removed and adequately cleaned. To control bad breath, removal of tartar, residual food and bacterial accretions on denture surfaces is important, as is mechanical cleaning by oral health care professionals. However, while dentures can be responsible for bad breath, depriving the patient of the dentures can cause other problems. Without dentures, elderly patients are likely to show poor chewing function, which may lead to reduced food consumption and poor nutritional state. Moreover, reduced chewing function can cause deteriorations in sensory function, and concerns have thus been raised that dementia may develop.

No specific oral care is available for elderly patients with bad breath. Treatments include: removal of plaque moisturizing the mouth; and massage of the lips, tongue and oral muscles. In addition, removal of dry secretions coating the tongue, palate and buccal mucosa is also necessary. Stimulating the submandibular and parotid glands can be helpful to enhance salivary function. Oral care using mouthwash and mouth deodorants alone is not recommended.

When creating an oral care plan for elderly patients with severe bad breath, seeking oral care from dental hygienists and consultation with dentists is advisable.

(Kenichiro Murakami)

54. Guidance for psychogenic halitosis

1. What is psychogenic halitosis?

Psychogenic halitosis is an obsession that the breath smells bad and offends others, despite the fact that others have no such perception. The patient often complains of the odor of their breath. Electroencephalographic findings have suggested that psychogenic halitosis may be caused by a disorder of the deep brain centering on the diencephalon.

2. Features

1) This condition often develops between the period of puberty and young adulthood
2) The condition is more common in females than in males
3) Patients show good oral hygiene, and have any decayed teeth and periodontal disease treated
4) No bad breath is perceived by others (test result is negative)
5) Patients are frequent visitors to dental clinics

These patients tend to interpret any sign of others covering their nose or averting their face as a reaction to the patient's extremely bad breath. This is because human beings are very susceptible to visual information in higher processing of olfactory information. Such misinterpretation acts to reinforce the beliefs of the patient.

3. Treatment

1) Medication *(Trade name)
   ① tricyclic antidepressive agent: clomipromine (Anafranil) 75 mg/day
   ② selective serotonin reuptake inhibitor: fluvoxamine (Depromel, Uvox) 150 mg/day
   ③ anxiolytics: flunitrazepam (Rohipnol) 1 mg/day, lorazepam (Wypax) 1.5 mg/day
   ④ antipsychotics: pisperidone (Risperdal) 2 mg/day
2) Psychotherapy

Patients with psychogenic halitosis tend to be wary of others, and thus require extra consideration when dealing with them. During the consultation, for example, patients may be dissatisfied with negative test results, because they have no doubt that malodor is present. Even under such circumstances, however, it is important to respond patiently by listening to their complaints and assuring them that no unpleasant odor is present. This can lead to successful treatment. In addition to medication, encouraging the patient to participate in social gatherings can help address mistaken notions. Recording their own conditions in their notes, diary and e-mail may also be effective in monitoring the condition. As these patients have good oral health, providing routine guidance on toothbrushing or oral hygiene may lead to tooth wear and gum recession, and advice should thus be given with care.

(Hiroyoshi Hiratsuka, Kenji Nakamori)

55. Devices for measuring halitosis

1. Measurement of bad breath (Organoleptic measurement)

There are various compounds that produce unpleasant odor from oral cavity, such as hydrogen sulfide, methyl mercaptan, dimetyl sulfide, n-dodecanol, phenol, indol and others. Mal odor is a mixture of these compounds. Among these compounds, most commonly detected are hydrogen sulfide, methyl mercaptan, dimetyl sufide (volatile sulfur compounds: VSC). Other compounds are also detected at lower levels. For this reason, the most common method of analyzing bad breath is organoleptic measurement, carried out simply by sniffing the patient's breath and scoring the degree of odor. This is usually done by more than one person. Evaluating oral odor in as objective a manner as possible is important, as useful clues for determining the efficacy of treatment and identifying changes in condition can be provided.

2. Halitosis-measuring devices

Reliable halitosis-measuring devices that are currently available in Japan are the gas chromatograph and OralChroma® (a portable gas chromatography). These devices measure VSCs in a sample of mouth air. Halimeter® and Breathtron® are sulfide monitor used to test for sulfide levels (specifically hydrogen sulfide) in the mouth. With these instruments, a sample of mouth air is directly injected into the device, and the measurement is performed using a semiconductor sensor that detects halitosis-producing compounds. Attain® is an ammonia-monitoring instrument that allows indirect measurement of levels of oral bacteria.

Listed below are the major halitosis-measuring devices:

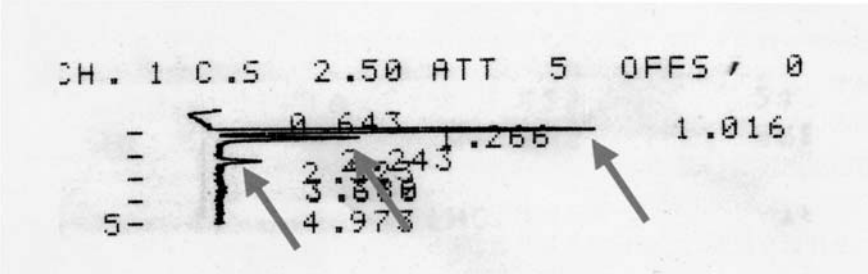


Photo. 1 The record by gas chromatograph
The peak of VCS is indicated by arrows

1) Gas chromatograph

A gas chromatograph (GC) uses a flow-through tube known as the column, into which the sample gas is injected. The column absorbs analyte molecules onto the column wall, and the carrier gas in the column acts to separate different components, causing each to exit the column at different times and thus enabling the instrument to identify three different components separately (Photo. 1). The GC uses nitrogen as a carrier gas, and is thus highly sensitive to VSCs. However, the equipment is not compact, and requires space for canisters of nitrogen, hydrogen and oxygen gas, and a ventilation system.

2) OralChroma (Photo. 2)

The OralChroma® is a portable GC system. Like GC, component VSCs can be measured separately.

The semiconductor gas sensor does not use a carrier gas, as required for conventional GC, instead using air from the room. This device should thus be set up in an environment free from volatile gases, although a large amount of space is not required.

Another advantage of OralChroma® is that as little as 0.5 cc of sample gas is needed. This can be either expiratory breath or gas sampled using a syringe inserted into the oral cavity and then injected directly into the device.

3) Halimeter®, Breathtron®

The Halimeter® and Breathtron® are portable devices specifically for measuring hydrogen sulfide levels in the mouth. A gas sample is obtained and injected into the device using a disposable straw or filtered straw for the device (Photo. 3). These devices are light-weight, compact and portable. The quantity of sample gas for the Halimeter® is somewhat large, while a smaller sample is sufficient for the Breathtron® due to the short distance to the sensor. The reading (total VSCs) is displayed in parts per billion.

4) Attain® (Photo. 4)

Attain® is a portable monitor to measure ammonia produced by oral bacteria after the subject rinses their mouth with a urea solution for 30 seconds. This method does not measure oral gas directly, but instead measures the concentration of ammonia produced by urea catabolized by urease. The ammonia gas detector tube reads the concentration of ammonia, which is then used to determine the level of bacteria in the mouth (Photo. 4b).

5) FF2-A odor identification device

This device is not specifically designed to measure halitosis-producing compounds, but can identify nine odor-related compounds, such as sulfur, ammonia, amines, organic acids, aldehydes, esters, arene and hydrocarbons. However, the device is not compact.

Various VSC-measuring instruments are available, and new devices such as odor-identification devices that can identify other agents in mouth air are currently under development. In the future, instruments that are at least as sensitive as the human nose are expected.

(Mitsuo Fukuda)

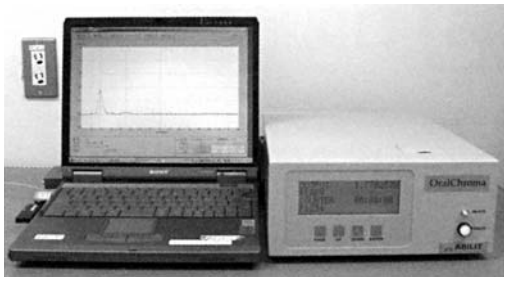


Photo. 2

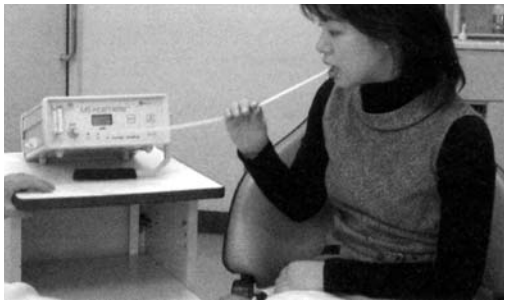


Photo. 3

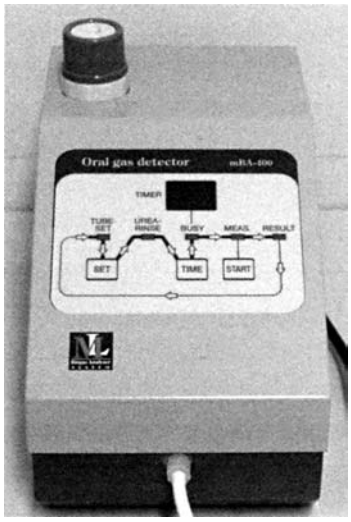


Photo. 4a

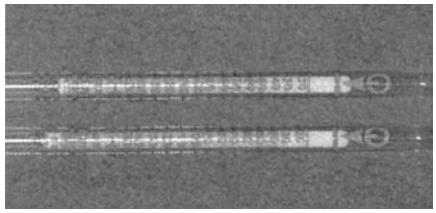


Photo. 4b

VI *Patients with a disorder or disease*

56. Methods for patients who cannot brush their teeth due to hemiplegia

Information on the patient must be gathered before providing directions on toothbrushing.

By observing posture and how the patient uses their hands during meals can provide useful information for guiding toothbrushing.

1. Posture

A sitting posture of the plantar setting is the most desirable. Obviously the patient needs to be able to maintain the position without getting tired, and a Farrar or semi-Farrar position on the bed may represent a secure alternative.

2. Paralysis

Whether the dominant side is paralyzed is more important than whether the paralysis is on the right or left. The tendency is for people to assume that the patient with paralysis is unable to doing anything, and to provide help. However, methods that do not result in pain or discomfort while promoting the maximum use of the remaining ability should be considered from the perspective of ICF. Improvements in QOL and reductions in the care burden can be achieved using this approach.

A change in the dominant hand may be necessary to improve the use of cleaning tools such as toothbrushes. Preparation is therefore necessary to provide flexible support for subjects. Even if a change in the dominant hand is achieved, consideration must be given to the possibility that the non-paralyzed side may not be fully functional (Photo. 1, 2). In the case of dental prostheses, cleaning tools can often be devised that the patient can use (Photo. 3, 4).

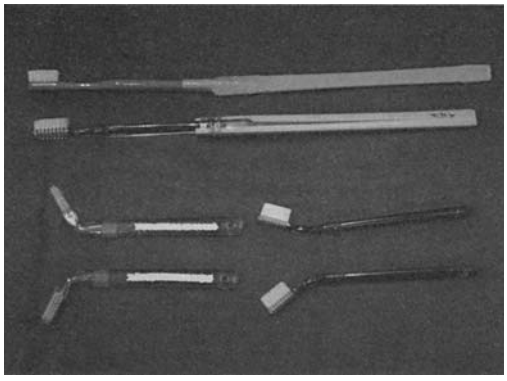


Photo. 1 The device of toothbrush

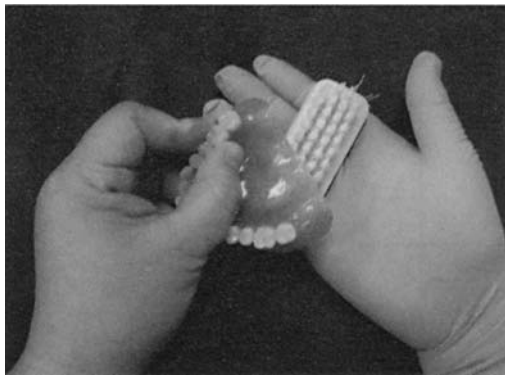


Photo. 2 A device of prosthesis cleaning
Holding a cleaning tool in paralysis side and moving prosthesis to clean with using non-paralysis side

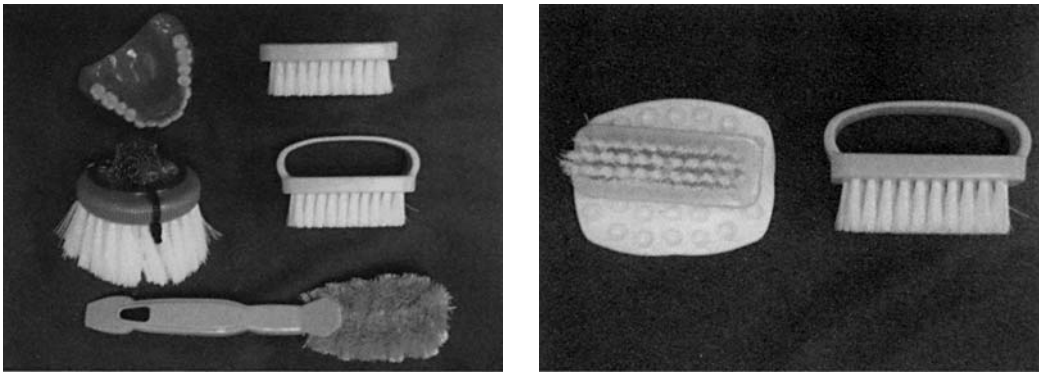
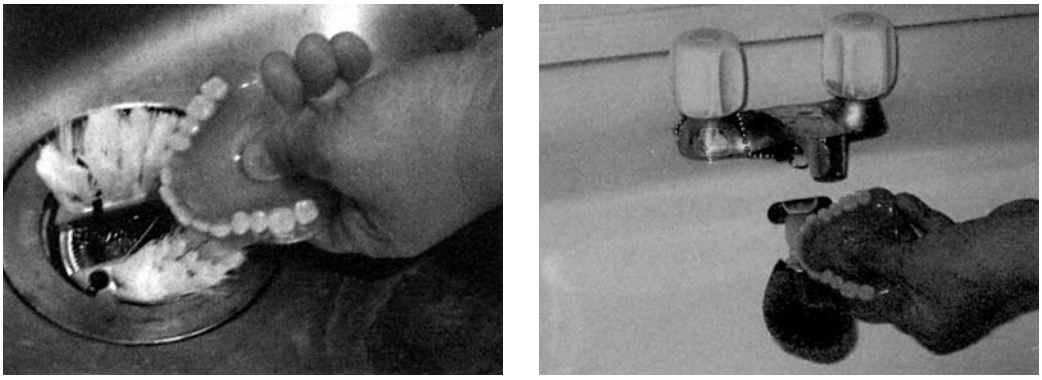


Photo. 3 The device of the prosthesis cleaning tool for hemiplegic people



a) We use the drainage of the kitchen. b) We use overflow of the washroom.

Photo. 4 A use case of the prosthesis cleaning tool for hemiplegic people

3. Loss of sensation and voluntary mobility on the paralyzed side

On the paralyzed side, the patient may also show a loss of sensation and voluntary mobility in the perioral region and oral cavity. Due to motor paralysis of the tongue, buccal mucosa and lips, the patient cannot spills food from the mouth even if there is the existence of saburra.

The presence of residual food and a lack of endodontic hygiene markedly increase the risk of aspiration and suffocation when the patient is lying in bed, in addition to the increased risk of infectious disease.

As a matter of course, the caregiver needs to be aware of the endodontic status of the patient, such as missing teeth or the use of prostheses. An endodontic examination is needed, rather than relying on notes or descriptions from previous caregivers.

The instructor needs to explain the endodontic situation to both the patient and their caregivers, and should provide advice individually to each.

Furthermore, to address dyskinesia resulting from paralysis of the facial and hypoglossal nerves, use of massage and stretching of the muscles around the oral circumference can have positive effects in improving paralysis.

4. Visual agnosia

Visual agnosia represents a disorder of higher brain function, particularly with left hemiplegia. With this disorder, the patient sees only the non-paralyzed side, with no perception of the paralyzed side. Often the patient cannot understand what the problem is, because they cannot recognize the affected side, even if

shown in a mirror and provided with an explanation. Information about the visual agnosia must therefore be given to a caregiver. For example, when the patient eats using only the non-paralyzed side and acts like the paralyzed side is not there, it follows visual recognition of the oral cavity on the paralyzed side may be absent. In this case, explanation must be provided to the caregiver that the subject cannot properly see the endodontic situation and needs assistance in cleaning the paralyzed side. Consistently pointing out the paralyzed side to the subject is also effective.

For the patient with visual-spatial agnosia, it is effective to make him/her aware of paralyzed side repeatedly for oral care.

5. Gargling (bubbled gargling)

In the presence of paralysis, symmetrical closure of the lips may be inadequate. In this case, help can be given to retain water in the oral cavity and gargle by assisting lip closure using the fingers of either the patient or the caregiver. Repeated gargling can also aid in the rehabilitation of lip closure and prevention of food spilling and aspiration.

(Junko Takemoto, Eiko Izui)

Glossary:

International Classification of Functioning, Disability and Health (ICF): The ICF was adopted as a system of human bionomics and a classification of disorders by the World Health Organization (WHO) in May 2001. The International Classification of Impairments, Disabilities, and Handicaps (ICIDH) used a system of classification according to negative aspects. Conversely, ICF uses positive bionomic aspects for a different perspective, with the addition of issues such as environmental factors.

(extracted from the Ministry of Health, Labour and Welfare webpage)

57. Oral care for patients with difficulty maintaining a seated posture

Fixing the posture of the patient during oral care is important to prevent aspiration and prevent fatigue. For patients who have problems with a seated posture, oral care can be difficult. An understanding of and attention to the overall status of the patient is thus important.

1. Position of the patient

When a seated posture cannot be used, the four main alternatives for oral care are the Farrar, semi-Farrar, lateral decubitus and supine positions (Fig. 1).

l) Farrar position

In this position, the patient is reclined at an angle of 45-60 ° on the bed. This can prevent the aspiration, but is moderately fatiguing. In addition, the upper body may easily slip down. Decubitus ulcers may result in the dorsal and sacral regions if this position is maintained for a long time.

2) Semi-Farrar position

In this position, the patient is raised approximately 30 ° from the bed. This is suitable for patients who are almost bedridden or needing bed rest. Aspiration is relatively unlikely in this position.

3) Lateral decubitus position

In this position, the patient faces either right or left on the flat bed. Moving the trunk sideways may be easy for the patient if it is possible. If hemiplegia is present, such as following cerebral infarction, aspiration and excessive production of saliva may be minimized by having the paralyzed side uppermost.

4) Supine position

This is the position with the patient lying flat, face-up on the bed. Substances in the oral cavity are comparatively unlikely to enter the trachea and easily enter the esophagus from this position. However, reflux to the nasal cavity occurs quite readily. When oral care is performed, this can be minimized by turning the face to the side as far as comfortably possible or anteflexing the head.

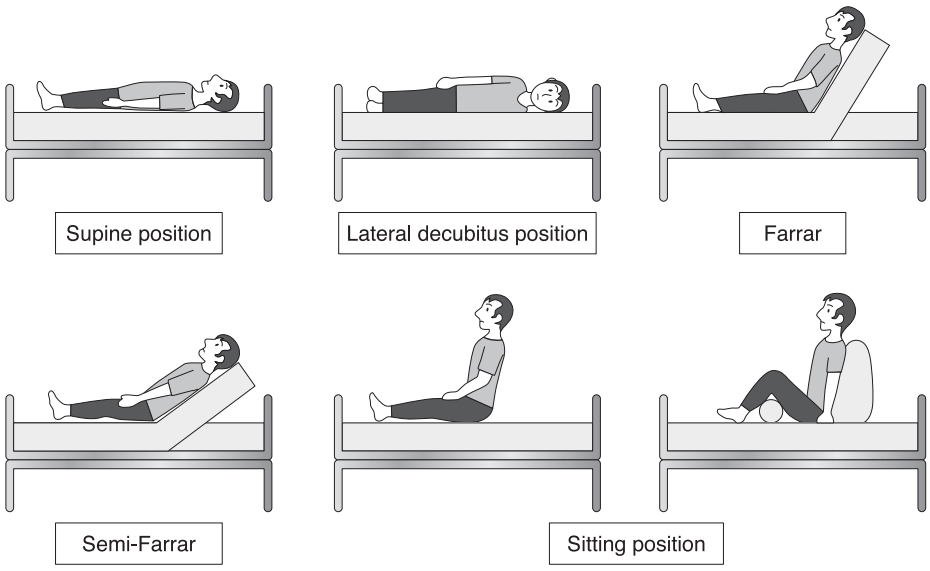


Photo. 1 About a position

2. Precautions for oral care

In oral care, the above-mentioned positions can be selected according to the state of the patient. Care must be taken regarding the following points:

1) When the head is retroflexed and extended, saliva easily enters the airways and aspiration can occur in any position. The head can therefore be anteflexed using a pillow or towel in any of these positions. As the sense of pressure on the laryngeal pharynx is markedly increased in extreme anteflexion, an angle of around 30 ° anteflexion is recommended (Fig. 2)
2) Avoid keeping the patient in the same position for extended periods (care should be kept as brief as possible), as pain and decubitus pressure may be exacerbated
3) Perform care under sufficient lighting to allow clear observation of the oral cavity (this will also help to reduce the time needed for oral care)
4) Avoid oral care for approximately 2 hours after meals, to minimize the risk of regurgitant aspiration

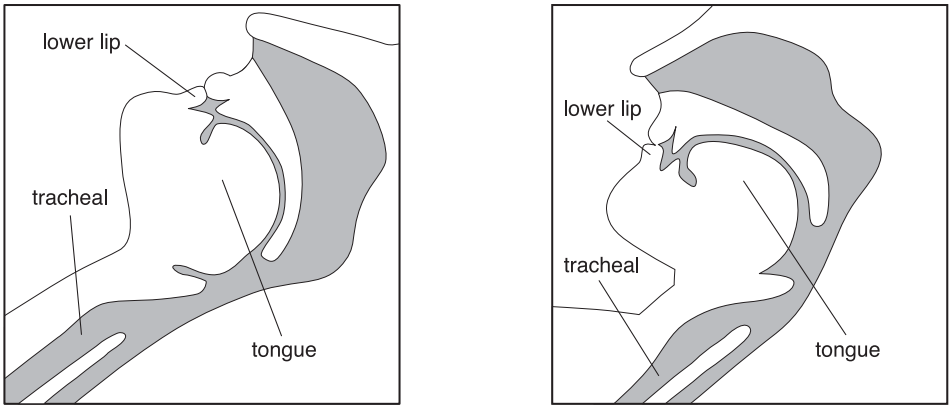


Photo. 2 The intervals from an oral cavity to a trachea become linear and are easy to aspirate it when we extend a neck like a left-hand figure. However, it is hard to become in the trachea because it is bent when we anteflex a neck like the right figure. (approximately around 30 degrees)

3. Position of the patient and oral care helper

Patients may feel uncomfortable with others touching the oral cavity. Having the oral care helper at the same level as the patient can help make the patient more comfortable, rather than having the patient looking up at the helper. Oral care for a patient who cannot take a seated position can also be stressful on body of the helper. Standing in a position allowing easy observation and palpation of the oral cavity may help to minimize such stress.

(Tetsuo Ohnishi, Miyuki Outani)

58. Oral care for patients with flexion and turn disorders of the neck

Limitations to flexion (anteflexion and retroflexion), inclination (right/left) or rotation of the neck are often associated with disorders of the jaw and oral functions such as mouth opening and closing, chewing and swallowing, pronunciation and breathing. When mouth opening is impaired, adequate examination may not be performed in all areas of the oral cavity, and oral care goods such as toothbrushes cannot be inserted and used easily. As a result, it becomes extremely difficult to clean the lingual surfaces of the dentition and posterior dorsum of the tongue.

MEMO 1 Diseases causing dyskinesia of the neck

1. Limitations of motor function: chronic rheumatism; disorders of the cervical vertebrae; muscle/ ligament rigidity
2. Involuntary movements: cerebrovascular disease; Parkinson's disease; cerebral palsy
3. Instability of the neck: severe developmental disorders disease; cerebral palsy; muscular dystrophy; ALS, etc.

Dyskinesia of the neck can be caused by vertebral, muscular, or neurological disorders (MEMO 1).

1. Function and involvement of the hand and arm

Even movement of the neck is limited, teaching the patient a way of basic oral self-care is important. The oral self-care can be achieved by improving the techniques and providing instruction utilizing tools for assistance. Under these circumstances, evaluation of motor function of the hand and arm (range of movement and ability to grip implements like a toothbrush) is crucial.

In the absence of functional disorders of the hand and arm, the patient will be able to eat and perform oral care independently even if neck movement is limited. However, dysfunction of the upper limbs may require helper's assistance. When teeth and prostheses settle well and motor function of the jaw remains intact, a mouth held device or a string in the mouth will allow partial substitution of hand and finger function. If upper limb function is impaired, the mouth can play an important role as a partial substitute for the hand and improve QOL even if complete independence of oral care is not sufficient. The care givers conduct the oral care to improve oral function of the patient and to keep it clean (Photo. 1, 2).

Photo. 1 An articular contracture (the left) and lockjaw (the right) of the patient with rheumatism
The patient has impairment of neck movement, but can brush her teeth or paint with using the self-help device. The shortage of the oral care can be supplemented by the caregivers at home and Professional Mechanical Tooth Cleaning (PMTC) by the dental hygienist or dentist

Photo. 2 Elderly patient with many missing teeth (a). Although patient's neck and armes are limited in movement, the QOL has been improved by wearing the prosthese (b) and mouth-held device (c) that enables the patient to operate personal computer

2. Oral care

As the oral cavity of the elderly patients is often dry and has retention of food, oral care should be performed after moistening the oral cavity enough by the usage of a cup and a feeding cup 'No-spill' beaker, or a spoon. Otherwise, the oral mucosa may be damaged, resulting in mucositis of the cheek, tongue, gingiva or palate and interfering with efficient oral care.

1) Mouth rinsing

When the patient has lockjaw, the mechanical oral cleaning with toothbrushes may be limited. Mouthwash can therefore be used to supplement cleaning. However, attention must be given to the frequent use of the mouthwashes because they often contain alcohol. In addition, patients with dysphagia may accidentally ingest the mouthwash. In this case, oral cleaning with gauze or sponge soaked in mouthwash may be recommended. Use of containing mouthwashes fluoride is effective for preventing caries and tooth hypersensitivity.

The patient can spit out liquid, water or saliva, these can be caught in a basin, but caution is required not to make them scattered and run. When the patient cannot take a lateral decubitus or seated position, oral care may be performed in a supine position. When the patient cannot spit out liquid in this position, the face can be turned to the basin, or a suction can be used (Photo. 3).

Photo. 3 Carrying-type simple aspirator (Res-Q-Vac)

Lastly, if the patient shows limited neck movement, the gag requires careful use.

2) Position

Patients showing the neck problems with flexion and turning are often unable to recurve the head during mouth rinsing, even if they can take a seated position and anteflex the head. Gargling is therefore difficult for them. Mouth rinsing is provided with the patient face-down while the upper body bends down and forward. Water can then drain from the mouth into a wide-mouthed container such as a basin or a water tray (Photo. 4). Basically, priority is to ensuring the comfort and stability of the patient, followed by the position of the helper to allow maximum mobility with minimum strain (Photo. 5). When a seated posture is difficult to take, the upper part of the body should be tilted up 15°, or rotated to a lateral decubitus or supine position with the face sideways.

A cushion or headrest can be used to stabilize the neck. When conducting oral care in front of a washstand with the patient sitting on a chair or in a wheelchair, the caregiver has to stand behind the patient and hold the head to get stabilized.

Photo. 4 Special gargle basin
Gargle basin with wide opening and handle is useful in giving the oral care to the person with disabilities. A similar tray might be fabricated with PET bottle

Photo. 5 Oral care of a person using a vintilator
It is not easy to give the oral care to the patient with severe disabilities, however, the daily oral care is indispensable

3) Tools for oral care

A small toothbrush is more easily used for giving the oral care. In particular, a small toothbrush should be used when the patient has neck and jaw movement restricted. Furthermore, the bristles of the toothbrush may need to be trimmed to access easily into the oral cavity and fit the dentition.

One commercially available toothbrush to which a thin tube is mounted, allows saliva suction during tooth-brushing (Brush Happy). Use of this type of tooth brush can prevent aspiration of saliva and bacterial plaque in the patient in a supine position.

Dental floss is effective for removing bacterial plaque and food residues from the interproximal spaces of the dentition. However, its extended use should be avoided to prevent injury to the periodontium when the patient has disorders of neck or jaw movement.

(Ichijiro Morisaki)

59. Oral care for patients with tongue dyskinesia

1. Causes of lingual dyskinesia

The elderly or persons with impairments often show getting tongue in and out of mouth, or pushing tongue out of mouth because it cannot fit in dental arch and those symptoms are intensified when they are under nervous strain. Though tongue dyskinesia does not disturb the oral care for maxillary anterior and vestibular side of molar regions, it disturbs the oral care for mandibular anterior teeth and lingual side of the posterion teeth.

MEMO 1 Primary diseases causing abnormal tongue movements

1. Tonic and paralytic diseases: cerebral palsy, cerebrovascular disease.
2. Intellectual disabilities: mental retardation.
3. Lax and macroglossia: Down syndrome, muscular dystrophy.
4. Abnormal tongue movements: dementia, dyskinesia, Parkinson's disease.

There are two types of tongue movement, voluntary or involuntary movement of getting it in and out of the mouth. The elderly often show involuntary motion called dyskinesia (later discussion). Also patients with cerebral palsy often show involuntary tongue movements, and the involuntary motion tends to be tensioned when the caregiver provides the oral care. Primary diseases causing abnormal tongue movements are listed in MEMO 1.

Patients who get the tongue in and out during oral care may have ulcer or inflammation in oral mucosa, progressed caries or periodontal disease. And because of pain caused by those diseases, they refuse to get oral care. In these cases, pain and uncomfortable symptoms should be removed prior providing the oral care. If the oral care is forcibly provided to patients refusing without careful oral examination, it may be possible that patients refuse strongly to mouth touched.

Patients who do not get used to mouth touched or, who do not like mouth cleansing and tooth brushing, often refuse to open mouth and push a tooth brush and caregiver's finger out of mouth with tongue.

2. Dyskinesia

Tongue dyskinesia or lip dyskinesia is rather common disorder in the elderly people. In dyskinesia, the face, lips and tongue show cyclic involuntary movements such as grimacing, puckering lips, opening mouth, closing mouth, masticatory movement, projecting tongue, trembling of lips (Photo. 1).

Photo. 1 Dyskinesia of face/lips/tongue often shown in elderly people. In dyskinesia cases, face and lips are moving all the time (Frame pictures from VTR)

Incidence of dyskinesia increases with age and it is considered that is assumed to the change of basal ganglion with aging. The dyskinesia is also caused by some medicines such as antipsychotic, anti-Parkinson and anti-depressant. These are well known to induce dyskinesia, more over agents affecting digestive organs such as metoclopramide and sulpiride also induce dyskinesia. Dyskinesia occurs in 3-5 years after the first taking of L-DOPA among a half of the patients with Parkinson's disease.

3. How to provide oral health care safely to person with tongue dyskinesia

1) Control of head movement

Patients with tongue dyskinesia sometimes push out tongue strongly against oral health care, and in many cases, heads and faces are moving as well. Therefore, it is important to stabilize the head during oral health care.

Controlling the head movement is easy when the head is firmly held against the arms and upper body of the caregiver. In some cases, it is easier to control the head movement when the caregiver anteflexes own body and raise the body of the patient around 15-30 °, control movement using a lateral decubitus or supine position, and bound a head from the rear. However, if the tongue is not extruded too much, care is possible even from the lateral or the front.

2) Control of tongue movement

Tongue movement can be controlled by holding the tongue with dry gauze, and then, the tongue, teeth, and oral mucosa can be cleaned carefully. The tongue is then displaced to the other side with using a tongue depressor or dessert spoon to prevent interference with oral care. Use a finger to pull the buccal mucosa from the angle of the mouth and enlarge the vestibular room, facilitating visual inspection and care.

3) Keep opening the mouth

When the patient tends to close the mouth or open inappropriately, it is required to keep the mouth open by caregivers. Placing a disposal chopstick covered with gauze or tied chopsticks (Photo. 2) on the occlusal surfaces of the mandibular and maxillary molars, and the mouth can be kept open. The caregiver must be careful when she/he places a finger in the oral cavity to avoid being bitten by the patient. Particular attention must be paid in taking care of patients with dementia in Pick disease at low conscious level or in an excited condition (Photo. 3).

Photo. 2
A chopstick covered with gauze can be used to keep the mouth open. Oral care can be performed easier with a chopstick covered with gauze bitten in a molar part or moving tongue pressure relieved with it

4) Treatment of dental caries and adjustment of prosthesis

When prosthesis is ill-fit or tooth collapse occurs due to caries and leaves a sharp-edged root, the tongue surface is easily damaged by its movement. Adjustment of prostheses and caries treatment are thus inevitable (Photo. 4).

5) Removal of tension (desensitization)

When muscle tone is increased due to conditions such as cerebral palsy, suppression of primitive reflexes may reduce muscle tone, allowing a reduction of abnormal reflexes. Ensuring the patient in an comfortable position is required when providing oral health care. When oral health care is provided little by little, desensitization can be gradually achieved even if hypersensitivity reactions occur for being touched mouth from the inside or outside.

Photo. 3
A patient with dementia in Pick disease (LEFT) and intraoral view of the patient (RIGHT). Oral health care can be provided with the creative approach by the caregiver; even sometimes the patient will not open mouth or pushes out the tongue. As teeth in the picture are sharpen, careful approach is required

Photo. 4
A patient's oral cavity with many missing teeth, residual roots and periodontitis. Providing oral health care is not easy because mouth is not opened widely enough and tongue is pushed out

6) Muscular dystrophy and Down syndrome

As the tongue relaxes and increases in volume, oral health care may be difficult to perform in patients with muscular dystrophy or Down syndrome. In such cases, gently move the tongue laterally to increase the space for oral health care.

7) Measures to dryness of the mouth

The oral cavity is often relatively dry and cracking or fissures of the oral mucosa and atrophy of the tongue are commonly seen in the elderly. Therefore, measures to dryness of the mouth (xerostomia) such as hydration and moisture retention for oral mucosa should be adopted.

(Ichijiro Morisaki)

Glossary:

Residual root: The jagged roots remaining after more than two-thirds of the tooth crown collapses

60. Oral care for patients with dementia

1. Dementia and its accompanied symptoms

Dementia refers to the state in which the mental function that has been functioned normally shows then a continuous decline due to the chronic organic brain disease. Causes of dementia include Alzheimer disease and cerebrovascular disease. These two diseases including hybrid conditions of them cover the pathologies up to 80-90% of patients with dementia.

In Alzheimer-type dementia, extensive loss of cerebral neurons, presence of senile plaque and neurogenic tangles, and cortical atrophy arise as the result of cerebral degenerative changes. Symptoms (Table 1) of Alzheimer-type dementia include amnesia (loss of the capacity to integrate and recall new memory), disorientation, personality disorder, apathy, hallucinations, and delusions. Intellectual functious in general show a continuous decline. In this type of dementia, marked impairment of oral functions is not seen until the condition is seriously advanced.

Dementia symptoms can also arise as a result of stroke (cerebral infarction and cerebral hemorrhage), showing gradual advances with stroke recurrence. Stroke sequelae causes many disorders including the oral functions, such as respiration, speech, digestion, and swallowing, along with motor dysfunction such as a hemiplegia in many cases. Therefore, these patients requires the care and support provided by caregivers. Patients with cerebrovascular dementia show more specific foci of dementia, often with relative preservation of comprehension, judgment and intelligence, and less marked declines in memory compared to patients with Alzheimer's disease.

Table 1 Symptom of dementia

1. A progressive deterioration in intellectual function	
Amnesia	Decline of a memory function Forgetfulness becomes severe.
Disorientation	Time, Place, People are not clear anymore.
Thought disorder	Declines of thinking and comprehension. Dyscalculia
Cognitive disorder	Decline of judgment and recognition abilities (personal misunderstanding)
2. A mental symptom and the impairment of a behavior	
Nocturnal delirium	Unstable mental and behavioral condition at night
Insomnia	Not sleep at night.
Hallucination	What is not is visible or can be heard.
Delusion	I believe an impossible thing firmly.
Depression	Depression, Torpor of a sentiment
Roaming	Wandering, Loitering
Repetitive behavior	Stereotype movement
Rough	Easy to get angry, Temper, Abusive words and a rough behavior
Pica	Disorder of appetite for substances largely non-nutritive, clay, soil, paper, feces et al.
Dirty gesture	Play with something dirty. Difficulty in distinguish clean from dirty.
3. Impairment of a physical function	
Dysbasia	Cannot walk well. Frequent tumble.
Dysphagia	Difficulty in swallowing of a Pablum,or carrying out aspiration.
Excretion disorder	Dysfunctions of urination and evacuation, an incontinentia or constipation

Moreover, although the intellectual functions degrade in the patients with cerebrovascular type of dementia, his or her personality is not so affected but likely to remain strongly. It is the condition called "lacunar dementia". What the patient had before the stroke event would remain well, including those involving oral health care and lifestyle.

Symptoms of dementia tend to be influenced by the surroundings. It is therefore important to show them the surroundings, schedule, etc. as clearly as possible for the patient. In terms of meals and oral health care, if the location and the time to be done, and items used are familiar for the patient, derangement may be avoidable. Moreover, the patient can act voluntarily and become easier to accept the care under such a familiar environment.

2. Dementia and oral health care

Healthy individuals are able to keep the oral cavity clean by toothbrushing and gargling. However, the patient with dementia has difficulty in doing oral health care voluntarily and, then requires the help by care providers. Problems may arise at the time of oral health care, such as refusing the help, disliking care activities, being embarrassed about their status, or biting the fingers of caregivers trying to help. In Pick disease, such deviations in behavior appear in particular, and rejection, abusive language and other difficult behaviors may be seen during also receiving the oral care.

For individuals with dementia, oral health care should be first incorporated into a daily life, and then accustomed to keep the oral cavity clean by toothbrushing after meal and before sleeping. Since the oral cavity becomes hypersensitive when neglected for a long time. Physical interaction with the oral cavity must be increased little by little, taking care so that the hypersensitivity such as negative reactions to being touched may be reduced gradually and receiving month care may be improved.

Patients with dementia often may not recognize even they have food retention remains in the oral cavity. In the elderly individuals, food may easily accumulate on the tooth surface or in the interdental spaces and is not washed away automatically. Moreover, in dementia, since the times of eating and sleeping also increase, the self-cleansing function of saliva is decreased. As a result, numbers of *Streptococcus mutans* are elevated, and the inside of the oral cavity is likely to become more acidic, and the risk of dental caries is increased (Photo. 1). Furthermore, patients with dementia may have foul odors, halitosis, from the mouth due to xerostomia and accumulations of dental plaque and tartar.

The oral health care should be performed according to a pace of person with dementia. However, when the patient has disorders such as aspiration, pica, denture incompatibility, or acute symptoms, compulsory intervention may be necessary to examine the oral cavity. A multidisciplinary approach with various health care professionals is also important in oral health care which effects the continuity and improvement of oral health care. Participation of dental professionals is obviously indispensable in improving oral health of the elderly with dementia.

With dementia progresses, impairment of consciousness will become apparent. In that case, the patient will fall into a comatose state or be confused state. It rises the risk of aspiration or suffocation due to dyphagia of food, drink, or saliva under such conditions. In the case of tube feeding, NG or PEG, since the oral cavity often becomes neglected and results the accumulations of microbial plaque on both teeth and tongue, careful oral health care is required even they are not fed orally.

Photo. 1
An oral cavity of the dementia patient whom the care worker is giving meal and mouth care. In the state of an oral-cavity with xerostomia, cervical area of tooth is highly susceptible to dental caries

3. Practical way of oral health care

1) Posture

According to the physical condition and level of consciousness of the patient, various positions can be applied such as standing position, sitting position, and recumbent position and a supine position (MEMO 1). In case of a wheelchair user, if the patient sits steady, care can be performed easily by stabilizing the head and upper body.

MEMO 1 Level of independence and oral health care

1. Independent:
   A person who can perform oral health care independently. A caregiver checks inside of the oral cavity occasionally, and will advise how to improve it when poor condition is noted.
2. Partially dependent:
   Toothbrushing, gargling, and care of the oral cavity, aimed at improving the patient's ability for self-care.
3. Totally dependent:
   When an individual has conscious impairment and disorders in upper limb, or hand function, a care giver needs to provide appropriate mouth care using a soft and saliva absorbing goods such as soft toothbrush, a gauze and sponge cone, etc.

When performing oral care on a bed, one way is to raise the bed 15 °with the patient in a recumbent position. In a case of supine position, the patient's face is turned laterally when cleaning the mouth. In gargling the patient's with hemiplegia, turning the head to the paralyzed side is recommended to avoid aspiration. When gargling is impossible, you should suck away oral fluid with an suction apparatus.

2) Bedridden patients with serious dementia

To perform oral health care safely, vital signs such as arterial oxygen saturation (SpO_2) should be monitored. Since the head is retroflexed, the patient is in pain and in high risk of aspiration, the head and upper half of body should be slouched to avoid uncomfortable position. In patients with severe dementia, the body may be stiff and jaw opening or closing movements is also restricted. In such cases, forcibly opening the mouth with a prop, toothbrush or spoon may result in dislocation of a tooth or mouth closing rather strongly. As a safer alternative, the patient can be encourage to open the mouth giving a small amount of favorite food of the patient.

When the patient interferes the oral health care with the hand, it can be controlled by wearing the glove on or belt up that.

3) Patients wearing dentures

When a patient with dementia wears the denture and the disease progresses, caution must be used. Since the patient may be unable to wear it appropriately, may throw it away, may put away and forget or may take others'. Use of dentures requires certain levels of intellectual and physical ability to put on or take off and clean them to prevent accident or injury.

In general, it is not easy for the elderly to be accustomed well to use dentures appropriately, even they are edentulous. Therefore, it is important to guide the patient who have missing teeth to wear the denture from the younger stage in tooth loss, so that the patient can become accustomed to wearing and managing the prostheses.

4. Dementia and food preference

As shown in Fig. 1, elderly patients with dementia tend to prefer sweet foods compared with healthy elderly individuals. In addition, conditions that increase the risk of dental caries, such as dry mouth, reduced competence with toothbrushing and residual roots of the tooth are accompanied with elderly patient in cognitive impairment. However, rather than performing difficult instruction in toothbrushing or restricting access to preferred sweet between-meal snacks, priority is providing dental prophylaxis to minimize the burden on the patient. As a result, self-care should be mainly directed on the use of fluoridated toothpaste. When sticky plaque and tartar adhered on the tooth surfaces, gingivitis or periodontitis are found in the mouth, a professional mechanical tooth-cleaning (PMTC) by a dentist or dental hygienist is required to promote oral and dental health of the elderly with dementia.

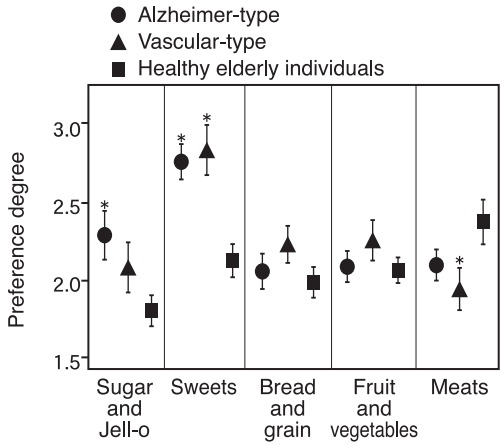


Fig. 1
Mean preference for each of the five food clusters for Alzheimer or vascular type dementia and healthy elderly groups (meas ± SEM)
Asterisk (*) shows the statistical difference ($p<0.05$) compared with healthy elderly group

(Ichijiro Morisaki)

61. Oral care for patients with disturbance of consciousness who bite oral care implements

The mastication reflex is one of the primitive reflexes of the oral cavity, as seen in infants for 2-3 months after birth, and can be seen when a finger is placed on the residual ridge of the posterior-tooth. The mastication reflex is controlled via the brainstem. This reflex will be controlled if the high order centrum function (a limbic system and cerebral neocortex) progresses, and it disappears after four months after the birth. However, since patients following cerebrovascular events or onset of cerebrovascular disease show impairment of higher-order centers, control of the mastication reflex may revert to the involuntary level, resulting in biting on instruments used in oral care. If a force is applied to a tooth in order to carry out a compulsion opening or transient pressure is placed on a large area of the palatal mucous membrane, the mouth will close reflectively. Conversely, continuous pressure to the palatal mucous membranes produces a reflexibility pore. The muscles functions are influenced by how the stimulus is provided (magnitude, time, site). Therefore, when placing a tool for oral care in the oral cavity, careful attention must be paid to the place of packing and the strength of force, otherwise the responses to specific approaches should be observed.

Since teeth suffering from caries, periodontal disease or prosthodontic work (false teeth, bridge, etc.) may break or fall out if exposed to excessive force during oral care, attention must be paid. Even if the patient clenches the teeth, if displacement of the lips is performed, it will be possible to brush the front of the teeth (lip side and buccal side). First of all, It is required for a care worker not to strain himself but to remove the dirt on the front side firmly, but firmly remove the accumulated plaque and residual food from the front side. Although care inside the mouth (lingual side and palatal side) is difficult, the following measures are effective.

1. Measures when when it is difficult to open mouth

1) Tripsis of the face and the mouth

First, hyposensitivity to irritation of oral areas also massages places other than the oral cavity previously. You loosen the musculus masseter of both sides slowly, massaging brow and mala, continuing to the brow, cheeks. In places where the lips have loosened a little, the submaxilla is lightly pushed downward by hand. If this is performed daily before initiating oral care, then little by little it will become easy to acquire to opening the mouth.

2) Use of the mouth prop

Various types of mouth props are available. For example, An instrument for odontotherapy provides certain mouth-opening (Photo. 1). A mouth prop of the tube type is useful for daily mouth care (Photo. 2-6). After performing the above-mentioned massage and relaxing the perioral muscles, you insert the tube crushed from the crevice per dentes premolares. If the tube is moved to the molar tooth, the lingual surface of the tooth is more easily cleaned from the side opposite the side of tube insertion. Once cleaning of one side is finished, the tube is moved and the other side is cleaned.

In principle, the mouth prop should not be applied to the front-tooth regionis. Because,if an excessive loading is applied to the tooth since the number of root of tooths is one,it is for breaking or moving into front tooth. Moreover, even if it is a molar teeth, you should avoid the mouth-prop use to the tooth currently shaken by periodontal disease etc.

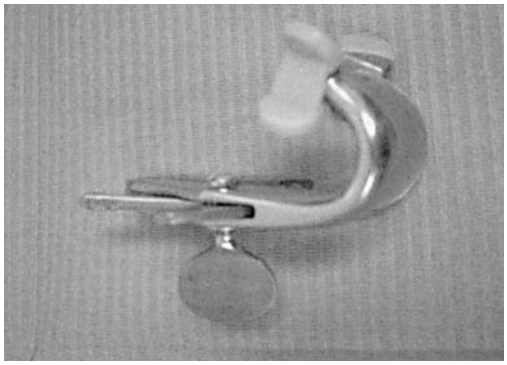


Photo. 1
An Omnipotent mouth prop

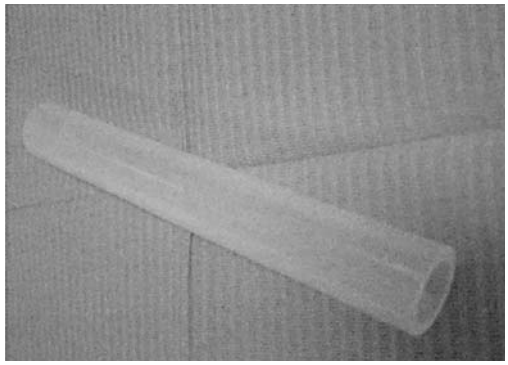


Photo. 2
A tube type mouth prop

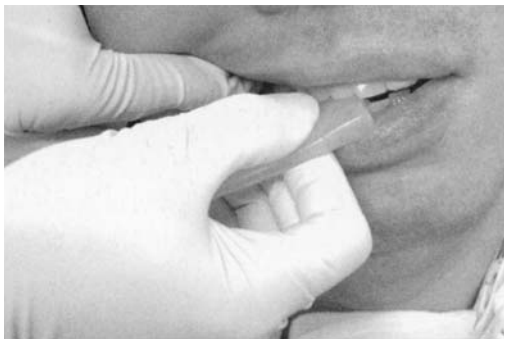


Photo. 3
The example of use of a tube type mouth prop. Crushing tube and insert from the crevice between up-and-down tooths

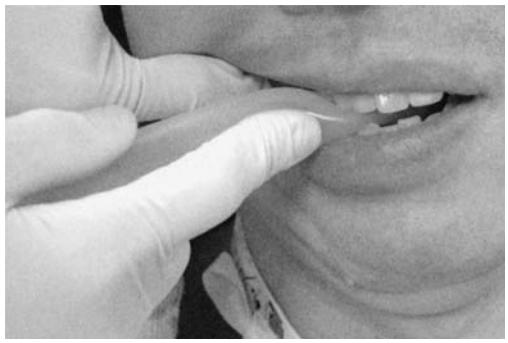


Photo. 4
Make it move to a wall-teeth regionis slowly

Photo. 5
Polish an opposite the side which I am inserting side. Depending on the case, choose the small toothbrush of a bed

Photo. 6
After polish one side, move a tube to polish another side

3) Use of pastes containing fluoride with a taste

There are also many cases which ease the reflex which opens the mouth by taste stimulus. Without mouth-opening in the beginning, start polishing from the dental front side, then polishing a lingual/palated side when the tonus of a musculus masseter has loosened by taste stimulus.

4) K-point stimulus

If a pressure stimulus is added to the oula of retromolar-triangle regionis, a pore reflex will arise. At this time, It is important that you put in a finger from between the front side of an odontosthoechos and mucous membrane of cheeks, and a finger is not made not to be bit.

However, this technique is better to carry out by two care workers, such as inserting a mouth prop at the moment K-point stimulus can be achieved, since continuing stimulation for a long time is technically difficult.

5) Suction of saliva

In patients with relatively intact sense in the oral cavity, the lips can be closed to prevent accumulated saliva dribbling from the mouth. You can prevent the aspiration of the polluted spittle with performing mouth care, drawing in briskly.

6) Selection of cleaning tools

Even using the above techniques, since the mouth cannot fully be opened, it may be difficult to put in a toothbrush inside an odontosthoechos. In such cases, other small instruments such as swabs can be used for improvised cleaning. However, to prevent accidental swallowing or aspiration, care must be taken to ensure that no parts of instruments are likely to become separated.

(Mika Kobayashi)

Glossary:

K-point stimulation: The K-point is a point inside the backmost part of the retromolar-triangle. Some clinicians report that the pressure stimulus at this point triggers an opening mouth, swallowing reflex and a digestion movement. Although the physiological basis of this process has not been elucidated, clinical studies have found this approach is useful for patients with trismus resulting from pseudobulbar paralysis.

62. Oral care for patients who can't express his/her pain

Since the possibility of some sort of dental pathology for pain in the oral cavity is high, the coping with immediate dentistry consultation and a root morbus is required. Therefore, when performing oral care for patients who cannot appeal against an ache clearly, the caregiver must be sensitive to any indications of being that the patient feels the pain sensitively. Therefore, oral care workers need to carefully observe indicators such as vital signs, the status in a patient's mouth, the facial expression and reaction during oral care. Some examples are shown in Table 1.

If the patient has pain, he/she will be uncomfortable during oral care and may refuse a care, oral care workers may have trouble to continue. However, deterioration of an oral-hygiene status worsens the disease triggering an ache. Discontinuance oral care causes more serious situation. Therefore, the treatment of an immediate cause disease and continuation of oral care are important.

Table 1 The ache in an oral cavity — A root, a symptom, and a correspondence —

The morbus leading to the ache in an oral cavity	The symptom in an oral cavity	The expression for oral care	Required treatment and correspondence
Ulitis, Periodontitis	The hemorrhage at the time of the rubor of an oula, a tumor, and a toothbrush Depending on the case, it is a drainage Stench from mouth Plaque, An attachment, a tinction, etc. of a tartar	・A rejection of oral care ・If a toothbrush is hit, A face turns away or Manus payment ・Bleeding by tooth brushing	・Dentistry consultation (Special oral care Periodontal-disease Txes, such as a stripping of a tartar) ・Use of a vellus toothbrush ・Toothbrushing and the gingival massage in a proper pressure
Oral-cavity xerosis	Dry expectoration An attachment of a coating of tongue Tunica mucosa oris The rubor of a tongue, and a xerosis	・A rejection of oral care	・Dentistry consultation (Professional oral care) ・Use of an oral-cavity moisturizer ・Use of a vellus toothbrush or a sponge brush ・Avoidance use of gargling agent including an ethanol
Perleche	The rubor of an angulus oris , Hemorrhage, An angulus oris festers	・Descending lip edages ・If a toothbrush etc. touch an angulus oris, a rejection and a face will turn away	・Dentistry consultation (A prescription of an unguent, A restoration of the vertical dimension by denture regulation etc.) ・Unguent application ・Be careful to protect a wound from an instrument
Stomatitis Ulcus	Stomatitis, The white of a tunica mucosa oris Red tangle, Phyma, Existence of a crack	・A patient dislikes putting instruments, such as a toothbrush, in a vent ・Bleeding by tooth brushing ・A patient dislike a pabulum and moisture with a stimulus taste	・Dentistry consultation (Stomatitis treatment, Pathological diagnosis of an ulcus, A stripping of the mechanical stimulus used as a root) ・Scrutinization of a nutriture
Cavity Tooth fracture Substantial teeth failure	The tooth is missing, The rubor of a dental circumference oula, An attachment of a saburra	・A patient dislikes oral care ・A patient will turn away his face, if a toothbrush hits ・A depression of an appetite	・Dentistry consultation (A dental treatment) ・Use of a vellus toothbrush

(Mika Kobayashi)

63. Oral care for patients who cannot expectorate

1. Expectorating

Respiratory secretions are generated by secretory epithelial cells and submucosal secretory glands onto the surfaces of the airways. Airways are always kept in a damp condition. Approximately 100 ml of respiratory secretions is produced each day. These secretions show a defense function and a barrier function, with transferability playing a crucial part in these functions. Under normal conditions, the secretions are consistently propelled toward the entrance to the gastrointestinal tract by ciliary movement from ciliated epithelial cells of the bronchial mucosa, then swallowed unconsciously.

However, secretions can accumulate in the respiratory tract when viscosity or quantity is increased. Such surplus discharges are called sputum and sputum spitted out called expectorated sputum. Sputum moves from the trachea periphery to the center and, is expectorated through the mouth by coughing.

2. Coughing and sputum

Coughing is a mechanism to remove sputum and other bodies that have accumulated or become lodged in the respiratory tract. Cough can be voluntary, but usually occurs through the involuntary cough reflex. Sensitive receptors distributed throughout the trachea react to the presence of accumulated material, sending signals through the glossopharyngeal nerve, superior laryngeal nerve, vagus branch or phrenic nerve to the cough center in the brainstem. Spasm of the diaphragm and intercostal muscles is then created by signals from this cough center through the vagus nerve, inferior laryngeal nerve, nerves leading to and from the diaphragm, and intercostal nerves. Coughing uses generalized muscle, expending about 2 kcal in each cough.

3. Observation of sputum and overall status

As sputum production or characteristics can change in various respiratory diseases, observation of sputum is important for early detection of illness. Characteristics such as color, quantity, and smell of the sputum can provide important information (Table 1).

Observing the properties of sputum, auscultation of respiratory status and pulmonary sounds, and arterial oxygen saturation measured by pulse oximetry can be used to confirm whether the patient is receiving sufficient oxygen. When ventilation is insufficient, oxygen inhalation therapy may be needed. Blood data can also show vital signs and identify signs of infection. A firm grasp of overall status is needed.

Table 1 Symptom of dementia

Property of the sputum		The main disease that is thought about
A hue	We are purulent	The infectious disease of the airway
	Non-purulent(serous sputum)	A bronchial asthma bronchioalveolar carcinoma pulmonary edemas
	Sputum bloody	The inflammation of the airway, a pneumonia, a pulmonary tuberculosis, a malignant tumor, the others hemopathy
Quantity	There is many it	A bronchiectasis a pulmonary edema bronchioalveolar carcinoma
A smell	A fetor	The infection with anaerobe

4. A correspondence to spitting distress of the sputum.

When sputum accumulates in the airways and alveoli, oxygen permeation is affected and oxygenation becomes insufficient. As a result, gas exchange decreases and dyspnea occurs. The affected areas of lung can also become colonized by bacteria and result in pneumonia.

As already described, coughing plays an important role in the removal of sputum. Coughing is carried out with the sequence of that the glottis closes when the air intake are enough, and opens when the intrapulmonary pressure increases enough, and then intrapulmonary pressure increases rapidly with pressure from the muscular spasm on the trapped intrapulmonary air. However, expectoration becomes difficult when the patient is suffering from disturbance of consciousness or muscle weakness due to disease or aging. Therefore oral care for facilitating spitting out sputum, and mechanically suctioning sputum should be carried out by care givers (MEMO 1). The care for spitting sputum is effective when performed in combination with various methods, but requires specific training.

MEMO 1 Care to facilitate spitting sputum

1. Increase water consumption: this lowers the viscosity of respiratory secretions, facilitating drainage
2. Tracheobronchial humidification: again, this lowers sputum viscosity, facilitating drainage
3. Postural drainage: sputum moves from alveoli to cough receptor by gravity
4. Aspiration: accumulated sputum can be softened with medicinal solutions
5. Breathing physical therapy (Squeegeeing, Vibration, Huffing): this allows sputum adhering firmly to the airways to be dislodged

5. Importance of oral care

When disorders of swallowing and the cough reflex results from diseases and aging, difficulty of spitting sputum and subclinical aspiration may occur and cause aspiration pneumonitis. The above-mentioned care can help the patient to expectorate, and oral care is needed to prevent aspiration pneumonitis.

Oral care should be carried out with clearing airway enough by suctioning with checking respiratory status and the presence or absence of accumulated sputum. Also, after providing oral care, respiratory status should be observed and sputum removed from the oral cavity and airways.

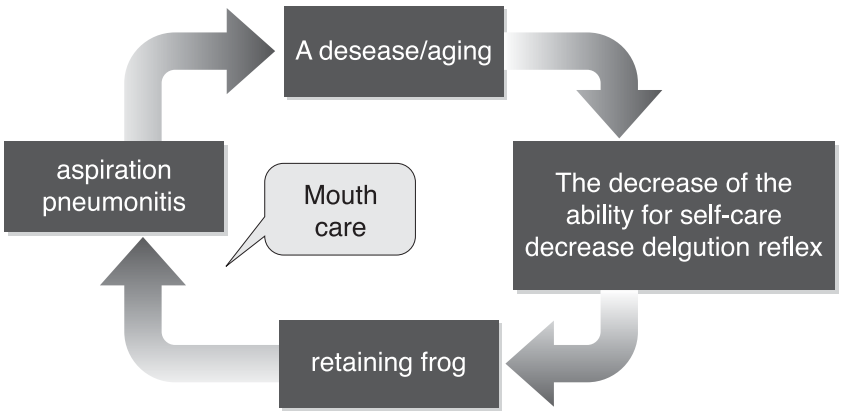


Photo. 1 Aspiration pneumonitis and Mouth care

(Tsumako Kawasaki)

64. Oral care for patients with enteral feeding

1. Enteral nutrition

Methods for nutritional support include parenteral nutrition and enteral nutrition. Parenteral nutrition cannot provide sufficient nutrition and increases the risk of bacterial infection. Enteral nutrition is thus considered preferable to parenteral nutrition in patients with an intact intestinal tract. A feeding tube, such as a nasogastric (NG) tube or percutaneous endoscopic gastrostomy (PEG) tube, is used to provide nutrition to patients who cannot obtain nutrition orally. Enteral nutrition includes continuous nasogastric tube feeding (CNG) and intermittent oro-esophageal (IOE) tube feeding.

2. Oral conditions of patients with enteral feeding (tube-fed patients)

Patients with enteral feeding generally has poor hygience as chewing is not required and saliva secretion is decreased. Saliva is a very important agent for lubricating the mouth, removing debris from the mouth, and neutralizing acids that can cause dental disease. Saliva also helps to prevent colonization of the mouth by harmful bacteria. If the tube-fed patient aspirates saliva, the risk of the saliva being pathogenic to the lungs is higher than in orally fed patients.

3. The important points of oral care in patients with enteral feedings

1) Avoid oral care right after nutrition injection. Oral care sometimes increases the incidence of gastroesophageal reflux.
2) Functional oral care (i.e., massage of the salivary glands) is recommended before nutrition injection to promote saliva secretion.
3) Confirm tube placement and ensure oral care is performed gently and with caution to avoid tube displacement.
4) Oral care should be provided with the patient in a sitting or lateral position to prevent aspiration. Keep the patient in this position for at least 2 hours after nutrition injection without oral care to prevent aspiration.
5) Regular tube change is important, as tube feeding may lead to aspiration pneumonia due to the microaspiration of bacteria colonizing the tube.

(Masumi Muramatsu, Haruhiko Kashiwazaki)

Glossary:

PEG tube: A PEG tube is generally placed into the patient's stomach as a means of feeding them when they are unable to eat. Tube placement is an endoscopic procedure that involves inserting a tube through the abdominal wall into the stomach. This procedure represents an alternative to surgical gastrostomy. PEG tubes may also be extended into the small bowel. The procedure does not require a general anesthetic, although mild sedation is typically used.

65. Oral care for intubated patients

1. Intubation

Intubation is performed to prevent aspiration by isolating the airway from the oral cavity, nasal cavity and esophagus, and to ensure a clear airway free of oral discharge and intratracheal vomit using a tracheal tube or tracheostomy cannula. Specifically, artificial respiration may be needed for an extended time if cardiopulmonary resuscitation is required for patients under general anesthesia. An airway can be secured using oropharyngeal intubation with an orotracheal tube, nasotracheal intubation with a transnasotracheal tube, or tracheostomy with a tracheostomy cannula. The advantages and disadvantages of tracheal intubation are outlined below.

1) Advantages of tracheal intubation

① The tongue cannot block the airway, and the risk of airway obstruction by vomit is removed

② Positive pressure ventilation is easy

③ Endotracheal suction is easy

④ Anatomical dead space is decreased

2) Disadvantages of tracheal intubation

① The intubation procedure may cause laryngospasm, bronchospasm, vomiting, aspiration, elevated blood pressure, tachycardia, bradycardia

② The ciliated epithelium of the bronchial mucosa may be injured (causing edema, granuloma)

③ Increased sputum production, increasing the risk of respiratory tract infection.

2. Characteristics and oral care of intubated and ventilated patients

1) Characteristics of intubated and ventilated patients

When severe disturbance of consciousness is seen such as after an operation, perioperative blooding, delayed awakening, head trauma, intracranial bleeding/tumor, cardiopulmonary resuscitation for an extended time such as heart/liver/esophagus, the patient may be admitted to a specialty intensive care unit such as the Intensive Care Unit (ICU), Coronary Care Unit (CCU), Surgical Intensive Care Unit (SICU), or Neurosurgical Care Unit (NCU) with placement of a tracheal tube for decreased body temperature, acidosis, electrolyte imbalance, delayed passage of general anesthetic agents (e.g., inhalation anesthetic, narcotic, muscle relaxant), brain protective therapy, and intensive care is performed after intubation. Most patients fall asleep on the hospital bed, and electrocardiography, pulse oxymetry and capnometry, infusion from the central veins of the liver, transfusion, administration of circulation agent, intensive care and nursing by the arterial blood pressure line are performed. The patient is also put on ventilation, and treatment/control is performed because the consciousness of the patients is reduced, and spontaneous respiration is insufficient. If this situation remains unchanged for a long time, tracheostomy is performed and the orotrachel tube is replaced with a tracheostomy cannula.

2) Oral condition

A tracheal intubation is provided, and a bite block is attached, and, as for the patients (Photo. 1) putting on the ventilator by the respirator, patients on ventilation show reduced production of saliva and thus reduced oral function. Blood, sputum and saliva can collect in the oral cavity, dried and attached to the tongue, periodontium and mucosal epithelium. These places readily become hotbeds of endodontic bacterial activity resulting in tongue coating, halitosis, periodontal disease, and ventilator-associated pneumonia (VAP).

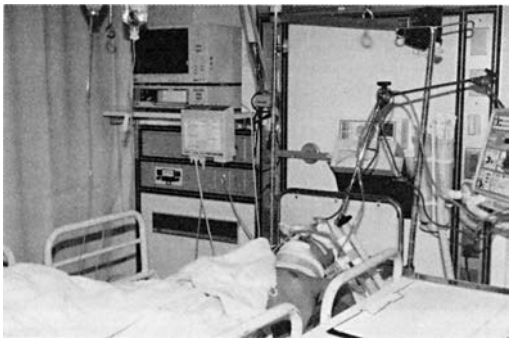


Photo. 1 The patients of NCU attached a respirator to

3) VAP

Existing inflammatory bacteria are retained at the upper cuff of the tracheal tube in the oral cavity, and VAP can result when these bacteria pass through the cuff and reach the tracheal mucosa, and enter in an airway inferior part.

Therefore the tracheal tube should choose a thing with a derivation line in a cuff. Also, the presence of the tracheal tube inhibits ciliary action of the ciliated epithelium and obstructs drainage of discharge, as the patient's natural defenses are more and more reduced.

Early development of pneumonia occurring within 4 days after intubation suggests colonization of the airway by pneumococcus or *Haemophilus influenzae* as causative organisms. On the other hand, late development of pneumonia after 4 days suggests the presence of *Pseudomonas aeruginosa*, *Acinetobacter*, *Enterobacter*, and *Methicillin-resistant Staphylococcus aureus* (MRSA) as causative organisms. When insufficient oral care is performed, candida multiplies in addition to these causative organisms, and the reservoirs of endodontic bacterium are thought to be further enlarged.

4) Purposes of oral care

Oral care in intubated patients on ventilation has the following purposes for everyday life and rehabilitation:

① Prevention of endodontic bacterium reproduction and aspiration pneumonitis

② Prevention of dental complications

③ Elimination of halitosis and provision of positive feelings from having a clean, refreshed mouth

④ Setting daily habits (preparations for start of caloric intake)

⑤ Opportunity to closely inspect the oral space

⑥ Aiding recovery (from coma to lucid intervals) of consciousness

Oral care is also important to compensate for decreases in physiological functions of saliva, and to decrease bacterial reproduction for preventing/treating VAP.

5) Real oral care

During oral care, we need to talk to the patient, and to explain him/her with or without a consciousness the need for oral care, procedures, the time required. Also, overall status of intubated patients is at great risk of general condition. As the state of consciousness is important, smooth high-quality oral care can be performed by creating and using an oral care assessment sheet for each institution.

An example sheet for use with oral care in the NCU is shown below.

6) Oral care in the NCU

(1) Regular mouth cleaning

Medicine to use: Isodine 2%

① The medication (2 ml) is given with 60 ml of water in a cup.

② To make a small cotton ball. Extraneous plaque and waste is scraped and endodontic cleaning is performed for the teeth, periodontium, cheek mucosa and tongue while enlarging the group part from an angle of mouth using an odontoscope, toothbrush, tongue depressor, gag, hook for the angle of the mouth, suction tube, and dilute solution of isodine (Photo. 2).

③ Implant a suction tube from an inner part of bit block and aspirate the discharge collected in the oral cavity and pharynx.

④ Aspirate oropharyngeal secretions that have accumulated in the upper cuff of the tracheal tube using an upper line of cuff and rinse the area. Cuff pressure is also checked using a cuff internal pressure meter.

(2) Oral cleaning for patients with severe halitosis

Perform endodontic cleaning for patients with severe halitosis using one of the following two kinds of medicine every 4-5 hours (Photo. 3).

① Lion green / tooth wash: diluted 100-fold

② Oxydol: using diluted 10-fold Oxydol irregularly

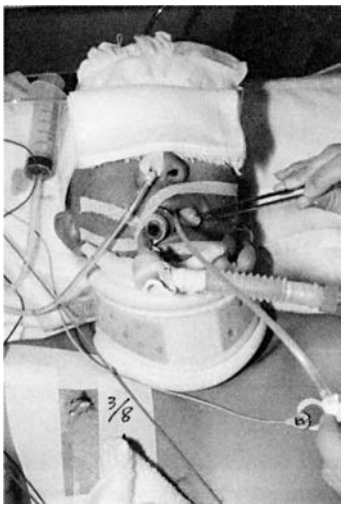


Photo. 2
Mouth care using the 2% isodine

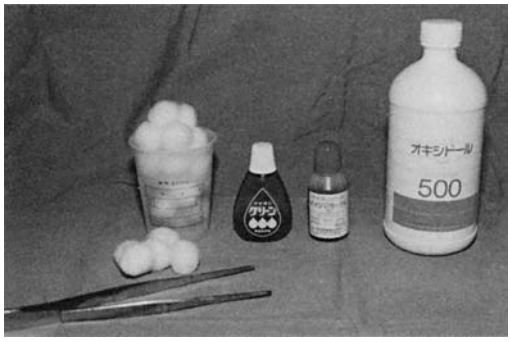


Photo. 3
Mouth care using the 2% isodine

(Morimasa Yamada)

66. Oral care before treatment of patients with oral cancer

Oral cancer accounts for 1-3% of malignant tumors. However, maintaining functions of speech and taking diets (chewing, swallowing) is important, and other functions such as eating, salivation, and airway function have strong influences on the social environment of the patient.

Following the rate of 26% for cerebrovascular disease, the rate of oral cancer postoperative patient was high of 12% among the 4132 patients who received treatment in the Athrocytosis function Department within 2 years.

When oral cavity dysfunction may result from treatments, we estimate the patient's condition during and post- treatments, and it is general to plan the treatment prior to the treatment.

1. Changes and disorders resulting from oral cancer treatment

Treatments for oral cancer depend on the stage of cancer, and radiotherapy and chemotherapy may be used in combination. Duration of treatment may take a few weeks to months or more owing to the way of treatment. The following changes and disorders may be caused by cancer therapies.

1) Surgery

This may result in non-physiological depression and an upsurge caused from scars, operation wounds and skin flap, and colonizing bacteria.

2) Radiotherapy

This may result in stomatitis, multiple caries, bone exposure, necrosis, xerostomia.

3) Chemotherapy

This may result in direct mucous membrane disorders, and passive mucous membrane following anemia or myelosuppression.

Surgery may sometimes leave a wound open by the condition of oral healing. As middle sutures are hard to implement in a closed wound, even slight external force may invite wound dehiscence. For example, under the circumstance of not seeing oral cavity easily, we sometimes execute oral care and stab a toothbrush in a sutured wound. Furthermore, even if the wound is stable, the scar makes the uneven part in the oral cavity, which is not easy to be cleaned, and the scar also inhibit lingual motion and it causes a bolus retained. In addition, observation and cleaning of the oral cavity may become difficult if lockjaw develops due to the operation scar.

Radiotherapy and chemotherapy can indirectly or directly cause depression of anemia and immune function. Stomatitis and thinning of the oral mucosa are likely. As a result, irritability of the oral mucosa increases, and the oral cavity bleeds easily. Angular cheilitis and lockjaw can result from radiotherapy in addition to stomatitis.

Given these potential effects, oral care should be performed prior to cancer therapy according to the issues that may occur after treatment. For example, therapies such as molar extraction will be more difficult if lockjaw develops. The need for dental treatments must therefore be assessed before initiating cancer treatment. Also, good condition can reduce the risk of stomatitis, thus increasing the likelihood of maintaining eating function and QOL. The impact of sensible precautions can thus be significant.

2. Endodontic evaluation before oral cancer treatment

Evaluation of whether a desirable oral environment is present before treatment is important. Pain and bleeding tendencies increase, and the native state of oral hygiene is thought to decrease with the onset of oral cancer. Also, an understanding of the oral status is required to relieve discomfort resulting from the tumor. The quality and quantity of the diet will be changed because of the onset of tumor and the treatment. It is important to understand

that how much the patient eats before treatment and evaluate the nutritive state after treatment. An initial interview with the patient and their family is thus important for determining the oral environment and state of nutrition.

The endodontic state is observed next, confirming toothbrushing, use of prostheses, and presence of cavities and lockjaw.

General status such as weight is also screened along with oral hygiene and dietary intake, as decreased physical ability and immune function may be decreased during carcinogenesis.

3. Factors and tools in oral care before treatment

Oral care before oral cancer treatment is performed not only to prepare for treatment, but also to maintain oral hygiene during treatment and optimize rehabilitation after treatment. The methods selected should be easily accepted by the patient and family and appropriate number of tools, amounts of mouthwash and time needed likely to prove effects. The effects of care can be shown to the patient and their family by recording progress, facilitating the later transition to self-care at home after treatment.

l) Reducing bacterial counts by oral cleaning

The oral cavity contains a large number of bacteria, and some bacteria become bound to proteins present in saliva on the dental surface. This film is called biofilm. Postoperative infection or aspiration pneumonitis may arise if bacteria in biofilm multiply due to xerostomia and decreased self-cleaning functions of the mouth following cancer therapy. As *Streptococcus milleri* and anaerobes of the endodontic resident flora represent predominant microbial populations in samples from operations involving the posterior cervical region, preoperative control of endodontic bacterial counts is important. Elimination of the biofilm requires specialized mouth care by a dentist or dental hygienist.

Even though membrane irritation can be avoided simply by wiping the oral cavity with povidone-iodine solution, elimination of plaque in the oral cavity cannot be accomplished. Mouthwash such as 10% benzathonium chloride solutions can be combined with brushing when planning oral cleaning. A dentifrice can be used subsequently, but cannot be expected to have much effect on oral bacterial counts.

When a prosthesis shows a feculent condition, preoperative cleaning is important to prevent emergence of candida specie. Prostheses should be removed and kept safe during cancer treatment.

2) Odontotherapy

Other than reports of cavities in patients, indications from previous medical examinations should be taken into account and consultation with a dentist recommended to treat any decay or periodontitis present. Evaluating the need for extractions within the target area for radiotherapy is particularly desirable, as extraction after starting therapy is inadvisable. Similarly, extractions should be performed before starting chemotherapy in patients with malignant lymphoma.

4. Respect for the personal tastes of the patient

Each individual has personal preferences, such as tobacco, coffee, carbonated drinks, and hot food. After having initially identified potential problems such as smoking and making recommendations like smoking cessation, it is better to take the method that the patients are easy to accept. For example the patient is directed to decrease the amount of cigarettes a day to 1/2, comparing to a day before cancer onset. Techniques should be adapted to fit around the tastes of the patient. For example, barley tea has reportedly been used as an oral wash.

In terms of diet, the discomfort associated with eating can be reduced by changing to irritating things and cutting food up into pieces, and plan to maintain and improve appetite.

(Michio Shikimori)

67. Oral care during radiotherapy or chemotherapy for oral cancer

1. Preface

Oral cancer treatments vary according to the specific pathology and also the institution to some extent, but marked progress has been achieved in chemotherapy and radiotherapy for oral cancer, and the percentage of patients treated using only chemotherapy or radiotherapy rather than surgery has increased.

Use of Fluorouracil (5FU) and combination therapy with platinum-containing drugs are currently the mainstay of chemotherapy, but taxanes have also recently gained popularity. Systemic therapy is also a mainstream approach, but selective intraarterial injection methods have been attempted. Catheterization can be performed from the superficial temporal and femoral arteries, and selective intraarterial injection can achieve carcinostatic effects by selectively blocking the supply of nutrients to the tumor via arteries such as the lingual arteries. In radiotherapy, methods such as conformation radiotherapy, intensity-modulated radiotherapy (IMRT) and brachytherapy have recently gained popularity.

However, in all therapies, various disorders may arise in the oral cavity. Side effects including stomatitis are particularly shown when chemo- and radiotherapy are provided at the same time. Also, inradiance level is higher in radiotherapy comparing to surgical remedy, and severe side events may be expected (Photo. 1, 2).

Oral care is known to be effective in relieving side-effects of these treatments and appropriate oral care to patient's each state both prior and post remedy is required. In addition, patients with a serious condition like cancer and highly invasive treatments may also experience side effects related to anxiety. The ability to reassure the patient and show progress in care while observing their psychological condition is therefore important.

Photo. 1 Deterioration of the lockjaw due to the cheilitis and periodontal disease

Photo. 2 The radiation stomatitis with eating disorders

2. Problems associated with chemotherapy (MEMO 1)

In chemotherapy for oral cancer, anticancer which develops side effects to mucosa is often used. In addition to disorders directly involving the oral mucosa (e.g., stomatitis, angular cheilitis) or changes in oral sensation, disorders such as gingivitis with myelosuppression, deterioration of periodontal disease, fever, and infection can arise. In particular, while few systemic side effects are likely to arise with selective intraarterial injection, strong local effects involving the oral mucosa are likely to occur. Early in the course of administration, the patient may notice such effects as dysesthesia and mucosal abnormality on the diseased side.

Immune function also decreases with the administration of carcinostatic agents, resulting in increased susceptibility to various infectious diseases. Blood data and duration of administration therefore represent vital pieces of information and oral care should be scheduled in consideration of predicted systemic and endodontic changes after administration. In our hospital, we provide scheduled oral care until white blood cells and platelets reach a minimal level.

MEMO 1 An endodontic disorder with the chemotherapy for the oral cancer

1. A stomatitis, a pharyngitis
2. Odontogenic infectious diseases (including the deterioration of periodontal disease)
3. Opportunistic infection such as candida, the herpes
4. Taste disturbance
5. Xerostomia
6. Dysesthesia
7. Sensitivity of teeth

3. Problems associated with radiotherapy (MEMO 2)

The range of emerging side effects varies according to the area and dose of radiation administered. When the lips are included within the radiation field, QOL is likely to markedly decrease due to extreme discomfort with eating resulting from effects such as angular cheilitis. Methods and devices for minimizing the radiated field should be considered wherever possible.

Xerostomia due to sensory disturbance can result in effects such as dysgeusia and salivary gland disorders. Radiation for cervical lymph node metastases and the oral cavity and pharynx can result in dysphagia due to pharyngitis.

In addition, forms of foods and nutrition condition of patients should be considered. In brachytherapy, without provision toward side effects, severe adverse events such as necrosis of mucosa or the jaw bone, and myelitis may occur. In particular, tooth extraction causing exposed bone after radiotherapy may transition to osteomyelitis, so it is basically contraindicated. Therefore tooth extraction should be done before starting radiotherapy.

MEMO 2 An endodontic disorder with the radiotherapy for the oral cancer

1. A stomatitis, a pharyngitis
2. Dermatitis
3. A candidiasis
4. Xerostomia (an athrocytosis/a dysphagia) due to the salivary gland disorder
5. Taste disturbance
6. A lockjaw
7. A cancer trace formation
8. Carious frequent occurrence (radiation decay)
9. A soft tissue necrosis
10. An osteonecrosis

4. Oral care

Cancer accounts for one third of the total deaths, so that associated medication to cancer treatments are emphasized. Recently oral care for the cancer patients are discussed frequently, standardization of oral care in various medical fields such as nursing. Methods and tools of oral care vary according to communities, establishments or professions of administrator. The need of team medicines is emphasized recently, team medicine is very important in the field of oral care.

Oral care for cancer patients is important from both mental and physical aspects. There is no question about that infection control and coping therapy to complications are important, furthermore mental support through oral care and improvement of nutrition and condition of hospitalizing may help patients to recover.

Under oral care for cancer patients, occasions will arise for care providers to touch location of the lesion directly, they should realize that oral care has the important meaning. Patients with surgery besides radiotherapy or chemotherapy may change in eating and swallowing functions, and may be infected after

operation. Possibilities of those should be considered when oral care is performed.

Cooperation between the different specialties in the multidisciplinary team can help to identify optimal methods for care.

Matters that require attention should be shared among the attending physician, dentist, dental hygienist and nurses before performing oral care. Confirm with the attending physician whether any sites in the oral cavity must not be touched. MEMO 3-5 summarize oral care in the widest sense, including odontotherapy. As radiotherapy and chemotherapy are often provided at the same time, oral cares under those therapies are considered mostly same and written uniformly.

MEMO 3 Oral care

1. Eliminate potential irritants (when a prosthesis touches a tumor, the prosthesis and orthodontic appliances should be removed. Polishing stimulated part and making protective prosthesis are needed
2. Odontotherapy (treatment of teeth representing potential sources of infection) as much as possible
3. Specialized oral care (tumor part should not be touched)
4. Directions for self-care (toothbrushing in the region of the tumor is contraindicated)
5. Fluoride application
6. Mouth rinsing
7. If teeth in the area of radiotherapy are likely to become sources of infection, perform dental extraction (at least 2 weeks before therapy, if possible)
8. Remove metals that may cause scattering of radiation
9. In the case of brachytherapy, manufacture a spacer

MEMO 4 Oral care during treatment

1. Endodontic observation and evaluation
2. Check ability to perform self-care (when self-care is impossible, conduct assisted oral care while avoiding pain and bleeding as far as possible)
3. Coping with odontopathies such as acute periodontal disease.
4. Coping with stomatitis (including use of ointments, mouthwash, analgesics)
5. Coping with infectious diseases such as candida and herpes simplex virus
6. Coping with xerostomia (including use of moisturizer, gargling)
7. Fluoride application

MEMO 5 Oral care after treatment

1. Check ability to perform self-care
2. Continue treatment of periodontal disease, maintenance of intraoral condition.
3. Check for xerostomia and dysesthesia, regular follow-up and coping with dysgeusia
4. According to radiation fields and exposure dose, extraction is contraindicated
5. Perform caries prevention such as fluoride application
6. Perform rehabilitation of oral cavity function

Judgment of the need for extraction should be made after conferring with the attending physician and dentist. If specialized oral care is needed, consultation with a dentist should be held as soon as possible. In addition, the patient and his/her dentist should be informed if the radiation site and dose preclude tooth extraction, even if radiotherapy has recently been completed. When extraction is absolutely necessary, consultation with oral surgeons will be required.

(Kensuke Sakai)

68. Oral care of patients with bleeding tendencies

During oral care, sudden bleeding from the gums and lips or palatine mucosa can cause alarm. Bleeding may arise from the gums or from small lesions in the oral cavity if a toothbrush or toothpick is used under normal conditions when bleeding is not expected. Such bleeding can be difficult to stop and can become serious. During oral care for patients with a bleeding tendency, the measures available to stop bleeding and precautions for providing oral care must be fully understood.

1. Bleeding tendency

Bleeding tendency refers to a systemic condition in which bleeding can occur as a result of slight external force or with no apparent cause, and such bleeding can prove very difficult to stop once it has begun. Under normal conditions, major bleeding does not occur during oral care, and minor bleeding seen from the gums due to periodontal disease typically lasts only a few minutes before spontaneously stopping. In patients with bleeding tendencies, however, bleeding can persist.

The term “hemorrhagic diathesis” is used synonymously with “bleeding tendency”. In this term, “diathesis” indicates a hereditary nature, and is often used in reference to patients with a congenital coagulopathy.

2. Factors causing a bleeding tendency

The mechanisms of hemostasis can basically be divided into primary hemostasis, in which vascular walls and platelets play a major role when bleeding first occurs, and secondary hemostasis, in which the coagulofibrinolytic system is involved. The causes of bleeding tendencies can be classified as follows: ① vascular wall abnormalities; ② platelet abnormalities; ③ abnormal blood coagulation; ④ exacerbated fibrinolysis; and ⑤ others.

1) Vascular wall abnormalities

Hereditary hemorrhagic telangiectasis (Osler’s disease), purpura simplex (Schönlein-Henoch syndrome), senile purpura, allergic purpura, scurvy

2) Platelet abnormalities

Idiopathic thrombocytopenic purpura (ITP), symptomatic thrombocytopenic purpura (hypoplastic anemia, leukemia, pernicious anemia, hepatic cirrhosis)

3) Abnormal blood coagulation

Hemophilia (Photo. 1, 2), von Willebrand disease, vitamin K deficiency, severe liver disease

Photo. 1 16 year－old male patient with hemophilia B.
Ecchymotic at calf circumference

Photo. 2 The same patient in Photo. 1
Bleeding in the mouth

4) Exacerbated fibrinolysis

Disseminated intravascular coagulation (DIC), hepatic cirrhosis, leukemia, thrombosis, infections, postoperative conditions

5) Others

Multiple myeloma, systemic lupus erythematosus (SLE), chronic rheumatoid arthritis or other autoimmune diseases, bone marrow transplants, chemotherapy of malignant tumors, pharmacological effects (drugs given to patients with cerebral infarction or myocardial infarction, to patients after prosthetic valve replacement, or to patients on dialysis)

3. Problems in patients with bleeding tendencies

1) Problems with oral bleeding

Continuous bleeding or accumulation of blood clots in the oral cavity can cause respiratory obstruction. Swallowing of blood or blood clots can also produce vomiting. Moreover, because hemostasis can be difficult, the patient may become agitated and anxious. Continuous bleeding and blood clots can also cause halitosis.

2) Problems with patients with systemic diseases and disorders

Patients with conditions associated with bleeding tendencies, such as dialysis, allergic diseases, bone marrow transplants or severe liver disease, or who must remain bedridden for long periods or show prolonged impairment of consciousness, are likely to be immunocompromised and susceptible to infections. If oral care is inadequate for this reason due to such susceptibility, the risks of stomatitis, parotitis and aspiration pneumonia are increased. Patients with some types of malnutrition, such as hypoproteinemia or deficiency of vitamin C or K, are highly susceptible to anemia. Bleeding can easily occur because the oral mucosa becomes friable.

3) Drug-related problems

Anti-thrombotic drugs (e.g., anticoagulants such as warfarin, platelet aggregation inhibitors such as acetylsalicylic acid) are given to patients with cerebral infarction or ischemic heart disease. Antibacterial agents such as penicillins and cephems decrease blood platelet function, as do most analgesics, thereby prolonging bleeding. Caution is required when using such drugs. Long-term administration of drugs can decrease hepatic function, and worsen the systemic condition of patients with bleeding tendencies.

4. Basic approaches to oral care

1) Significance of oral care

Patients with a bleeding tendency can become excessively concerned about bleeding, to the point where they neglect proper oral care. In such cases, the importance of preventing bleeding and infections must be explained, so the patient understands the significance of oral care. Armed with this understanding, the patient can make every effort to implement proper care, keep the oral cavity clean, and prevent periodontal disease and dental caries.

2) Treatment of dental diseases

Patients with very loose teeth or remaining roots, or with ulceration of the mucosa, must obtain treatment at a dental treatment facility. Such patients must also be checked for improperly fitted dentures, which can injure the mucosa and teeth.

3) Regular dental examinations

Performing dental examinations on a continuous basis is important. At these times, professional oral care can also be undertaken, including instructions on oral hygiene, removal of dental calculus and plaque, and adjustment of dentures.

4) Severity of bleeding tendencies

When providing oral care, determining the severity of bleeding tendencies is essential. The patient also needs to understand the tests and other procedures required for this purpose. If congenital blood diseases are discovered during interviews, the patient should visit their primary care provider for consultation before providing oral care. In addition, systemic conditions and the severity of the disorder must be determined and taken into consideration. If a bleeding tendency has not been identified beforehand, purpura and frequent bleeding involving the nose, digestive tract, joints, or genitalia may suggest such a condition.

5) Regular medication

Patients do not need to stop taking their regular medication because of oral care. In particular, drugs taken for anticoagulant therapy should typically be continued.

6) Infection countermeasures

If viral hepatitis is the cause of severe liver disease, caution must be exercised to prevent the spread of infection via the blood.

7) Oral care methods

Improper brushing of the teeth can lead to bleeding, and an understanding of the correct methods of oral care is therefore imperative. Combining routine oral care with professional oral care is also of vital importance.

8) Xerostomia

In patients with bleeding tendencies and xerostomia, inflammation may easily arise, increasing the risk of bleeding. Checking the lips, tongue, and palatine mucosa for inflammation is therefore crucial.

5. Basic methods of oral care

1) An advance understanding of oral conditions and bleeding tendencies will allow proper methods of oral care to be determined. Coercive tooth brushing must be avoided, but conscientious brushing should be encouraged.
2) If the bleeding tendency is slight and places no restrictions on daily life, regular tooth brushing can be performed, provided no problems are present in the oral cavity.
3) For patients with a slight bleeding tendency and moderate to severe periodontitis, the teeth must be brushed as instructed by an oral hygienist specialized in this field.
4) If the bleeding tendency is severe and the oral cavity is in poor condition, a toothbrush should not be used. Instead, the teeth should be wiped with a cotton swab or sponge brush soaked in 3% Isodine gargle, taking care not to injure the gums. If inflammation of the gums or mucosa is present (Photo. 3), hemostasis and disinfection can be performed using a cotton ball containing a 20-fold dilution of Oxydol.

Photo. 3 23 year-old female patient with primary immunodeficiency syndrome
Severe periodontitis and flare and bleeding in gingiva

5) Sites requiring oral care include the gums, teeth, lips, tongue, palate, and buccal mucosa. Regular oral care can be used when no inflammation or bleeding is present. For brushing, the scraping method is ideal because inflammation can occur in the gum close to the teeth. With this method, brushing takes place close to the cervical region of the teeth. The bath method is inappropriate, as the tip of the toothbrush is inserted up to the gingival sulcus, which is likely to cause bleeding.
6) Gargles and antibacterial mouthwashes: If the patient is able to gargle, gargles such as Isodine gargle (povidone-iodine), Oradol gargle (domiphen bromide) or Neostelin Green (benzethonium chloride) should be actively used. If gargling is difficult, gauze or a toothbrush soaked in the gargling agent can be used. Depending on conditions in the oral cavity, dental rinses or other products on the market can also be used.
7) Extreme caution must be exercised when using dental floss or interdental brushes. Inflammation often occurs at adjacent gum surfaces, so the narrowest interdental brush should be used initially.
8) Bleeding can easily occur if phlegm or secretions adhering to the lingual or palatal mucosa are removed forcefully. Such deposits should first be gradually softened with Oxydol or green tea, then removed very slowly and gently.
9) Areas affected by angular cheilitis or perleche are prone to bleeding and should thus be protected using an ointment, etc.
10) Bleeding countermeasures: Bleeding normally stops naturally within about 10 minutes. If bleeding persists, the patient should gargle first, and then check the bleeding areas. If necessary, the patient should bite down on a piece of moistened gauze or use the gauze to firmly press down on the affected area using the fingertips. In most cases, bleeding will stop after hemostasis for 10-20 minutes. If bleeding cannot be stopped, the patient should consult a health professional.

(Keika Gen)

69. Oral care for patients with fever

1. Oral symptoms found in patients with fever (MEMO 1)

Perspiration due to fever, increased metabolism, increased respiratory rate (resulting in increased transpiration), and patients with fever show a tendency toward dehydration that readily results in decreased salivation. As a result, when the oral cavity dries, symtoms such as coating of the tongue, rhagades / detachment of the labial mucosa, angular cheilitis, and dental plaque are increased (Photo. 1). Halitosis and decreased gustatory sensation, and increased salivary viscosity are also observed. Other than pyrexia, moisture thanks it for perspiration from the oral cavity including the embarrassment impotence with a mouth breathing due to the nasal congestion and difficulty in mouth closing due to the orotracheal intubation; when is, and increase a situation, the desiccation symptom worsens more.

MEMO 1 Common oral symptoms in patients with fever

1. Symptoms related to decreased salivation
   Xerostomia
   Increased prevalence of tongue coat
   Rhagades/detachment of labial mucosa
   Angular cheilitis
   Increased bacterial dental plaque
   Viscous salivary (making the inside of the mouth sticky)
   Halitosis
   Reduced gustatory sensitivity
2. Symptoms related to decreased systemic physical ability
   Orolabial herpes, herpetic stomatitis, a shingles
   Candida stomatitis (exacerbated by decreased salivation)

In addition, viral diseases (including orolabial herpes, herpetic gingivostomatitis (Photo. 2), the shingles) and mycotic infection (including candida stomatitis) may arise when food intake via mouth decreases and systemic phylaxis ability decreases because nutrition is decreased (so-called “loss of physical strength”). Proliferation of candida easily arises as a superinfection when salivary antibacterial actions are decreased.

When saliva production and autopurification are decreased, bacterial dental plaque and coating of the tongue increase, but a dental caries rarely progresses during the short term. However, we may generate acute attack of chronic periodontitis, gingival abscess formation, pericoronitis of the wisdom teeth and sialadenitis when accompanied by decreases in the physical ability.

Photo. 1 coat of the tongue

Photo. 2 herpetic gingivostomatitis

2. Does lack of oral care lead to fever?

Confirmation of whether "the cause of fever is associated with lack of oral care" is necessary for patients with fever (MEMO 2). Reports have described decreases in the number of days with fever after surgery under general anesthesia and among nursing home residents following oral care, suggesting the importance of oral care in patients with fever, attributable to reductions in aspiration pneumonia. In addition, "fever of unknown origin" may result from pneumonia caused by aspiration that is not noticed by the patient or their caregivers (silent aspiration).

MEMO 2 Causes of fever due to inadequate oral care

1. Aspiration pneumonitis
2. Bacteremia/sepsis
3. Acute attack of chronic periodontitis
4. Gingival abscess
5. Pericoronitis

Bacteria may also enter the blood from sites of gingival bleeding and stomatitis, causing sepsis. Fever may result from acute attack of chronic periodontitis, gingival abscess, pericoronitis of wisdom teeth, and sialadenitis.

When fever originated from oral cavity is suggested, treatment is obviously necessary. To improve oral condition, "cure" is essential in addition to "care". Improvements in fever may prove difficult to attain if the cause remains unaddressed and mouth care remains insufficient.

Bubbled gargling (mouth rinsing) and rattled gargling using mouthwash combined with antiseptic are often used to address the oral infection (MEMO 3). Isodine and Neo-sterol Green require prescriptions. As no clear differences in the effects of mouthwash listed in MEMO 3 are apparent, decisions should be made based on convenience and patient preferences, including easy of availability and taste.

MEMO 3 Mouthwashes showing antiseptic effects

1. Povidone-iodine (Isodine)
2. Benzethonium chloride (Neostelin Green)
3. Chlorhexidine gluconate (ConCool F)
4. Essential oils such as 1.8 cineole, and thymol (Listerine)

3. Oral care for patients with decreased salivation (xerostomia)

Treatment addressing the specific causes of fever and dehydration is clearly needed. Increased salivary discharge is difficult to obtain with care only, as amelioration of pyrexia and dehydration are required to increase saliva production, similar to how urine flow is not increased very much even if diuretics are administered when the patient is dehydrated.

Symptomatic treatment for xerostomia involves two phases: "humidification"; and "moisture retention" (MEMO 4). Methods of moisture retention include application to the lips, mouth rinsing for humidification, spray, while humidification can be achieved by placing on a chunk of ice in the mouth or petrolatum lip cream, application of a flu mask is cheap and easy. Placing ice in the mouth (substantivity can be expected until ice melting) and use of a flu mask to reduce perspiration are recommended.

Also, when patiets' fever gets stable temporarily with the usage of antifebrile agents if self-care is possible in patients with fever, oral self-care should be considered. Not a special method is required, we teach patients to perform ordinal way of mouth rinsing and brushing teeth even if they do not eat and drink.

1) Humidification

Water or physiological saline is suitable as a mouth-rinsing spray, but green tea or water with addition of a small amount of lemon juice may be preferential in terms of taste and fragrance (however,

antibacterial effects and accelerated salivation should not be expected). When the mucosa is in a fragile condition by desiccation, an azulene formulation (Azunol Gargle liquid and Hachiazule) may be used.

Though artificial saliva (Saliveht) may be used as the mouth spray, it is effective relatively for humidification and it is relatively expensive, because artificial saliva is a product of duplicating electrolyte composition of saliva (sodium and kalium) and it does not have the efficacy for moisture retention.

The validity of routinely using antiseptic mouthwashes for rinsing the mouth has recently cast into doubt (MEMO 3). While decreasing the total bacterial load is beneficial for patients with infection, undermining the balance of commensal bacteria in the mouth with long-term use may have detrimental effects, allowing pathogenic bacteria to become established in the place of harmless existing bacteria. In addition, many mouthwash products contain ethanol, furtherance of drying and strong stimuli of the mucosa represent reasons to avoid using such mouthwashes unless needed.

2) Moisture retention

As a moisturizer, polyalcohols are used with hyaluronic acid. Polyalcohols including xylitol and sorbitol are used to maintain the long-term viscosity of products such as dentifrices or cosmetics. As these substances are alcohols, some degree of moisture absorption occurs, and while use in small amounts seems fine, mucosal moisture may be absorbed if use is increased. In particular, a small portion should be used when glycerin which strongly absorbs moisture is used. Absorbency of xylitol and sorbitol is milder than with glycerin and also they are artificial sweeteners and it is easy to get them (MEMO 4).

As moisturizing gels and hyaluronic acid (Oral Wet, Kinusui, Wet Care) are expensive, use is generally limited to when patients show strong pain.

MEMO 4 Symptomatic treatment for xerostomia.

1. Humidification: mouth rinsing; sprays; chunks of ice
2. Moisture retention: prevention of perspiration; petrolatum lip cream; moisturizing gels (also offering a humidification effect; Oral Balance, BioExtra Aqua Mouth Gel, Orals Wet); masks; hyaluronic acid ; polyalcohols

3) Treatment for coating of the tongue

If ingestion is reduced, the lack of friction from food and contact with the palate along with decreased saliva production can allow the coating on the tongue to easily thicken. Explain to patients that the coating on the tongue is not necessarily problematic and will decreases if overall status improves and ingestion is resumed.

With a thickened coating of the tongue, hyperkeratosis of the mucosal epithelium on the dorsum of the tongue is enhanced, filiform papillae are extended, and the tegmental epithelium which undergo exfoliation under normal conditions instead becomes multi-layered. Residual materials and bacteria are also included to some extent, but can be partially removed while dental plaque attached to the teeth surface can be removed completely. However, a thickened coating of the tongue is the thing such as “the carpet with a long pile” and allows increased reproduction of bacteria, oral care with scrubbing the surface delicately should be taken. As elimination of the coating of the tongue is not a feasible goal, specialist implements for tongue care are not needed and a sponge brush or toothbrush should be used to gently clean the tongue surface. Use of 0.3-1.5% hydrogen peroxide solution and 2% sodium bicarbonate solution may help with cleansing, acting as subsidiary. These solutions can be used with a sponge brush or as mouthwash.

4. Swab

As symptoms of dry mouth worsen, patients who find self-care difficult will show rapid decreases in oral hygiene, but the basic methods of care remain the same. If oral flush instead of mouth rinse is possible, we apply methods mentioned above, but when oral flush is difficult, oral care by swab is taken mainly. For swab, we take following 3 steps 1: a softening of the pollutant, 2: an elimination/collection of the pollutant, 3: the moisture retention of the mucosa.

l) Softening of the pollutant

As before, 0.3-1.5% oxygenated water (physical washing by foaming) and 2% sodium bicarbonate solution (reducing the viscosity of liquids and protein due to the alkaline nature of the substance) are generally used and also olive oil (we expect osmotic pressure) is known to result in softening of pollutants. Recently applying moisture retention gel such as Oral Balance, Bio Extra Aqua Mouth Gel, Oral Wet on the tongue and left for 10~20 minutes, and waiting for infiltration is a major method.

In addition, mouthwash and dental conditioners (Bioteen Mouthwash, Bio Extra alcohol-free Mouth-rinse) that do not include ethanol facilitate elimination of pollutants. In addition, effective antiseptics (e.g., benzalkonium chloride: final concentration, 0.025% or less) with surfactant is used by preference in substitution of products above.

2) Elimination/collection of pollutants

A brush like a sponge brush or toothbrush is used for elimination/collection of pollutants from the mucosa. Cotton swab looses surface friction easily, and it is not effective for elimination. If the major purpose is resumption of pollutants, usage of the product with suction tube is useful (Photo. 3).

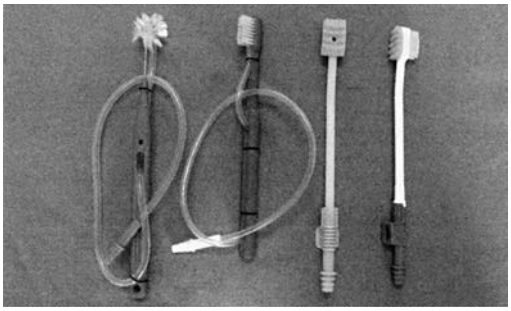


Photo. 3 variations of toothbrushes with suction tube

3) Mucosal moisture retention

For mucosal moisture retention, hyaluronic acid can be used (such as Wet Care) along with various moisturizing gels as the final step in oral care. When using a moisturizing gel together with hyaluronic acid, the hyaluronic acid is used first. As thickly applied moisturizing gel is easy to cake, the gel should be applied widely and thinly.

(Hiromitsu Kishimoto, Masahiro Urade)

70. Oral care for diabetic patients

1. Diabetes

Insulin is an essential hormone for maintaining life, but metabolic disease can result in various clinical conditions such as hyperglycemia, positive urinary sugar, and hyperlipidemia. Diabetes represents a chronic deficiency in the levels or effects of insulin. Complications as a result of chronic hyperglycemia include many serious events, such as necrosis involving the brain, heart and extremities due to arteriosclerosis, blindness due to retinopathy, renal failure, and neuropathy. There are two types of diabetes. One is insulin-dependent diabetes which onset at young age and the amount of insulin secreted is absolutely deficient, the other is non- insulin- dependent diabetes which may onset at the middle-age in obese people. The number of patients with diabetes is 5% of population of Japan, it can be up to 10% of those if carriers are included into the number.

Diabetes is diagnosed based on a blood glucose level above 200 mg/dl or a fasting blood glucose level above 126 mg/dl. Fasting blood sugar levels are increased by 65-105 mg/dl within an hour after a meal, but not to above 140 mg/dl, and healthy subjects show normalization to preprandial values within 2 hours after meals. Control of blood glucose levels can be estimated by measuring hemoglobin (Hb) A1c levels (Table 1).

The purpose of diabetes treatment is to control blood glucose levels and thus prevent complications. Basics of treatment are to maintain a healthy diet and encourage exercise, but insulin treatment is performed when glycemic control is poor.

Table 1 A control of the diabetes

A control	Fasting blood sugar (mg/dl)	Postcibal blood glucose level (mg/dl)	HbA1c
Normal Values	65~105＞	≦140	4.0~6.0
Very good	≦110	≦150	≦6.0
Good	≦140	≦200	≦7.0
OK	≦170	≦250	≦8.0
Not good	＞170	＞250	＞8.0

2. Implications of diabetes for odontotherapy

Patients with diabetes readily suffer from caries and periodontal disease, and such periodontal disease is difficult to cure because the decreased levels of glucose result in decreased immune function in the oral cavity. However, if blood glucose levels can be controlled, periodontal disease appears much easier to treat, and the mechanisms by which this occurs are attracting attention.

Diabetic patients also readily develop odontogenic infectious diseases from periodontal disease due to the poor immune function. Necrotizing fasciitis may develop, and many diabetic patients reportedly die from aggravation of odontogenic infectious diseases. Diabetes tends to be associated with delayed wound-healing, so administration of antimicrobial agent is warranted after surgical management such as extractions. During treatment, HbA1c levels should be measured to clarify blood glucose levels and had better leave the patient as first aid when a control state was “OK” or “Not good” in Table1.

Diabetic patients may also develop hypoglycemic or hyperglycemic coma during treatment. Correctly identifying whether the patient is in a hypoglycemic or hyperglycemic state in such circumstances is thus

imperative. Physical examination will typically reveal pallor and moist mucosal in hypoglycemic coma and a flushed face and dry mucosa in hyperglycemic coma.

Hypoglycemic coma is more common, particularly in patients receiving insulin may get hypoglycemic easily, odontotherapy should be avoided when the patient is hungry. When the patients displays signs and symptoms such as hunger, yawning, headache, mental restlessness, perspiration, or fits during odontotherapy, hypoglycemia should be suspected. Dextrose can be given intravenously or sugar, fruit juice or candy can be given. Use of medications such as aspirin needs careful attention when insulin formulations are being used, because aspirin helps to develop low blood glucose level. The likelihood of hyperglycemic coma occurring during odontotherapy is not high, but requires fast-acting insulin and normalization of the acidosis that arises from the accumulation of the ketone bodies.

3. Implications of diabetes for oral care

About 70-80% of diabetic patients develop periodontitis and often present with relatively severe gingival inflammation and tooth mobility. In addition, large accumulations of bacterial plaque and tartar may be found, and halitosis characterized by large accumulations of bacterial plaque and tartar may be present. If the bleeding during brushing is not heavy, the plaque state may get better with repeated gentle brushing. When xerostomia is present, self-purification functions of the mouth may be reactivated by increasing fluid intake and initiating regular gargling.

Patients with poor glycemic control are usually recommended to receive more frequent oral care and dental examinations. In addition, avoiding snacks, maintaining a healthy diet and getting into the habit of brushing after every meal and before going to sleep are important. This not only prevents secondary infection through a continual state of endodontic cleanliness, but also can inhibit the progress of diabetes, so the patient should be helped to understand the importance of oral care.

(Takahide Komori)

71. Oral care for patients with cardiac disorders

1. Cardiac disorders

Representative heart disorders are angina pectoris and myocardial infarction, in which ischemic heart disease results from reductions in blood flow through the coronary arteries due to arteriosclerosis. Angina pectoris presents as chest pain when the demand for oxygen in cardiac muscle outstrips the supply through the coronary arteries. If the coronary arteries become closed, myocardial infarction can result. This represents the death and necrosis of cardiac muscle tissue due to oxygen deficiency. Nitroglycerin is used to prevent attacks of angina, and stress should be avoided in patients within 6 months after myocardial infarction.

Other heart disorders include heart valve disease and arrhythmia. Severe heart valve disease requires prosthetic replacement if stenosis or a dysrhaphic state are present. As patients who have undergone prosthetic replacement often take anticoagulants, attention to bleeding is required and, due to the risk of infective endocarditis is high, attention is also required. The type and level of arrhythmia various, but because even patients with atrial fibrillation often take anticoagulants to prevent infarction, careful observation is needed.

2. Antithrombotic therapy

Patients with heart disorder such as myocardial infarction, atrial fibrillation and heart valve disease often receive antithrombotic therapy with an anticoagulant (warfarin) or antiplatelet drug (biaspilin). When the patient has a history of procedures such as extractions, medications should be reduced or discontinued in consultation with a physician, and generic treatment should be provided. However, thromboembolism reportedly occurs in the ratio of one of 100 times of cessation of the drug. The status of the patient should therefore be monitored, without censsation of the drug or reduction of the drug, invalsive treatment is recently provided. Naturally, care must be taken to achieve sufficient local hemostasis and avoid secondary hemorrhage. In addition, caregivers need to recognize that oral bleeding may be difficult to stop in patients being treated for heart disorders if oral care such as brushing is not performed with care.

3. Prophylaxis against infective endocarditis

In patients who have undergone implantation of heart valve prostheses or have serious congenital heart disease, not only procedures involving open wounds such as extractions, but also dental scaling or brushing with bleeding may cause infective endocarditis. Prophylaxis with antimicrobial agents before such treatment is therefore required. Oral or intravenous penicillins are commonly used for this purpose (Table 1).

4. Issues that require attention in oral care

As treatments may increase stress on the patient, oral care should be conducted with a view to minimizing burden on the heart. For the acute phase of myocardial infarction, a physician should be consulted and a decision made whether to continue with treatment or provide first aid. For patients receiving antiplatelet therapy or anticoagulants, extreme care must be taken regarding bleeding tendencies, but use of a soft toothbrush or sponge brush is not needed as long as oral care is performed with caution and a focus on preventing bleeding.

Table 1 Odontotherapy and prophylaxis (than AHA, 1997 guidelines) of infective endocarditis (IE)

Patients who need prophylaxis	
High risk	After prosthetic valves transplantation
	History of IE
	Congenital heart disease (single ventricle, transposition of aorta, tetralogy of Fallot)
Intermediate risk	Most congenital cardiac anomalies
	Acquired valve disease (including rheumatic sex)
	Hypertrophic cardiomyopathy
	Mitral valve prolapse with return
Patients who do not need prophylaxis	
Atrial septal defect	
More than atrial septal defect, ventricular septal defect, postoperative six months of patent ductus arteriosus	
After coronary artery bypass graft	
Mitral valve prolapse without return	
Physiological cardiac murmur that does not need functional treatment	
History of Kawasaki disease without valve disease	
History of rheumatism without valve disease	
Pacemaker	
Treatment that prophylaxis needs	
Extraction	
Treatment (periodontal surgery, scaling, root planing, probing, recall maintenance) of periodontal disease	
Implant and replantation of teeth	
Endodontic treatment (where instrument is beyond root apex)	
Subgingival insertion of strips	
Insertion (except bracket) of orthodontic band	
Periodental injection	
Preventive treatment (brush) with bleeding	
Treatment that prophylaxis is not necessary	
Filling and prosthetic treatment	
Infiltration anesthesia	
Root canal therapy (when instrument is limited in root canal)	
Rubber dam insertion	
Suture removal	
Insertion of prosthesis and orthodontic appliance	
Impression taking	
Fluorine application	
Dental radiography	
Orthodontic appliance adjustment	
Deciduous tooth defluxion	

In the case of patients at high risk of developing infective endocarditis, prophylaxis using antimicrobial agents may be warranted after implantation of prosthetic valves. Attention should be paid because bacteria may enter the blood from sites of endodontic inflammation and cause the endocardium..

(Takahide Komori)

72. Oral care for patients with hematologic diseases

1. Hematologic diseases

A hematologic disease is a disorders of blood components. The main hmatologic diseases are as follows.

1) Anemia (iron-deficiency anemia, hemolytic anemia)
2) Deficiencies of blood components (aplastic anemia)
3) Malignancy (leukemia, malignant lymphoma)
4) Coagulopathies (thrombocytopenia, hemophilia)

Hematologic deseases can be roughly categorized into hematopoietic tumors and other diseases. This section focuses on hematopoietic tumors. We vary according to the disease unlike other solid tumor in the treatment of hematopoietic tumors, therefore, which anticancer drug for chemotherapy depend on the drug. Also, we may perform the hematopoietic stem cell transplant when we give only chemotherapy (an anticancer drug).

MEMO 1 Blood components and their roles

1) Erythrocytes: transporting oxygen
2) White blood cells: providing defense against bacteria and viruses
3) Platelets: crucial in the control of blood loss

MEMO 2 Symptoms of hematologic diseases

1) Anemia: fatigue, shortness of breath
2) Decreased white blood cell count: fever, infection
3) Decreased platelet count: bleeding, purpura (a contused wound), nosebleeds, hypermenorrhea
4) Increased red or white blood cell count: enlargement of submandibular, cervical, axillary (armpit) or inguinal lymph nodes, shortness of breath, headache, vertigo, confusion
5) Abnormality of blood coagulation factors: leg pain, fever, shortness of breath, pleuritic pain

2. Oral care for patients with hematopoietic stem cell transplant (HSCT)

Oral mucositis develop patients with HSCT due to chemotherapy, or as an adverse reaction due to radiotherapy. Oral care plays thus an important role among patients with HSCT.

Patients with HSCT need to undergo a detailed examination of potential foci of infection before transplantation. A system of oral hygiene instruction needs to be implemented so that the plaque control record (PCR) becomes fewer than 20% before sterile room admission. Therefore, the number of days of oral care in the outpatient depends on the oral and dental situation of the individual patient, but a minimum of 1-3 months of oral care needs before transplantation. Panoramic radiography, periodontal testing, and bacterial examination should be indicated prior transplantation.

Oral care requirements to prevent oral mucositis are described below.

1) Directions for brushing

PCR, scaling (SC) and professional mechanical tooth cleaning (PMTC) are directed. The toothbrush should have a straight moderately type or with soft bristles regularly. If oral mucositis appear, an ultra-soft toothbrush should be used.

2) Tongue care

The tongue should be gently brushed from the direction of the root to tip of the tongue with a sponge brush or toothbrush, then mouth gel for tongue surface to control focal or opportunistic infection.

3) Establishing daily habits of gargling and rinsing the mouth

Mouth wash containing Nozu Ren, and Nozu Ren elase including 4% xylocaine liquid and purified water should be selected depending on the case. With a group of two pharyngeal gargles and two mouth rinses, gargle and rinse are usually performed 8 times a day (on getting up, before and after each main meal, and before going to bed).

4) Prevention of xerostomia

A wide variety of medicines used during transplantation and induction of remission cause dry mouth, such as chemotherapeutic drugs, antiemetics, diuretics and immunosuppressives. Dry mouth increases oral microflora and greatly increases the risk of infection. To prevent xerostomia, specifically, mouth rinse and gargle should first be conducted with mouthwash containing hyaluronic acid.

5) Protection of oral mucosa and lips

A conditioning mouth gel with petrolatum and mouthrinse including hyaluronic acid can be used depending on the case. In particular, mucosal protection and moisturized care can be used prophylactically before developing of mucosal edema with chemotherapy or formation of a tooth mark on a lingual side and buccal mucosa contacting to tooth.

6) Prevention of taste disturbance

We make food containing zinc and change the seasoning for food. Dietary contents need to be discussed in accordance with a degree of dysgeusia.

Patients developing edema of the oral mucosa should receive food-taking counseling because they may sometimes bite a mucosa by mistake. At least a day before transplantation, provide explanations in the form of pamphlets and projections on changes in the oral mucosa that will occur following transplantation, and allow the patient to clarify any concerns. The methods of oral care (induction therapy and postremission therapy) before transplantation, oral care (salvage chemotherapy, prevention of mucositis with radiotherapy) in case of bone marrow, oral care for acute GVHD after transplantation, and oral care for chronic GVHD of the recall should be implemented gradually and depending on the needs

MEMO 3 Candidate diseases for hematopoietic cells transplantation

1) Malignancy: chronic myeloid leukemia; acute myeloid leukemia (Photo. l); acute lymphocytic leukemia; medullary dysplastic syndrome; multiple bone marrow tumors; malignant lymphoma; solid cancer
2) Nonmalignant disease: aplastic anemia; medullary fibrosis; congenital immunodeficiency

a: Front side Gingival redness is evident at maxillary and mandibular anterior teeth, and swelling and bleeding are apparent

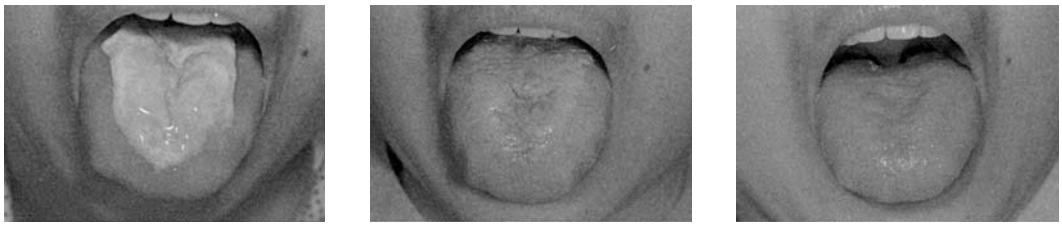
b: Lateral side Gingival tumentia and bleeding at the interdental papilla of the molar and premolar region in both maxilla and mandible

Gingival manifestation of acute myeloid leukemia (Photo. 1).

3. Oral care during induction therapy and post-remission therapy

Leukocyte count rapidly decreases within a week after induction of remission , and such states continue for 2-3 weeks. As oral mucositis easily arise with leukocyte counts of 1,000/1 mm^3 or less, care to strengthen the condition of the tongue and mucosa is necessary before nadir phase to prevent oral mucositis (Photo. 2).

Concerning the neutrophil count following induction therapy, approximately 0 situations last about 2 weeks after maximal myelosuppression. To avoid any worsening of oral mucositis, continuous self-care before reaching maximal myelosuppression is important. Increased oral care is needed if oral mucositis worsens with increased C-reactive protein (CRP). As bacterial counts increase with dry mouth, the mucosa should be protected against infection by moisturizing and promoting epithelial regeneration.



a: It is before treatment:
There is a furred tongue, and an ulceration is found in the whole tongue

b: In the treatment:
We provided a furred tongue control by self-care

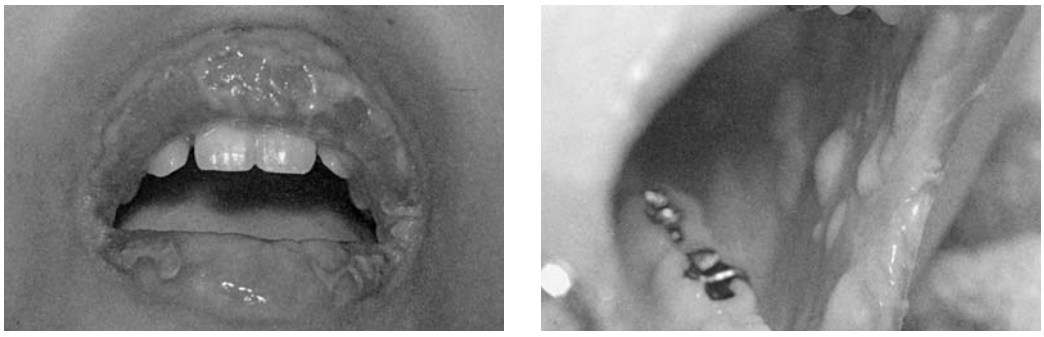
c: After treatment:
A furred tongue control was established, and the deterioration of the lingual mucosa was not found, too

Photo. 2 An induction therapy entrance intracavitary finding (a change of tongue surface)

4. Oral care for patients with GVHD

Patients with GVHD show Sjögren's syndrome-like salivary disorder, xerostomia, stomatitis, delayed taste and flat scaly vitiligo and bullous lesions in the oral mucosa (Photo. 3).

Oral mucositis are mainly conducted by moisturizing care. In addition, administration of prednisolone (PSL) caused an immunosuppressive. Mouthwash containing hyaluronic acid (to prevent microbial substitution due to multiple antimicrobial agents) should be used for tongue and mucosal care (including gargling) focused on preventing infection including fur of the tongue and candidal infection.



a: An edema, a sore are found around lip

b: Blister formation is found in buccal mucosa

Photo. 3 Manifestation of GVHD on the labial and buccal mucosa

5. Oral care for patients receiving radiotherapy

Total body irradiation (TBI) and total lymphoid irradiation (TLI): Some methods of oral care differ between TBI and TLI head to foot lymph node radiation.

1) TBI cases

Moisturizing care is provided for patients receiving radiotherapy. The quantity of saliva before and after radiation should be confirmed by using an Moisture Checker for Mucus.

Gargling with mouthwash alone is acceptable, but fluid volume may be improved by application of mouth gel when the fluid volume is low. In addition, cooling of the parotid gland can be performed after radiotherapy. Parotid gland massage can help to improve the quantity of saliva to oral rehabilitation.

2) TLI cases

Concerning cases of TBI, the quantity of saliva after radiation is compared to that before radiation by using Moisture Checker for Mucus. Mouthrinse is acceptable by itself, but salivary fluid volume may be improved by application of mouth gel when the salivary fluid volume is low.

6. Hematopoietic stem cell transplants (HSCT) recipients

As HSCT recipients must undergo depletion of leukemic cells before transplantation, salvage chemotherapy (with anticancer drugs) and radiotherapy are performed. Anticancer drugs produce high concentrations of free radicals (such as active oxygen), which help destroy cancer cells. Conversely, free radicals exert stress on the oral mucosa and cause oral mucositis. Salivary glands can also be affected by radiotherapy, decreasing saliva secretion and thus developing xerostomia and impeding self-purification. This in turn can increase susceptibility to local infection and stomatitis. Furthermore, the neutrophils that help defend the body against bacteria are decreased by myelosuppression.

As patients who develop stomatitis are at increased risk of infectious complications, bacterial cultures can be performed if the patient presents with fever and antimicrobial agents covering oral microflora should be administered. When fever is accompanied by neutropenia in particular, broad-spectrum antibiotics that cover gram-negative bacilli considering of the presence of *Pseudomonas aeruginosa*. Given the increased risk of death in patients with fever and infection, close attention must be paid to the presence of stomatitis during oral care in HSCT recipients. Fluid replacement or fluid food must also be considered, as patients can experience dehydration and renal failure.

(Nobuo Motegi)

Glossary:

Leukemia treatment: Leukemia treatment (when more than 1 trillion leukemic cells are present in the body) is aimed at removing leukemic cells, and can be divided into two forms. Induction therapy is performed to achieve a state of complete remission (less than 5% leukemic cells in peripheral blood and bone marrow, normalization of bone marrow, and resolution of symptoms and signs of leukemia). However, about 108~109 of leukemic cells are thought to remain in the body even if remission is obtained. Recurrence results if these remaining leukemic cells are not addressed. Repeated postremission therapy is therefore required to exterminate these remaining leukemic cells.

Graft-versus-host disease (GVHD): Acute GVHD occurs within 100 days after transplantation, while chronic GVHD occurs after this time. Increased lymphocyte counts in the body are donor-derived. These lymphocytes recognize the cells of the patient as foreign bodies that must be destroyed. Typical targets are the skin, liver and gastrointestinal tract. Other conditions can show symptoms closely resembling acute GVHD, representing collagen disease in many cases even if occurring more than 100 days after transplantation. Symptoms resembling collagen diseases such as Sjögren's syndrome, chronic rheumatism and scleroderma may appear, and those symptoms are common in Sjögren's syndrome.

Neutrophils: Neutrophils are white blood cells that are designed to identify and attack foreign bodies such as bacteria. These cells display phagocytic activity, the ability to migrate to foreign bodies and the ability to release granules. These granules contain enzymes and reactive oxygen species that have antimicrobial actions. Microbial infection, angiitis, diseases showing inflammation and necrosis of tissue including infarction, uremia, tumors such as cancer and lymphoma, acute bleeding, and hemolysis show increased neutrophil counts.

73. Oral care for patients with Behcet disease

1. Characteristics of Behcet disease

Behcet disease is a syndrome presenting recurrent aphthous ulcers of the oral mucosa, ocular manifestations (hypopyon-related iridocyclitis), skin symptoms (erythema nodosum), and pudendal ulcer. This disease is most common in Japan, but is also common in the Near and Middle East and in Mediterranean countries. Behcet disease can be divided into complete and incomplete types, but has rare cases appear all main symptoms from the first time. We describe the main symptoms below:

1) Recurrent aphthous ulcers of the oral mucosa

Circular sores with distinct borders are present on the lips, buccal mucosa, tongue, gingiva and palatal mucosa. This symptom is important, appearing in 98% of cases on presentation.

2) Ocular manifestations

In most cases, both eyes are affected. Iridocyclitis occurs in the anterior eyeball, and photosensitivity and dyscoria may be identified. Chorioretinitis appears in the posterior eyeball and may cause blindness.

3) Skin symptoms

Erythema nodosum-like rash can be found on the extensor side of the lower leg, and thrombophlebitis may be apparent subcutaneously. In addition, cul-de-sac flame-like rashes may be seen on the face, neck and chest.

4) Genital ulcaration

Painful sores may be present on the labia majora and minora and vaginal mucosa in women, and on the scrotum, penis and glans in men.

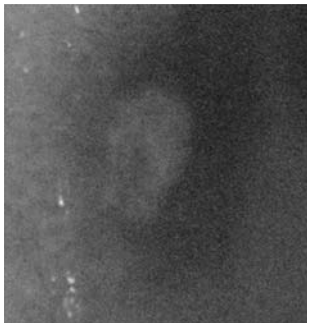


Photo. 1 An aphthous stomatitis (the right buccal mucosa).

Photo. 2
Recurrent aphthous ulcers
(the right buccal mucosa)

Photo. 3 Recurrent aphthous ulcers (mucous membrane of lower lip)

5) Accessory symptoms

Arthritis, epididymitis, lesions involving the digestive tract, vascular disease and lesions of the central nerve system may be found.

The presence of resident endodontic bacteria such as *Streptococcus(S). sanguis*, *S. salivarius*, and *S. pyogenes* was reported in skin tests performed on patients in a study by the Ministry of Health, Labour and Welfare Behcet Disease Research Squad (Yutaka Mizushima et al., 1989). These results suggest that streptococci, which form part of the resident endodontic flora, are closely associated with Behcet disease. These oral microflora are also associated with focal dental infection, making this an interesting finding.

MEMO 1 Clinical examination and laboratory study evidence of Behcet disease

1. Clinical examination: Erythema nodosum on the extensor-side skin of the lower leg, recurrent aphthous ulcers of the oral mucosa, genital ulceration
2. Laboratory findings: Hemolytic anemia (normochromia blood cell-related anemia), increased blood sedimentation rate, leukocytosis, changes in serum proteins (decreased albumin, increased globulins, reduced Albumin/Globulin ratio (A/G), C-reactive protein (CRP) positive

2. Issues requiring attention in oral care

Careful attention to oral hygiene will improve the oral environment and prevent microbial infection.

1) For aphthae, use an ointment or gel containing steroid (e.g., triamcinolone acetonide, beclometasone dipropionate, dexamethasone)
2) In the case of large, refractory aphthae, short-term use of oral corticosteroids may be necessary, but should only be prescribed in cooperation with a specialist
3) Isodine mouth washes and azulene formulations may provide a comfortable cooling sensation in the mouth. Use of alcohol-free mouthrinse is recommended if pain is present
4) When brushing, avoid stimulating the gingiva with the bristles
5) When a toothbrush cannot be used, clean all surfaces that can be reached using swabs

3. Issues requiring attention during odontotherapy

1) Dental procedure should be performed when the patient is in remission, as exacerbation of the disease might result if procedures are performed in the acute phase
2) Treatment should be determined in close cooperation with the specialists in internal medicine (particularly allergies and collagen diseases), dermatology, and ophthalmology
3) We remove the sharp side of teeth, incompatible fillings, and clasp
4) When immunosuppressives are administered, dental treatment that may cause focal infection is necessary

4. Issues requiring attention in patients receiving steroid therapy

1) Issues that require attention for acute adrenocortical insufficiency
   (1) Adrenocortical function may decrease
   (2) Acute adrenocortical insufficiency may be caused by stress and may result in circulatory collapse from hypotension. Particular care must be taken regarding such incidents just after stopping steroid administration
   (3) Invasive surgical procedures such as tooth extraction may require steroid supplementation (as so-called steroid cover)

(4) In the case of Prednisolone less than 15 mg/day (by cortisone level conversion 60 mg/day), and steroid cover is often required. Consultation with a specialist in internal medicine is warranted
(5) The treatment should provide in a horizontal position to prevent hypotension and the vital should be carefully monitored during the treatment
(6) Attention must be paid to the state of the patient, and use of surface anesthetic and analgesic should be considered

2) Attention for patients who are vulnerable to infection with delayed wound-healing
(1) Decreased resistance to infection and delayed wound healing easily result from steroid administration
(2) Patients undergoing tooth extraction need to be monitored and administration of antibiotics and wound suturing should be considered

3) Attention to administration of analgesics and antibiotics
(1) Gastric ulcers readily may arise as an adverse effect of steroid therapy
(2) Medicines with a lower frequency of gastric ulcers should be prescribed and patients should be administered a combination of agents to protect the gastric mucosa and antacid

(Nobuo Motegi)

74. Oral care for patients with oral candidiasis

Oral candidiasis develops when the oral cavity is infected with a fungus (Candida albicans). Recently, patients with oral candidiasis have increased because of the increase of elderly people and the rise of high-risk patients since immunotherapy and transplantation have been frequently performed. Previously, oral candidiasis was seen in only particular patients, the immunocompromised patients. Today, it is seen in relatively healthy elderly people too. Therefore, precaution against oral candidiasis is indispensable. Oral candidiasis is not transmitted from person to person.

1. Pathemas of oral candidiasis

There are following pathemas in oral candidiasis:

1) Acute pseudomembranous oral candidiasis
2) Acute atrophic (erythematous) oral candidiasis
3) Chronic hypertrophic oral candidiasis
4) Chronic atrophic (erythematous) oral candidiasis

Acute pseudomembranous oral candidiasis is accompanied with milk-white fur. It does not have a strong symptom so that some patients do not notice it (Photo. 1). Fur develops everywhere in the oral cavity, so it has no particular predilection sites. Hypertrophic oral candidiasis is chronic pseudomembranous oral candidiasis where the mucous membranes infected by candidiasis get thick.
Atrophic (erythematous) oral candidiasis is also called denture stomatitis that is often seen in patients with dentures (Photo. 2). Erythema is often seen in regions corresponding to the denture edges. It brings sharp pain to patients when they eat something with bitter taste, or it causes denture instability.

Photo. 1
Acute pseudomembranous oral candidiasis

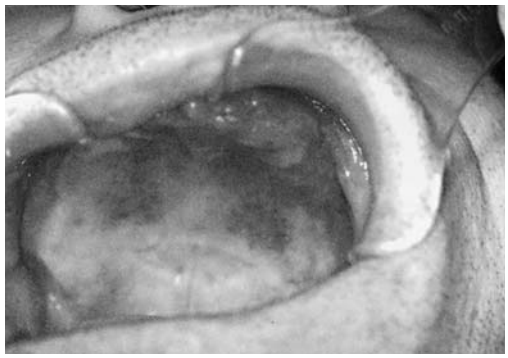


Photo. 2
Acute atrophic (erythematous) oral candidiasis

2. Factors to develop oral candidiasis derived from oral conditions

The incidence rate of oral candidiasis varies depending upon oral conditions as well as systemic factors including immunodeficiency. Since Candida albicans, which is the main cause of oral candidiasis, is an oral indigenous flora, oral candidiasis does not develop simply because Candida albicans exists in the oral cavity, but it develops because Candida albicans massively grows owing to losing balance of bacterial floras. Therefore, the oral cavity gets easily infected with oral candidiasis if oral conditions are suitable for overgrowth of Candida albicans, even without systemic causes of oral candidiasis.

There are several factors to cause oral candidiasis derived from oral conditions. For example, insufficient oral cleanings, especially insufficient denture cleaning by denture-wearing people, and insufficient oral cleaning by elderly care-receivers who cannot clean teeth by themselves, especially people with dementia are those factors. Dry mouth is also one of the factors to cause oral candidiasis. Following people have to be careful for oral candidiasis: people with declining secretion of saliva due to old age, and people who are fed through a tube, which weakens chewing motions and decreases secretion of saliva.

3. Oral care for patients with oral candidiasis

As mentioned before, many of the patients with oral candidiasis are the elderly or people who have diseases to weaken immunocompetence including HIV and leukemia. In addition, insufficient oral cleaning performed by a patient alone and dry mouth are included in the factors of oral candidiasis derived from oral conditions. Therefore, what is important for patients with oral candidiasis is thorough oral cleaning. Such thorough oral mucosa cleaning is also important for patients with edentulate (toothless) jaw. In particular, more careful observation is needed on the elderly with dementia, because they sometimes hate receiving oral cleaning, or oral cleaning on their own is not performed as perfectly as it seems to be done.

For patients with oral candidiasis accompanied with dry mouth, the oral care should be focused on moisturizing the oral cavity. (Details are shown in Article 97 “Dry mouth and Oral care”.)

People wearing dentures sometimes get erythematous oral candidiasis even if they have no systemic factors. In this case, dentures have to be cleaned more frequently using a denture wash.

4. Treatment for oral candidiasis

When oral candidiasis is not improved with oral care alone, medication is needed. Recently, miconazole (Florid oral gel) which is directly applied on the surface of the oral cavity and itraconazole capsule oral solution have been used for oral candidiasis. However, since many antifungal drugs have strong side effects or many of them are in contraindication or caution when being taken in combination with other medicine, patients should take those drugs under doctor’s instructions.

(Hideo Sakaguchi)

75. Oral care for patients with MRSA

1. What is MRSA?

MRSA is an abbreviation of *Methicillin-resistant* Staphylococcus aureus. Methicillin-resistant Staphylococcus aureus is Staphylococcus aureus that has resistance against Methicillin, a beta-lactan antibiotic effective for Penicillin-resistant Staphylococcus aureus. Since MRSA has resistance against not only Methillin but also against beta-lactan antibiotics including cephem antibiotics, it is also referred as Methicillin and Cephem-resistant Staphylococcus aureus. Previously, MRSA were susceptible to aminoglycoside antibiotics, minocycline, fosfomycin, and new quinolone antibiotics, but recently it has acquired resistance against these drugs. Therefore, today, MRSA is categorized to a multi-drug resistant bacterium.

Although MRSA has resistance against Methillin and many other antibiotics, pathogenity of MRSA is not more serious than that of Staphylococcus aureus, which is skin flora. Therefore, MRSA does not usually manifest any symptoms even if it lives in the healthy skin and oral cavity. Enterotoxin and toxic shock syndrome toxin-1 (TSST-1) have been reported as pathogenic factors of MRSA. By producing DNase and various kinds of protein lyase such as hemolytic toxins (α, δ toxin), exfoliatin, and coagulase, these pathogenic factors of MRSA exert strong effect upon the infected tissues. For postoperative patients or immunocompromised patients, a big problem is that MRSA causes such serious diseases as infectious diseases in a wound, septic fever, MRSA enteritis, and MRSA pneumonia. Sometimes they die of shock and multiple organ failure induced by TSST-1 and enterotoxin.

2. Treatment for and prevention against MRSA

Even if MRSA is found at the skin and nasal/oral cavities, active treatment for eliminating MRSA is not usually performed if patients are merely in the “carrier state” or have “resident MRSA” of which MRSA have no infectivity. However, if people are such people as postoperative patients and medical workers who should be cautious for MRSA and are judged that their MRSA be eliminated, they should apply povidone- iodine solution on their nasal vestibule 1-2 times a day or gargle 3-4 times a day with povidone- iodine solution unless they are hypersensitive to iodine.

For treatment for MRSA infectious diseases, new quinolone antibiotics including Norfloxacin are a first-line drug, although minocyclineis is sometimes effective for MRSA. However, since MRSA with strong resistance against these drugs has increased, rifampicin, arbekacin, and vancomycin have been frequently used. These drugs are not only used solely but also used in combination with fosfomycin for expectation of synergism.

Recently clinicians have dealt with MRSA as a resident flora. Thus, there is no measure left any more to block MRSA infection completely. However, to some extent, it is possible to prevent MRSA from being transmitted from infected patients and carriers to high-risk patients such as elderly patients with weak immune system and preoperational patients, if regular measures against hospital-associated infections are strictly taken. What is indispensable is to decrease the number of new MRSA patients.

3. Oral care for patients with MRSA

Since MRSA has been spreading to healthcare facilities and homes in addition to hospitals, oral careproviders as well as MRSA-negative patients are always faced with risks of MRSA infections. In addition, we should not neglect damages of MRSA including hospital-associated infections and healthcare

facility-associated infections to other people around a MRSA-positive individual.

When MRSA is found in the pharynx, it is reasonable to think that MRSA will be also found in oral and nasal cavities. It is said, however, that these MRSA do not always cause airway infections and MRSA inapparent deglutition pneumonia. In elderly people and patients with hemiplegia caused by a cerebrovascular accident, however, risks of airway infections and deglutition pneumonia are enhanced. Therefore, what is important for preventing infections including infections of serious MRSA pneumonia is to decrease the number of bacteria as well as MRSA to the least by practicing the planed oral care. For careproviders, big trouble is droplet infections of sputum and contamination of instruments used for oral care, contamination of clothes, and contamination of fingers. Proper procedures for oral care in everyday life and maintaining clean environment including sterilization of fingers and instruments can reduce the opportunity of bacterium transmission, and then, the risks of infections.

As mentioned the above, there is no particular way of oral care for MRSA patients. Therefore, what is important is to keep the oral cavity clean while practicing normal oral care diligently according to individual conditions.

Here are the actual procedures of oral care and attentions.

1) Gargle three-four times a day with povidone- iodine solution in addition to the regular oral care. It is said that povidone- iodine solution is effective for eliminating MRSA in the oral cavity and pharynx. If patients cannot gargle, wipe the oral cavity cleanly with cotton swabs and sponge brush. Cleaning tools including toothbrush, sponge brush, and cup should be used exclusively for each patient or these tools should be disposable. Observing the universal precautions is recommended.
2) Washing hands before and after providing oral care is essential for careproviders. Although regular washing hands can prevent MRSA sufficiently, hygieiologic washing is more preferable. Wearing gloves is recommendable during oral care. (Do not use the used gloves again.) You may think that it is difficult to wash hands every time you give oral care if the oral care is given to many persons one after another, like the care in healthcare facilities. However, washing hands with running water is the fundamental practice. Further, careproviders should try to reduce MRSA by sterilizing hands with a hand gel, a waterless hand washing.

(Mitsuyoshi Matsuda)

76. Oral care for patients taking antiepileptic drugs

1. What are antiepileptic drugs?

Epilepsy is chronic encephalopathia caused by various factors. Its main symptom is recurrent seizures (epileptic seizure), which are caused by excessive electrical discharge in the cerebral neuron. Antiepileptic drugs are central nervous system depressants used to control epileptic seizures and convulsions. Side effects of antiepileptic drugs include oral disorders such as gingival enlargement and dry mouth, as well as anorexia, nausea, vomiting, fervescence, and headache.

2. Oral conditions of patients taking antiepileptic drugs

Phenytoin (Aleviatin, Hydantol) is effective un controlling seizures, but sometimes, long-term administration of phenytoin causes gingival enlargement. Also, since phenytoin is often administered polypharmaceutically, the oral cavity easily gets dry, which leads to plaque accumulation between the teeth and gingiva. As the result, secondary infections due to oral bacteria occur resulting in serious periodontitis and stomatorrhagia.

3. Attentions to be paid during oral care provided to patients with epilepsy

1) It is recommended that if gingival enlargement is found in the patients, professional oral care by dentists or dental hygienists should be performed to improve gingival enlargement. Since chronic periodontitis due to gingival enlargement is likey to form deep periodontal pockets, dentists should try to decrease bacteria in the pockets by washing the inside of the pockets.
2) If dry mouth is seen in the patients, it is recommended to clean the oral cavity after the oral mucosa is moisturized with humectants.
3) Because patients with epilepsy have few subjective symptoms including pain and many of them do not have insight, it is important to give instruction about oral hygiene and encourage them to practice oral care every day. If patients cannot perform oral care by themselves, support of their families and careproviders is essential.
4) It is important to get the patients to relax relaxed. Triggers that cause seizures like glimmerings should be avoided.

(Haruhiko Kashiwazaki, Masumi Muramatsu)

77. Oral care for patients having injuries in the oral cavity

1. The oral cavity with injuries

Oral injuries have various sorts of injuries such as post-operational wounds and small tumors. Therefore, the oral care has to be given according to individual oral conditions. However, when careproviders give oral care to injured patients, the most important matter in any oral care is that careproviders should not produce more injuries on the original injuries. Providing oral care should not get patient's painful time lingering, since the original injuries themselves have already given agony to the patients.

2. Preparation before starting oral care

Choose tools to use oral care after careproviders carefully observe the inside and outside of the patient's mouth, including the regions of wounds, a size of the wound, curing process, how large the mouth can open, whether the mouth can be kept open, dryness of the lips, whether patients have perlèche, and whether swallowing motions work well. In particular, when the patients have injuries in their lips, in the angles of mouth, and in mucous membranes of the cheek, apply humectants such as Vaseline ointment on both the tools and areas around the lips before starting the oral care.

3. Procedures and instruments for oral care

Although the best way to reduce bacteria and control growth of bacteria in the oral cavity is to clean the cavity mechanically, some patients cannot finish it because of their serious systemic or oral conditions. Even if patients are in such conditions, caregivers have to try to find the optimum way to meet patient's conditions.

1) In the case that the patients can use a toothbrush

Change a toothbrushe to one with a small head and soft bristle in order not to injure wounds and mucous membranes around the wounds. Although it is desirable to use interdental brushes and dental flosses as often as possible, a wire of an interdental brush and floss are apt to injure the wounds depending upon the way to hold. In such cases, caregivers do not necessarily have to use them.

2) In the case that patients cannot use a toothbrush fully or partly but can gargle

Ask the patients to gargle sufficiently. Give the patients advice that they should not gargle strongly immediately after an operation because a strong gargling inhibits clot forming. As a medicine for gargling, various kinds of gargle are available. If the patients have inflammation, sodium azulenesulfonate (Azunol), which is a vulnerary to remedy wounds, and benzethonium chloride (Neostein Green), which has wide antibacterial effects against fungi without severe irritation are recommendable. (Photo. 1). Since both of them are liquid and soluble in clod water, it is easy for surgeons to use them and easy for the patients to get fresh feeling. Although it is not good to rely too much on these

Photo. 1
Gargle suitable for patients with inflammation

medicines, these medicines can enhance patient's motivation to keep the mouth clean. On the other hand, some patients hate the taste of them, so careproviders have to have good communication with the patients when using them.

3) In the case that patients cannot gargle

First, clean the oral cavity with wet gauze, absorbent cottons, or a little bit large cotton swabs moisturized with gargle. Clean the cavity with careful observation while pressing the lip and cheek mucous membrane with fingers if necessary so as not to touch wounds with the tools. If swallowing action of the patients is not good, squeeze hard the wet gauze and cotton so that extra water does not enter into the oral cavity. When cleaning rough places, it is recommended to use cotton swabs instead of small cotton balls for fear that such small balls might be lost. Be careful not to leave cotton fiber in the oral cavity.

When patients have injuries, motions of oral organs are restricted. Then, secretion of saliva decreases and patients breathe through the mouth, which results in the oral cavity getting dry. When the tongue and gingivobuccal folds get dirty, regular auto-cleaning actions in the oral cavity do not work. Therefore, clean carefully every oral region besides dentition.

4) Mouth washing and moisture retaining

If patients have the good swallowing action and can undergo aspiration, aspirate water and saliva from the mouth while washing all over the oral cavity using a syringe. Be careful not to injure wounds and oral mucous membrane with the tip of a suction tube.

Finally, apply humectants around the lips in order to protect the oral cavity getting dry. Petrolatum ointment and lip cream are suitable for using as humectants. As a special jell for retaining moisture, "Polyglycerol Methcrylate (Biotene Oral balance)", which has the same enzymes as saliva does, and "Glyceryl polymethacrylate (Bioxtra aqua mouth jell), which is compounded with immunoglobulin and growth factors".

(Hibiki Kumotsu, Hideo Sakaguchi)

78. Oral care for people wearing an orthodontic appliance

Orthodontic appliances are roughly classified into two types; one is an appliance detachable from teeth (removable orthodontic appliance), the other is an appliance undetachable (fixed appliance). Either orthodontic appliance is removed after orthodontic treatment is over. During the treatment, it is necessary to perform suitable oral care for each appliance. Here are explanations of the ways to perform oral care for people with removable orthodontic appliance and for people with fixed appliance.

1. Oral care for people wearing removable orthodontic appliances

Removable orthodontic appliances require fundamentally the same manner of oral care as removable dentures do. There are two types of removable orthodontic appliances, appliances worn all day long and worn at night. Even though people have to wear appliances for 24-hours, they can clean the mouth as usual during the time that the appliance is removed, so there needs no particular notice when the people brush teeth. The appliance is necessary to be brushed mechanically with a toothbrush for removing dirty substances from the appliance while the appliance is detached. If the appliance is very dirty, it is recommendable to clean it chemically using denture washes. After washing the appliance, keep it in a vessel with water cleanly. Differences between a removable orthodontic appliance and removable denture are that the removable orthodontic appliance can be removed from teeth during eating, the removable orthodontic appliance must be worn on teeth during sleep, and it gives patients pain because the orthodontic force presses on the teeth. The pain caused by the force usually lasts for 2-3 days after adjustment of appliance and then disappears.

2. Oral care for people wearing fixed orthodontic appliances

The most frequently used appliance among the fixed orthodontic appliances is a multi-bracket appliance (Photo. 1). Attentions to all other fixed orthodontic appliances are almost the same as those to the multi-bracket, so multi-bracket alone is explained here. Oral care for people with a multi-bracket needs more careful attentions than that without it. The oral regions requiring careful care are the surfaces of teeth between a gum and bracket (tube) and the back of an arch-wire. It also needs careful care if the teeth become snaggleteeth (loose teeth or teeth inclining toward the lingual side) during orthodontic treatment.

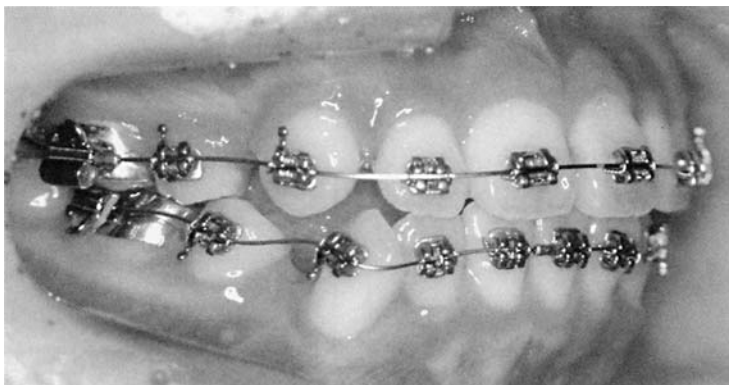


Photo. 1 A multi bracket appliance, of which brackets are bonded to the anterior teeth and premolar teeth, and of which bands with a tube are attached to molar teeth. Arch-wires running horizontally through brackets and tubes improve malposition of each tooth

Eating while wearing a multi-bracket should be avoided because hard food may deform or break the brackets and tubes, or sticky food may deform wires and get the brackets coming off. If possible, sugar-contained food should be avoided because such food invites caries.

Pain accompanying the bracket comes from tooth movements due to orthodontic treatment or comes from injuries that the distal end of the wire hurts the soft tissue. Mostly the former pain abates gradually although the pain lasts for 2-3 days after a wire is adjusted. The latter pain requires adjustment of a wire arch, so in this case, patients should talk with their dentist about it.

3. Oral care for people with white lesions caused by an appliance contacting with soft tissues during wearing the appliance

If patients leave wires or elastic wires touching oral soft tissues while wearing fixed orthodontic appliances including the above-mentioned multi-bracket appliances, white lesions such as sores sometimes develop. Treatment for the white lesions needs readjustment of the wires or elastic wires. Most of the white lesions will be diminished by the readjustment. If the patients have chronic stomatitis due to orthodontic appliances, clean the mouth closely. Yet, if the lesions are not improved, talk with their dentist to change the appliance.

(Noriyuki Kitai)

Glossary:

Multi-bracket appliance (Photo. 1): It consists of brackets (tubes) and arch-wires. The brackets (tubes) are attached to each tooth. The arch-wires run through the brackets. A multi-bracket is an orthodontic appliance that can move teeth from the malposition three-dimentionally to the right position.

Orthodontic movement of teeth: To move each tooth from the malposition to the right position by putting orthodontic pressure on the teeth. A threshold for force magnitude that can switch on tooth movement is very small. When applied force of pressure increases, rate of orthodontic tooth movement also increases until it reaches to some level. Then, even when the force continues to increase, the rate of orthodontic tooth movement does not change over the wide span. However, excessively strong force decreases the rate of orthodontic tooth movement. Thus, the optimum orthodontic force magnitude is one to be able to achieve a maximum rate of tooth movement with a minimum magnitude. In some cases, growth of the jaw is controlled by orthopedic forces.

VII *Tooth decay (dental caries) and periodontitis*

79. Xylitol

Xylitol is an alternative sweetener that has recently been used as a remarkable substance for diet, prevention of dental caries, and sparing of insulin.

1. Xylitol and alternative sweeteners (sugar substitute)

Sugar has been used for a long time as a sweetener. It has advantages of sweetness, availability, and a source of energy. On the other hand, excessive intake leads to obesity, tooth decay (dental caries), and a rise of blood sugar level in patients with diabetes. Consequently, many alternative sweeteners have been produced in place of sugar. Alternative sweeteners are roughly classified into two types, one is saccharide sweeteners, and the other is non-saccharide sweeteners (Fig. 1). The former provides calories, and the latter, which is made naturally or synthetically, has no calorie. Of saccharide sweeteners, xylitol belongs to sugar alcohol together with sorbitol and maltitol.

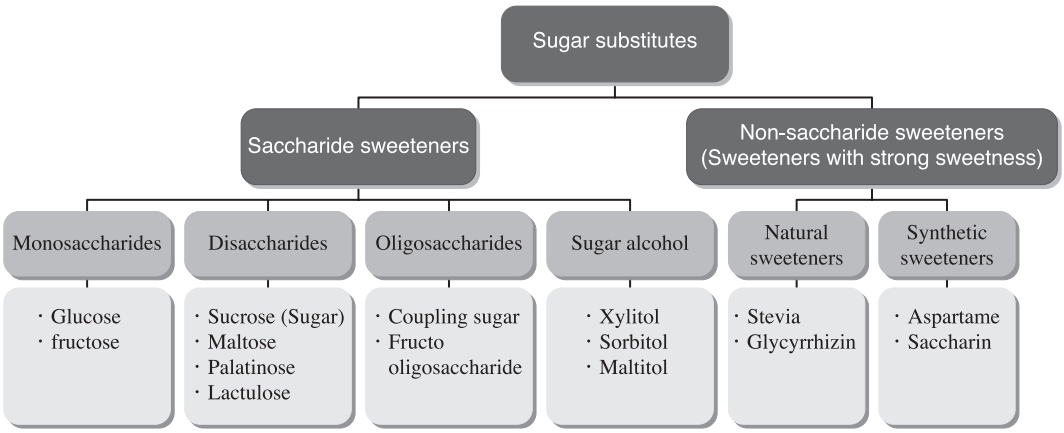


Fig. 1 Types of Sugar substitutes

2. Chemistry of xylitol

Xylitol is sugar alcohol that is produced from corn or birch trees (Fig. 2). The chemical formula is $C_5H_{12}O_5$, and molecular weight (g/mol) is 152.15g, (C 39.47%, H 7.95%, O 52.58%). Compared with sucrose (cane sugar or sugar), xylitol is as sweet as sucrose and has 75% calories of sucrose.

3. Xylitol and Tooth decay (dental caries)

Table 1 shows relationships between alternative sweeteners and tooth decay (dental caries). As viewed from four factors: generation of acid, production of non-aqueous glucan, bacterial agglutination, and animal caries, sugar (sucrose or cane sugar) develops tooth decay more often than alternative sweeteners do. Some of alternative sweeteners produce acid, but they all develop tooth decay very little.

The reason why xylitol does not develop dental caries is as follows: during the process of glycometabolism that Streptococcus mutans (a dental caries pathogen), glucose, and xylitol are cultured together, xylitol is taken in the Streptococcus mutans trough fructosyltransferases, and becomes xylitol-5-phosphate. This xylitol-5-phosphate is not metabolized but accumulated in the Streptococcus mutans.

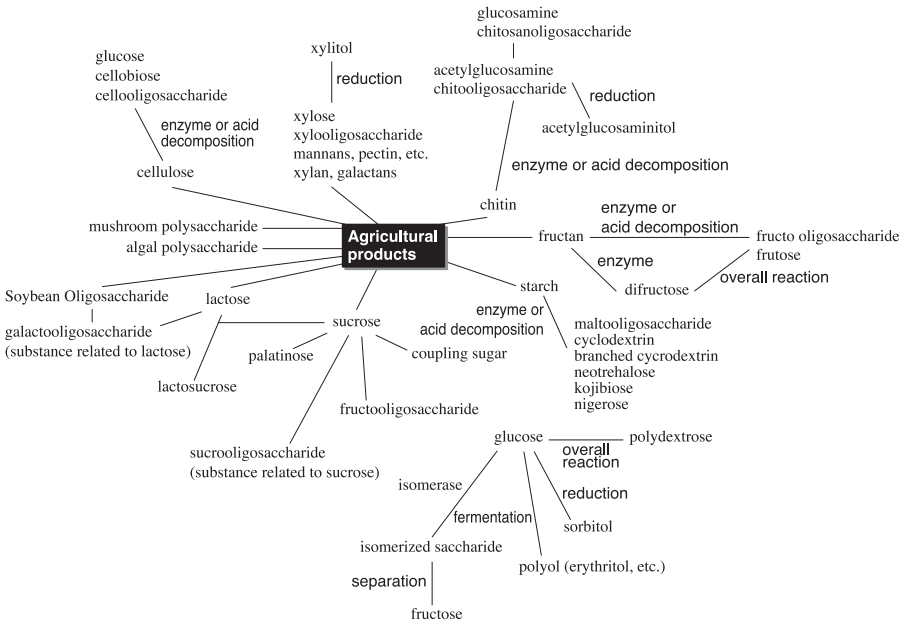


Fig. 2 Process of production and alternative sweeteners

Table 1 Commercial sweeteners that do not cause dental caries easily, their cariogenicity, and main uses

Sweeteners	Raw materials	Sweetness	Cariogenicity(a)				Uses
			Generation of acid	Production of non-aqueous glucan	Bacterial agglutination	Animal caries	
Control							
Sugar (cane sugar)	Sugar cane, etc.	1	+++	+++	+++	+++	Widely used
Oligosaccharides							
Coupling sugar	Cane sugar and starch	0.6	+(-) [c]	-	±(-) [c]	+(-) [c]	Confectionery, jam and table sugar
Meioligo P	Cane sugar	0.4	±(-) [d]	-	-	±(-) [c]	Table sugar, confectionery and dairy products
Palatinose	Cane sugar	0.4	-	-	-	± [b]	Chewing gum and candy
Lactulose	Lactose	0.6	-	-	-	±	Dairy products and table sugar
Sugar alcohol							
Sorbitol	Glucose	0.6	+	-	-	-	Confectionery, paste-products and table sugar
Xylitol	Wood sugar	1	-	-	-	-	Relatively widely used(e)
Maltitol	Maltose	0.8	-	-	-	-	Confectionery, jam and table sugar
Reduced starch syrup	Starch	0.4	-	-	-	±	Confectionery and foods boiled in sweetened soy sauce
Glycoside							
Stevioside	Plant leaves	300	-	-	-	*	Beverages and sweet supplement
Dipeptide							
Aspartame	Amino acid	180	-	-	-	*	Beverages and table sugar
Protein							
Thaumatin	Fruits	2,000	-	-	-	*	Pickles and sweet supplement

Note: (a) is written on the basis of the study by the Bacteriology of Matsudo Dental School of Nihon University. (b) comes from the study by Ooshima, et al., (c) a main ingredient of maltolsucrose, (d) a main ingredient of nystose, (e) is not approved to use as a sweetener in Japan, (*) no experiment was performed on it.
Usually, many commercial sweeteners are not manufactured with a single sweetener in the above table but are manufactured using the mixed sweeteners with others.

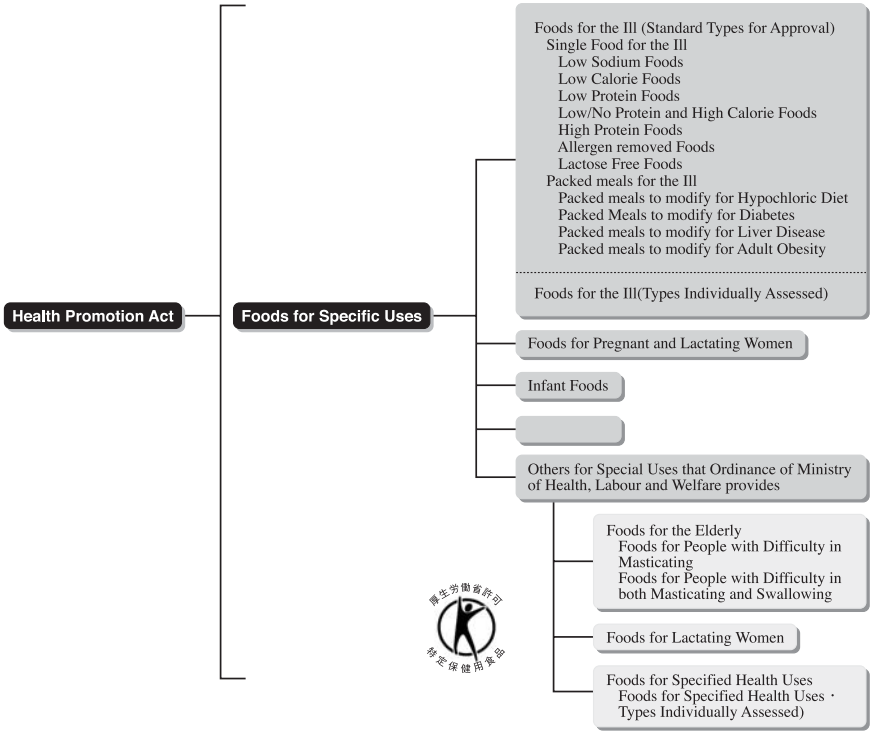


Fig. 3 List of labels of foods for specified health uses that are approved by the Japanese Health Promotion Act

This accumulation inhibits glucose metabolism. As the result, Streptococcus mutans does not proliferate. However, there was once a theory that xylitol advanced remineralization. It said that xylitol encouraged mineral ions such as calcium to calcify again. Mineral ions dissolve in the early stage of dental caries, which is seen at a white spot tooth. Today, this action of advancing remineralization, however, is thought to be caused by the remineralization action of saliva.

4. Uses of xylitol and points that requires attention when using it

Xylitol-mixed chewing gums have been on the market, being mixed with other ingredients for expectation of re-calcification. The Japanese Health Promotion Act, Article 26, Clause 1 provides that a person who wants to label foods as “Foods for Specific Uses” should obtain approval from the Minister of the Japanese Ministry of Health, Labour and Welfare. Among the above foods, the foods that can satisfy an expectation of a person who wants to take in the foods for specific health purpose is approved to be labeled as “Foods for Specified Health Uses”. In that case, a seal of “Tokuho-mark” must be put on the foods (Fig. 3). Several kinds of chewing gums with xylitol have been approved to prevent dental caries.

Xylitol, as mentioned before, does not cause rapid elevation of blood sugar level and reaction of insulin, because it has lower calories and slower absorption than sucrose. Therefore, it is approved to use as an injection for patients with diabetes and patients with liver diseases.

Weak points of xylitol are moisture absorption and laxation. Sugar alcohol except erythritol has such little energy that it is not easily digested. Therefore, if people take in a great deal of it at once, they would have diarrhea. Xylitol is 10 times more expensive than sucrose.

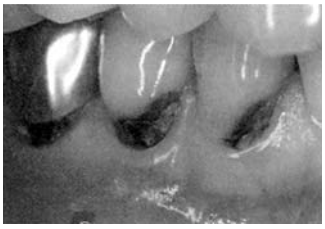
(Haruo Nakagaki)

80. Characteristics of tooth decay in the elderly

1. Tooth decay in tooth roots …… root surface caries

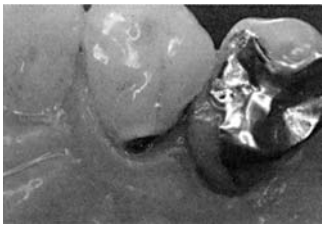
In order to maintain QOL of the elderly, it is important to minimize tooth-loss including tooth decay during days from childhood to the middle age for maintaining a good masticatory function with own teeth. For that purpose, it is important for dentists to perform preventive treatment to control risks of tooth decay and management of teeth, in addition to symptomatic restorative treatment such as filling teeth after removing decayed caries and capping a tooth with a crown. Furthermore, it is essential to tell the elderly the importance of self-care of their teeth and encouraging them to practice it. Recently, such concept has gradually been understood in many people so that healthy jaw-alignment can be seen relatively many in the middle-aged and elderly people.

However, tooth decay at the tooth root, which is apparently different from the tooth decay at a dental crown, has been seen in middle-aged and elderly people. That tooth decay is called “root surface caries”, as it develops at the tooth root surface (Photo. 1). No article, however, is found about root surface caries in the book of Black GV that, for the first time in history, described a dental therapy system for preserving tooth structures. Moreover, there have been no adequate epidemiological studies, or clinical and laboratory studies to elucidate root surface caries yet.



(a) Under the cheek teeth attached with golden crowns

(b) At the mandibular front teeth



(c) At the lingual side

Photo. 1 Root surface caries

Among few studies about root surface caries, Maki reported that 40% of Japanese men in their 50s had root surface caries. He said that when the elderly population with healthy teeth was on the increase, treatment of root surface caries would become vital important tasks. Senda said that treatment of root surface caries would be a new challenge for dentistry, because such treatment was fundamentally different from the treatment of ordinary tooth decay in various aspects.

Table 1 shows appearance of root surface caries and its clinical features.

Table 1 Appearance of root surface caries and its clinical features

1. It is observed specifically in middle-aged and elderly people.
2. It develops at the cementum.
3. Cavitates in dental caries (a lesion of a tooth that is caused by tooth decay) have no clear boundary in the extent and depth.
4. In many cases, patients have few subjective symptoms including toothache or sensitive discomfort, even though the symptom develops fairly seriously.
5. Root surface caries girdles around the tooth root. When it develops significantly, the tooth may fracture at the tooth root.
6. Removal of lesions of root surface caries and its restoration are difficult, because root surface caries develops deeply into the root apex in the gingival sulcus.

Concerning tooth decay in the dental crown, especially dental caries in the dental enamel in the early stage, the detailed studies have advanced. Today, pathogenic bacteria of dental caries are identified. It is known that dental caries does not develops at the most upper surface of the enamel but develops at about 20_m under the surface layer, and that some decayed tooth in the early stage may reverse to healthy one (to be cured) under some good conditions.

On the other hands, laboratory studies have not yet found pathogenic bacteria of root surface caries and clear mechanisms of its initial onset and progress. It have been vaguely said that there is a relationship between progress of periodontosis and root surface caries, or, an involvement of periodontosis-related bacteria. We hope that laboratory and clinical studies on it advance further.

2. Treatment of root surface caries

Once cavitates of dental caries are formed at the root surface and spread into deep and broad areas, it is not easy to obtain favorable results, because root surface caries does not have clear boundary between healthy and morbid tooth-substance. Thus, it is far more difficult to remove the morbid substance and to restore the removed region than the case of dental crown caries. Therefore, the most effective treatment is the treatment actively preventing the teeth from getting decayed.

There are two kinds of preventive care: one is professional care that dentists and dental hygienists perform, and the other is self-care that patients themselves perform under the guidance of professionals. Even if patients have undergone restorative treatment, their root surface caries may spread into any other teeth including the restored teeth unless the patients undergo further preventive-treatment on all the teeth including the restored teeth regularly. Professional care includes guidance of oral hygiene such as regular training of tooth brushing, professional mechanical tooth screening (PMTC), regular application of fluorine compounds to teeth, etc. When patients themselves care their teeth with fluorides (including by caregivers), it is more effective to leave high concentrated toothpaste containing fluorides in the mouth-cavity as long as possible to let the mouth-cavity be under the fluoric condition. Regular care and PMTC for root surface caries are common therapy and management to those of periodontosis. As mentioned before, root surface caries deeply relates to periodontosis or the periodontosis-related bacteria. Therefore, treatment and prevention of root surface caries can be performed in similar manners to those of periodontosis.

Middle-aged and elderly people have lower metabolism than young people. Besides, they tend to secrete less saliva, probably because they take hypertensive medecines , all of which are reason why so many middle-aged and elderly people are suffering from root surface caries. Therefore, dentists should perform tailor-made treatment, paying attention to risks of caries including whether patients take hypertensive medecines, how much patients secrete saliva, or how much patients have acid-buffer capacity. Further, many elderly people have difficulty in removing plaque sufficiently in the root surface or interdental spaces (between teeth), although they have gotten blushing training. If dentists find such evidence, recommend patients to use an electric (sonic) toothbrush.

Caregivers who care the elderly should know the actual state (symptom) of dental caries and know the features of root surface caries to support the elderly to perform self-care. Because root surface caries progresses without toothache, caregivers do not notice the elderly having the root surface caries until the end results of periodontosis come. Since periodontosis develops and progresses simultaneously, caregivers do not notice until elderly people say, “my tooth is getting loose and is going to fall out” or “my tooth was abruptly fractured” at the tooth root girdled by root surface caries. Caregivers should try to perform suitable oral care and support of tooth brushing for the elderly with caries, obtaining the above-mentioned information about caries risks and guidance from dentists and dental hygienists.

(Akira Senda)

81. Periodontal disease

1. Definition of periodontal disease

Periodontal disease was previously known as alveolar pyorrhea. However, this name only suggests one aspect of the symptoms in this disease and thus has been considered inappropriate. The term periodontal disease is therefore widespread now. Periodontal disease represents infectious lesions that destroy the periodontal tissues supporting and investing the tooth, comprising the gingiva, periodontal ligament, root cementum, and alveolar bone (Fig. 1). The processes involved can be broadly classified into gingivitis and periodontitis. Destruction of the periodontal tissue is initiated by the interaction between bacteria in dental plaque and host defenses, involving inflammation, immune responses and environmental factors (Fig. 2). Periodontal disease thus involves bacterial infection with characteristics of a lifestyle-related disease.

Environmental factors involved in periodontal disease have been thought to include tobacco smoking, diabetes mellitus, psychosocial stress, and osteoporosis. The condition has thus been thought to display a rather diverse pathogenesis. This means that professional treatment by a dentist alone will not be successful without efforts toward improving patient lifestyle.

Periodontal disease has now been shown not only to be affected by systemic factors, but also to affect systemic conditions.

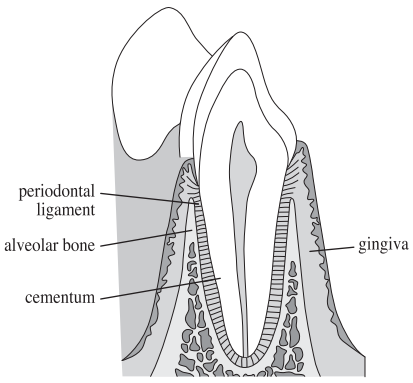


Fig. 1 Periodontal tissue (It is consisted by four tissues: gingiva, periodontal ligament, root cementum, and alveolar bone)
Gingiva: It prevents the invasion of bacteria and foreign body to the surrounding tissue of teeth and supports teeth. Periodontal ligament: It is a connective tissue that lies between the alveolar bone and the root cementum. Cementum: One edge of periodontal ligament fiber is inserted in it for the fixation of the alveolar bone and tooth and the cementum works as the supportive tissue of a tooth. Alveolar bone: The alveolar bone plants tooth vertically and it has the form and structure that is stood up to the occlusal pressure for tooth

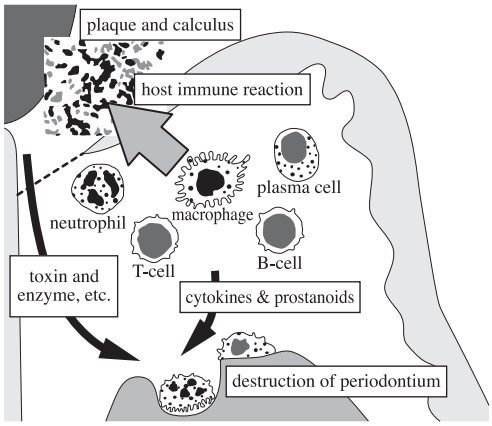


Fig. 2 The destruction of periodontal tissue by host immune response
When it is kept chronically receiving from the influence of the plaque in the periodontal pocket, periodontal tissue composition cells and the immunocompetent cells migrated from the blood vessels cause the sustained and excessive host immune response. It is thought that this condition deeply takes part in the destruction of the periodontal tissue

Tooth loss is reportedly caused by periodontal disease in 50% of cases, decayed tooth in 40%, and other causes in 10%. Clearly, a large number of teeth could be retained by preventing and treating periodontal disease and tooth decay. The prevalence of periodontal disease increases every year, and the lack of a proper appreciation of the importance of periodontal disease is thought to be one of the key factors, although other environmental factors are thought to contribute, including changes in Japanese eating habits becoming closer to those in Europe and the United States, increases in psychosocial stress, and the increasing aging of society. The efficacy of preventive measures against periodontal disease is not currently sufficient, although measures to protect against tooth decay appear to have been much more successful. About 60% of 12-year-old children reportedly show gingivitis, representing the initial state of periodontal disease, and tendencies toward periodontal disease are increasing every year. Periodontal disease can thus be considered to impact all stages of life, even though the disease is recognized in adults only.

2. Gingivitis

The major symptoms in gingivitis are gingival redness, swelling, and bleeding, initiated and progressing with increased accumulation of plaque following inadequate brushing. Gingivitis does not show major symptoms, and progression is generally moderate, so the symptoms are often overlooked. However, rare cases show rapid progression. The gingiva are red and swollen in gingivitis, while healthy gingiva are firm, pink and tightened around the cervical portion of the teeth (Photo. 1, 2). However, the inflammation in gingivitis is localized to the gingiva and the dentogingival junction (attachment of the gingiva to the tooth) is still normal (Photo. 3). The causative plaque is firmly attached to the tooth surface and cannot be removed by mouthwash or dental rinse, but a healthy gingival condition can be recovered by plaque removal by a dentist or dental hygienist, followed by regular brushing.

Photo. 1 Healthy gingiva
The color of healthy gingiva usually presents a pink or a coral color. Moreover, a lot of small holes that are made by pulled from gingival fibers are admitted on the surface of healthy gingiva and are called ‘stippling’

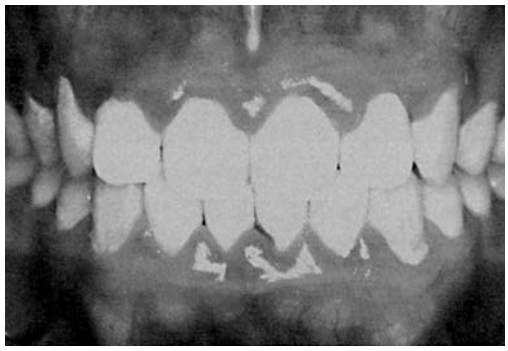


Photo. 2 Gingivitis
The symptom of an inflammation appears in the gingival sulcus as the number of bacteria increases in the mouth

3. Periodontitis

If gingivitis progresses, bacteria enter and proliferate between the teeth and gingiva in the gingival sulcus. This results in the formation of the periodontal pocket with apical migration of the junctional epithelium, representing the first indication of true periodontitis (Photo. 4). This loss of attachment is what separates periodontitis from gingivitis, and infection and inflammation progress to the apical portion of the root along with bacterial proliferation. As a result of periodontal destruction reaching not only the gingiva, but also the periodontal ligament, root cementum, and alveolar bone, the periodontal pocket becomes deeper with bleeding and pus

discharge. The loss of periodontal supportive tissues causes tooth mobility, which in turn means that biting force cannot be withstood. Malocclusion and tooth loss can eventually be occurred (Fig. 3).

As the degree of pain from periodontitis is often slight, serious progression has usually occurred by the time the patient raises concerns about symptoms, although periodontitis usually shows several cycles of painful gingival swelling and recovery during the course of progression. Periodontitis thus represents a progression from gingivitis, and it doesn't return completely healthy as gingivitis does.

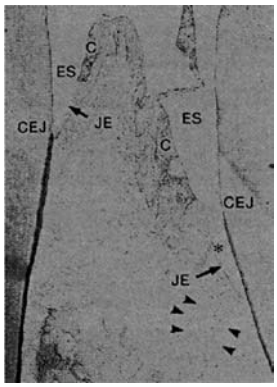


Photo. 3 Histopathological features of gingivitis (left side) and slight periodontitis (right side)
The gingival pocket is formed more than half the coronal side of the junctional epithelium (JE), and the apical side edge of JE is stayed on the cement-enamel junction (CEJ). In slight periodontitis (right side), the JE is located on the root cementum. Transseptal fibers are destroyed (arrow head) and the alveolar bone resorption is seen. C: calculus and plaque ES: zone of the decalcified enamel *: artificial abrasion

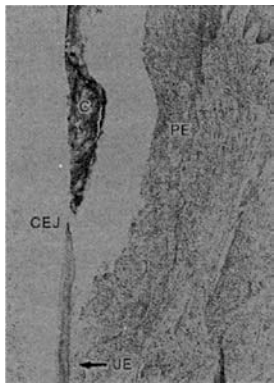


Photo. 4 Histopathological feature of periodontal pocket
The bottom of the periodontal pocket is located on the apical side from CEJ downward, and JE is adhered on the root cementum. C: calculus PE: The epithelium of periodontal pocket

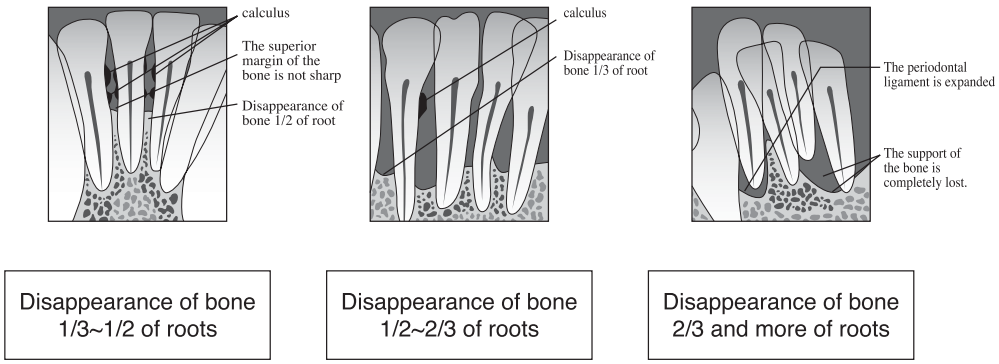


Fig. 3 An increase in tooth mobility from the alveolar bone level
When the alveolar bone level decreases, the center of gyration and the position of the fulcrum of the tooth change, and the tooth mobility that is measured in the coronal portion increases, even if the amount of the transformation of the periodontal membrane and the alveolar bone is in the physiological ranges

4. Classification of periodontitis

Periodontitis can be roughly classified into two types: chronic periodontitis, which usually develops after the middle thirties; and aggressive periodontitis, which develops before this age. As mentioned above, the plaque causing gingivitis is a supragingival plaque that adheres above the gingival margin, while the plaque

causing periodontitis is subgingival plaque in the periodontal pocket. The type and composition of bacteria included in these types of plaque differ substantially, as shown by advances in bacteriology, immunology, and molecular biology in recent years. In addition, the composition of subgingival plaque differs between patients and parts of the mouth, and the pathogenecities of each subgingival plaque likewise differ. Moreover, host protective responses against bacterial infection also vary, and hereditary traits and immune dysfunction represent important systemic factors, particularly in patients with aggressive periodontitis.

5. Treatment of periodontitis

Periodontitis develops due to plaque, and the most effective method of controlling plaque is currently brushing with a toothbrush. Removing the plaque that adheres to the tooth near the gingival margin and in the interdental area between teeth is indispensable, as plaque in these areas could cause periodontitis. Complete removal of plaque from the interdental areas is impossible using only a toothbrush, so cleaning (plaque control) using supplementary cleaning tools (e.g., dental floss, interdental brush) in conjunction with a toothbrush is important. Plaque control is crucial to periodontal treatment, and effective periodontal treatment cannot be expected without the patient being conscious of and making efforts to improve periodontal disease.

Subgingival plaque and calculus should be removed using scaling and root planing (SRP) by a dentist or dental hygienist, because removal using a toothbrush alone is not possible and the root surface of the tooth should be made nontoxic. The gingiva adheres to the root surface that has been cleaned by SRP, decreasing the depth of periodontal pocket. Gingivitis and mild periodontitis often recover with such basic periodontal treatment (initial preparation). When the results of re-evaluation indicate that risk factors have been adequately addressed and periodontal disease has improved, periodontal treatment shifts to maintenance.

Conversely, when deep periodontal pocket remain or sufficient plaque control has not been attained by the time of re-evaluation, periodontal treatment may need to shift to periodontal surgery. The purpose of periodontal surgery is similar to SRP from the initial preparation stage in terms of detoxifying of the root and achieving adhesion of gingival tissue to the root surface. However, periodontal surgery attempts to achieve these goals by closure of the periodontal pocket by elevating the periodontal flap, osteoplasty to restore alveolar bone absorbed due to periodontitis, and grafting of autogenous or artificial bone. In recent years, attempts have been made to regenerate periodontal tissues lost through periodontitis, and several kinds of procedures have already been applied clinically.

Guided tissue regeneration (GTR) using a biocompatible barrier membrane and regenerative techniques for periodontal tissue using special proteins extracted from porcine tooth buds have been applied clinically, and numerous study results have been reported since around the 1980's. In the future, periodontal tissue and tooth regenerative procedures that follow the concept of tissue engineering will be applied clinically, using the three elements of cells, growth factors and scaffold materials.

The average life span in Japan exceeds 80 years now. However, almost a 10-year difference in lifespan exists between the average lifespan and the healthy lifespan of individuals who do not become bedridden. The existence of teeth is indispensable for extending the duration of this healthy lifespan. When periodontal tissue management is practiced successfully for periodontitis over a long period of time with the mutual trust and efforts of both patient and dentist, prevention of initial or recurrent periodontal disease becomes possible. The ability to keep eating whatever foods the individual chooses with their natural teeth throughout life is an important part of living a comfortable life, and creating a medical system that can maintain oral health using regular oral examinations as part of a holistic approach to health and well-being is also very important.

(Miki, Nishida, Yoshinari)

82. Checkpoints and preventive methods for periodontitis

1. Checkpoints on periodontitis

Before checking periodontitis, it is important to know how the healthy periodontium is (MEMO 1).

Then, the following points on periodontitis should be checked up.

1) A gum is looked reddish, or red-purple
2) A gum breeds easily when brushing teeth
3) An interdental gum swells and looks roundish
4) An interdental gum gets receded and a triangle opening between teeth is seen
5) A tooth gets loose
6) A tooth is looked to lengthen
7) An interdental space spreads widely
8) The mouth is sticky at the time of rising
9) A gum gets swollen and sometimes, painful when the body gets tired
10) A patient have halitosis, or bad breath

MEMO 1 Macroscopic features of the healthy gums

Healthy gums are pale pink and elastic. Stippling is seen on the gum surface in the lingual side.

1. A detached gum is: the mobile gum that does not attach to the tooth surface and forms the gingival sulcus.
2. An attached gum is: the immobile gum that attaches tightly to the tooth surface and an alveolar bone.
3. Gingival sulcus is: the sulcus that is located between the tooth and detached gum. Healthy sulcus is 1-2 mm in depth in the buccolingual side, and 2-3 mm in the interdental side.

2. Prevention of periodontitis

Most of periodontitis is an inflammatory disease primarily caused by bacterial plaque. Fundamental methods for preventing this inflammatory disease are to remove an irritative substance (pathogen) causing inflammation, and to increase resistance against the inflammatory diseases.

First thing to do is to encourage patients to get knowledge about periodontitis and to practice removing plaque at home daily, because the plaque is the most responsible factor for periodontitis (plaque control).

Second is to encourage patients to keep a healthy body and good masticatory functions, and to increase the strength of periodontium.

1) Plaque control

The point of the plaque control for preventing periodontitis is the first, practice, the second, methods, and the third, choosing suitable instruments for care.

Fundamentally, dental brushes, dental flosses, and interdental brushes are used for cleaning teeth. Because patients have no subjective symptom, importance of daily practice for keeping hygienic mouth should be emphasized. Brushing at home, however, is apt to be done inappropriately in the particular manner of each patient. Therefore, professional care and guidance on a regular basis are also necessary for preventing periodontitis.

Then, what is good brushing, and how to do it? Let us think it from two different angles: brushing practice and techniques.

(1) Brushing practice

Dentists should teach patients how often a day patients should brush the teeth, when they should do, how long patients should take time for one brushing, where they should brush, and what posture (standing or sitting position) they should take when brushing.

In order to establish successful brushing practice, patients should know effectiveness of brushing against periodontitis and the risks when neglecting it. To accomplish the good practice, motivation for every-day brushing is essential for patients.

(2) Brushing techniques

Dentists should give patients information as to what is the good tooth instrument, at what angle a toothbrush should be placed against a tooth, how a toothbrush should be moved, the pressure of brushing, the order of brushing, and checkups for successful brushing.

Ordinarily, a toothbrush toe is used in brushing. In the scraping method, placing toothbrush vertically against the outer surface of the tooth, and placing it at 45-degree angle against the inner surface of the tooth are recommendable. In order to remove plaque, a toothbrush should be moved in short strokes horizontally with the pressure of about 200g.

In order to assist a toothbrush, there are various supplementary cleaning-instruments. Usually, dental floss is used in the tight inter-dental space and an inter-dental brush is used in the sufficiently large space between teeth.

2) Auto-cleaning and resistance against periodontitis

Besides brushing and oral irrigation, auto-cleaning is another factor to reduce plaque in the cervical areas.

(1) The ways to increase auto-cleaning action are:

① To take plenty of food for strongly assisting auto-cleaning to remove plaque (fibrous food or hard food),

② To reduce sugar-rich food and soft food. Both of them easily adhere to teeth when eating,

③ To keep a healthy jaw-alignment by preventing tooth decay, in particular, tooth loss, and to establish a good practice of chewing food sufficiently by strengthening masticatory function.

(2) The ways to strengthen resistance of periodontium against periodontitis are:

① To observe lifestyle habits including dietary habits and exercise for keeping a healthy body,

② To keep sound masticatory function so as to physiologically stimulate periodontium, and

③ To massage the gums with brushing to have a good blood circulation, and to strengthen resistance against bacteria and their products by epithelial keratinization

In addition, regular examinations on periodontium, preventive therapy for periodontitis, early diagnosis and treatment for periodontitis, and checking-ups about good brushing practice at a dental clinic are indispensable.

(Takahide Nakayama)

83. A loose tooth that is going to fall out, and oral care

1. Risks of leaving a loose tooth untreated

While periodontitis progresses, teeth get increasingly loose because alveolar bone is resorbed. Ordinarily, a tooth moving up and down because of periodontitis (along the tooth axis), is judged to be extracted, because it cannot be cured even if patients undergo a surgical operation. If the patients leave the teeth un-extracted, they cannot chew food well with the loose teeth, because the tooth will pain while chewing. Therefore, not only is masticatory function remarkably damaged but also risks inviting acute symptoms such as swollen gums, pyorrhea, and pain increase. Moreover, because deep periodontal pockets continue to exist in many cases, inflammatory cytokine produced by chronic inflammation in the periodontal pockets, and pathogenic bacteria of periodontosis move from a blood vessel to the whole body, which leads to injury of the vessel-inner wall, and consequently, arteriosclerosis occurs.

If a patient is able to visit a dental clinic regularly, but his/her tooth with progressed periodontitis is not expected to be cured, and the tooth gives the patient only risks of periodontitis and difficulties in chewing food, the tooth should be extracted after adequate explanation by a dentist is given to the patient and the patient consents. Then, the patient undergoes prosthetic treatment (for attaching an artificial tooth) to ensure successful cure.

2. In the case that a loose tooth is left un-extracted

If a deep pocket is continuously neglected because of no hope of cure, the loose tooth will get so remarkably unsteady that it results in oral care impossible.

1) In the case that a patient refuses extraction of a tooth because of no subjective symptom even though the patient has a deep periodontal pocket

Primarily, dentists should adequately explain risks of the untreated tooth to patients, and should, if necessary, extract the tooth at proper time and perform prosthetic treatment. However, the patient may be reluctant to undergo tooth extraction if he/she do not have subjective symptom. During regular dental care, dentists should tell patients about full risks of the loose tooth including what will happen in future and recommend the patients to undergo proper treatment before the patient is unable to come to the dental clinic.

2) In the case that, in the past days, a patient was healthy and was able to come to a dental clinic regularly, and his/her periodontitis was not so serious as the indication for tooth extraction, but after that, despite the progressed periodontitis, the patient became so weak that he/she is not able to come to the dental clinic at all

If it is not so long before a patient becomes unable to come to a dental clinic regularly, and if the patient has an opportunity to have dentist's visit at home to be checked with the mouth and gets oral care, it is desirable for the dentist to examine whether the tooth can be extracted before the extraction gets impossible.

3) In the case that a dentist was unable to extract the tooth because the patient has a systemic disease and takes medicine

Even if a dentist judges that the tooth be extracted, the tooth extraction may be impossible because the patient has big risks originated from the systemic disease. In that case, there is no way but keeping the loose tooth clean and leaving the tooth un-extracted. If the patient is able to go to the dentistry of a hospital and to hospitalize to undergo tooth-extraction, this is more recommendable. Therefore, a dentist should recommend a patient to go to the hospital to undergo tooth-extraction in time.

3. Oral care of the loose tooth that is going to fall out

The most ideal condition is that a patient has no “loose tooth that is going to fall out” at all. If the patient has it, however, there is no other way but to choose any one of the following methods because there are risks such as a tooth being dislocated, or in some cases, a tooth being mistakenly swallowed into the stomach or lung during oral care.

Those methods are:

1) To ask a dentist who is responsible for the patient to extract the tooth immediately

This is the ideal way. However, actually, there have been many teeth left untreated, because various conditions hindered dentists from extracting teeth immediately.

2) To explain a patient and patient’ family that there are many risks during oral care such as swallowing a tooth into the stomach or lung. The dentist does not perform oral care this day, but arranges the date of the extraction for other day.

Dentist should deeply understand how dangerous the oral care of “the loose tooth that is going to fall out” is, and should be courageous to cancel the care.

(Atsuhiro Kinoshita)

84. Relationships between periodontitis and tobacco smoking

1. Strengthened control of tobacco use

World Health Organization (WHO) considers both tobacco smoking and AIDS as biggest problems in public health. WHO has strongly promoted anti-smoking activities, regarding tobacco smoking as "the single leading preventable cause among causes of diseases". The 2008 WHO slogan in the "No Tobacco Day" is "Tobacco Free Youth". In order to "protect present and future generations from devastating health, social, environmental, and economic consequences of tobacco consumption and exposure to tobacco smoke", advertisement, packaging, and labeling of tobacco products were globally regulated under the international cooperation. Further, since WHO Framework Convention on Tobacco Control (FCTC) that provides for international collaboration on tobacco control entered into force on 27 February 2005, strict control of tobacco use became an urgent matter. In Japan, the Health Promotion Act, which provides for second-hand smoke, was implemented on 1 May 2003 (MEMO 1, 2).

MEMO 1 WHO Framework Convention on Tobacco Control (FCTC)

The Japanese Government decided at the cabinet on 9 March 2004 to require the Japanese Diet to approve signing and concluding FCTC. Then, Japan signed the treaty at the UN Headquarters as the 19th state. On 8 June 2004, Japan deposited the acceptance to the Secretary-General of the UN. In accordance with the Article of the WHO FCTC, the Convention, which is the first international treaty in the world public hygiene, entered into force on 27 February 2005, 90 days after the 40th State had acceded to, ratified, accepted, or approved it. The Convention consists of 11 parts and 38 articles. The Signatories to FCTC reaches to 171 states of 191 WHO member states (89.5%) as of the end of November 2010.

WHO Framework Convention on Tobacco Control

Article 8 Protection from exposure to tobacco smoke

1. Parties recognize that scientific evidence has unequivocally established that exposure to tobacco smoke causes death, disease and disability.
2. Each Party shall adopt and implement in areas of existing national jurisdiction as determined by national law and actively promote at other jurisdictional levels the adoption and implementation of effective legislative, executive, administrative and/or other measures, providing for protection from exposure to tobacco smoke in indoor workplaces, public transport, indoor public places, and, as appropriate, other public places.

MEMO 2 Health promotion Act of Japan Prevention against Second-hand smoke

Issue: 2 August 2002 Act No. 103
Enforcement: 1 May 2003
Chapter 5
Section 2 Prevention against second-hand smoke
Article 25

Person in charge of management at facilities used by large numbers of people*, such as schools, gymnasiums, hospitals, theaters, viewing stands, assembly halls, exhibition halls, department stores, office, public facilities, and eating and drinking places shall endeavor to take necessary measures to protect users of these facilities from being exposed to second-hand smoke (second-hand smoke refers to being forced to inhale other people's cigarette smoke in an indoor or equivalent environment).

*The Notice issued by the Director-General of the Health Bureau of Ministry of Health, Labour and Welfare of the Japanese Government (30 April 2003)

Facilities used by large numbers of people

"The facilities used by large numbers of people", which the above Article 25 touched upon, also includes railroad stations, bus-terminals, airport-terminals, seaport-terminals, financial institutions, art museums, museums, facilities for social welfares, shops, accommodations including hotels and Japanese inns, outdoor sport arenas, and entertainment facilities such as amusement parks. In the view of the purport of the said Article, railroad cars, buses and taxis, airplanes and ships are also included in the facilities.

2. periodontitis and tobacco smoking

Multiple studies have proved that smokers have the high morbidity rate of cancer, strokes, pulmonatry emphysema, asthma, and periodontitis, and that tobacco smoke is associated with a cause of these diseases. Since tobacco smoke affects immunocompetence against carbon monoxide and nicotine; micro-cardiovascular system; neutrophilic leukocyte function; and cytokine productivity, host-response in the periodontium and healing mechanism, in particular, are damaged. Hence, destruction in the periodontium advances in smokers (although gingivitis is not so severe, both attachment loss and absorption of alveolar bones are serious), and improvements in response to periodontal therapy and in prognosis of periodontal surgical therapy get diminished. Thus, these are called "Smoking-attributable periodontitis" or "Periodontitis associated with smoking".

In addition, it has been found that because of second-hand smoke or environmental smoke, the morbidity rates of various diseases including lung cancer and heart diseases elevate, and that the birth rate of an underweight baby in even non-smokers also goes up. Arbes et al. analyzed data of 5,658 persons obtained from the Third National Health and Nutrition Examination Survey in the U.S. (1988 -1994). He warned that the risks of periodontitis of adult non-smokers exposed to environmental tobacco smoke at home and work place increased by 57% (the adjusted odds of having periodontal disease were 1.57 and 95% confidence interval = 1.15-2.16). Hanioka et al. reported that excessive melanin pigmentation in the gingiva of children was associated with parent smoking. He reported two examiners who observed melanin pigmentation in the gingiva of 59 nonsmoking children who visited a dental clinic in Japan. Of the children, 61% has a smoking parent. Odds rate of gingival pigmentation in children adjusted by age and gender were 5.4 (95% confidence interval: 1.5-20.00) and 5.6 (95% confidence interval: 1.4-21.2). We studied "influence of second-hand smoke on the periodontium of children", examining alterations in the periodontium of children caused by the second-hand smoke (melanin pigmentation) in the gingiva of children. We found that 28 (67%) out of 42 children (the age of 10.7 ± 5.5) were affected by exposure of second-hand smoke at home. Of them, 20 children (83%) had melanin pigmentation in the gingiva. Odds rate of gingival pigmentation due to second-hand smoke in children adjusted by age and gender were 6.7 (95% confidence interval: 1.5-30.5), which indicated that second-hand smoke was a significantly high risk factor.

Cessation of tobacco smoking, however, may prevent periodontitis, may improve assessment of periodontal therapy for the advanced periodontitis, and may control tooth loss.

3. Support for cessation of tobacco smoking in dental therapy

Usually, tobacco-smoking patients who come to undergo dental therapy do not say anything about their wishes to quit tobacco smoking from dentists or dental hygienists. Therefore, dentists have to tell again and again about association of smoking with periodontitis or other deleterious effects on the body to the patients with the smoking-caused progressed periodontitis, and recommend them to quit smoking, these of which are the least required therapy for periodontitis. In the past days, it was considered that smoking was merely a habit and that individuals were "willing" to smoke. Today, it is recognized, however, that failure of smoking cessation is attributable to "nicotine dependence (one of drug addiction)", which is psychological and physical nicotine dependence. Therefore, support for smoking cessation has become a more and more important issue. (MEMO 3)

In 2000, "A clinical practice guideline for treatment of tobacco use and dependence, 2000" was made by U.S. Agency for Healthcare Research and Quality (a substructure of U.N. Department of Health and Human Service). This guideline is based on evidences of which approximately 6,000 literatures were reviewed with the results of more than 50 meta-analyses. It shows a procedure of "Five As" for clinical practices when primary care clinicians support patients' quit attempts (Johnson & Hill, 2004).

MEMO 3 Nicotine Dependence

"Mental and behavioral disorders due to psychoactive substance use" in ICD-10 (WHO International Classification of Diseases) includes tobacco in "Substance involved" and classifies as "F17: Mental and behavioral disorders due to use of tobacco (Chronic nicotine dependence)". Each clinical state due to psychoactive substance use is categorized into the following sections: "F17.1 Harmful use", "F17.2 Dependence syndrome", and "F17.3 Withdrawal state". If smokers are diagnosed with ICD-10 criteria, almost 100% of them are diagnosed as nicotine dependence. In other words, most of smokers are one who:

① has a strong desire or sense of compulsion to take tobacco, beyond pleasures,
② has difficulties in controlling quantity and timing of tobacco smoking,
③ is in withdrawal state when tobacco use has ceased,
④ takes more doses of tobacco than that in the early days of smoking (The increased tolerance against tobacco),
⑤ has, sometimes, progressive neglect of alternative pleasures or interests such as going to movies or traveling abroad because of tobacco use, or
⑥ is persisting with tobacco use despite clear evidence of overtly harmful consequences.

A diagnosis of dependence should be made only if three or more of the above six have been experienced or exhibited for over one month.

"Nicotine Dependence" was also prescribed in 305.1, DSM-IV-TR (Criteria of American Psychiatric Association) in 1987. DSM-IV-TR categorizes "disorders due to substance use" into two items: 1. Abuse: Recurrent social or interpersonal problems, or legal problems due to substance use, 2. Dependence: Continued use despite adverse consequences. Someone may say that nicotine abuse can be ignored, because nicotine does not have a psycho-inhibiting action and does not disturb daily life. That is not true, because not all substance that has weak abusable property have weak dependence.

If the "Five As" recommended in this guideline apply to patients with periodontitis, it will be as follows:

1) Ask

To identify tobacco-use status (the number of cigarettes smoked daily, age when smoking started, years of smoking, and experience of quit attempts) and medical history by interview.

2) Advise

Regardless of whether patients are willing to quit or unwilling to quit, clinicians should explain noxiousness of tobacco smoking to all patients and urge them to quit tobacco smoking, telling its hazardous effects on patients' periodontium. Avoiding unclear advice, clinicians should advise patients in strong and personalized manner. Phrases such as "I would recommend you to quit smoking if you can." or "You might reduce doses of tobacco one by one" are inappropriate. Clinicians should absolutely avoid such phrases because these easy remarks apt to spoil patients' motivation to quit attempts.

3)Assess

To assess how much a patient wants to quit smoking (at what stage of quit smoking a patient is) and assess degree of nicotine dependence considering background of daily life and psychosomatic medical aspects

Fagerström Tolerance Questionnaire, 1978 (FTQ) that Fagerström developed is a questionnaire most frequently used to assess nicotine dependence. Fagerström is a person who developed alternative medicine to nicotine. This questionnaire is useful for clinicians to decide whether they should apply nicotine replacement therapy including nicotine gum to patients. Following FTQ, Fagerström Test for Nicotine Dependence, 1991 (FTND) revised by Heatherton is recognized as a test having clinically good usability. Using this FTND, patients can easily know their degree of nicotine dependence if they check by themselves or clinicians do during guidance. Further, it is more favorable to use "The Kano Test for Social Nicotine Dependence" (KTSND) that can determine psychological nicotine dependence (in particularly, cognitive distortions to tobacco), together with FTND. However, clinicians can estimate patient's degree of nicotine dependence (physical dependence) with only one easy question to a patient, i.e. "How long can you endure without

tobacco smoking after getting up in the morning?" (a desire to take tobacco at rising). Nicotine concentration in the body is the lowest at the time of getting up in the morning. A degree of desire to take tobacco reflects a degree of nicotine dependence. It is also recommendable for clinicians to measure patient's carbon monoxide (CO) in expiration and nicotine concentration in saliva and urine, if possible.

During the above procedures, clinicians should pick up smokers who have willingness to quit smoking, and start assistance.

4)Assist

To offer treatment for periodontitis as well as assistance for cessation of tobacco smoking to patients who want to quit smoking

Depending upon types of nicotine dependence, therapies vary. In physical dependence, a main therapy may be a therapy for withdrawal symptoms, in which nicotine replacement therapy is necessary to introduce. In psychiatric therapy, combination with behavioral therapy is effective. Only an explanation about hazardous effects of tobacco may not get patients motivated to quit smoking. Therefore, clinicians have to present more effective and practicable ways so as to provide information on advantage of smoking cessation such as the improved quality of life.

Nicotine replacement therapies help patients to quit smoking by reducing nicotine withdrawal symptoms, while it lets nicotine be absorbed into the body through surfaces of skin or oral mucous membrane contacting with nicotine supplementary materials. In Japan, nicotine gums (Nicorette, OTC) and nicotine patches (Nicorette Patche, Ciganon CQ, Nicotinell Patch, OTC) are applicable to nicotine replacement therapies. However, it should be cautious to use them to medically contraindicated populations whom nicotine gives adverse effects, such as patients with cardiac infarction. However, nicotine supplementary materials can apply to patients with cardiac diseases except unstable angina, cardiac infarction in the acute phase, and grave arrhythmia. Following the nicotine patches, non-nicotine, selective nicotine-acetylcholine receptor partial agonist: Varenicline was approved for medical use in Jan. 2008.

Clinicians should encourage patients to undergo behavioral therapies repeatedly to overcome temptations of smoking caused by psychological dependence such as a habit and conditional reflex. In other words, removing tobacco products from patient's environment and making patients divert their attention from tobacco are inevitable.

Effective therapy today is not conventional arduous therapy that has been less successful in tobacco cessation and has had a full relapse, but a tobacco-free therapy called "Reset of tobacco cessation" in which clinicians urges smokers to aware exact danger of tobacco.

5) Arrange

To evaluate response of the periodontium to periodontal basic therapy after the patient quits smoking, and to continue to assist patients' endeavor of smoking cessation

Further, it is important for clinicians to make patients aware that even only one cigarette leads to failure of smoking cessation.

Tobacco cessation therapy based on "Guidelines for tobacco cessation", which is jointly used by the following nine societies, started in medical schools in April 2006. (MEMO 4)

MEMO 4 Guidelines for tobacco cessation jointly used by the following nine societies

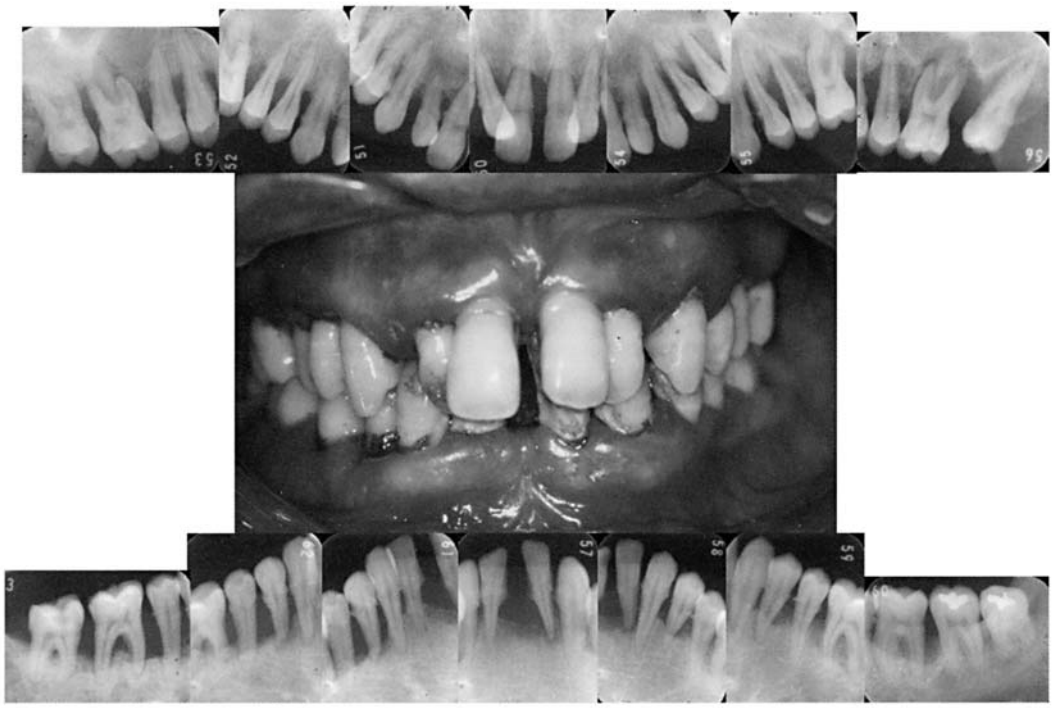
The Japanese Society for Dental Health, Japanese Society of Oral and Maxillofacial Surgeons, Japanese Society of Public Health, The Japanese Respiratory Society, Japan Society of Obstetrics and Gynecology, The Japanese Circulation Society, Japan Pediatric Society, The Japanese College of Cardiology, and The Japan Lung Cancer Society.

After that, the other two societies: The Japanese Society of Periodontology and Japanese Cancer Association participated in the guideline. Today, 17 societies are engaged in tobacco cessation therapies.

4. Current smoking cessation therapies and current studies on assistance and interventions for smoking cessation

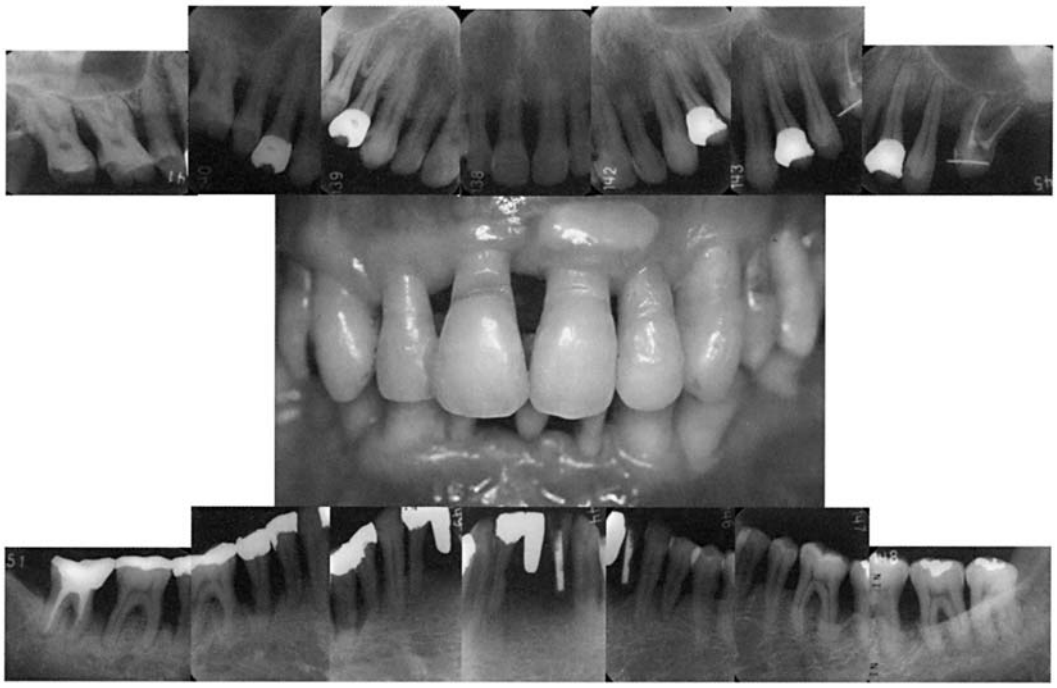
Usually, processes of behavioral changes such as a change from "Willing to smoke or unwilling to quit smoking" to "Unwilling to smoke or willing to quit smoking" are classifies into five stages: inmotives, and maintenance. The stage of preparation, in particular, is the stage that patients want to quit smoking immediately, so that they want to find a trigger for cessation of smoking and to get assistance. Therefore, for smokers in this stage, assistance and guidance are indicated. It is also an important task for clinicians to guide smokers from the stage of pre contemplators and contemplators to preparers and action.

Meta-analysis of a study on intervention for smoking cessation indicated that if clinicians gave simple advice to smokers, the smoking cessation rate of the smokers went up 1.3 times higher than that of smokers who received no advice. If smokers got nicotine replacement therapies, a smoking cessation rate of the smokers went up 1.7 times higher than that of smokers who received no therapies. In UK hospital, 98 cigarette smokers received smoking reduction advice in combination with periodontal care. One year later, the smoking cessation rate in the intervention group was 13.3% compared with 5.3% in 38 control subjects who received periodontal care but no advice. The result indicated that advice against smoking combined with periodontal care could be effective aid to reducing tobacco consumption. Another study reported that clinicians gave counseling and nicotine replacement therapy if necessary, to 154 patients in 54 dental clinics in the UK. Among them, 17 (11%) were successful in giving-up tobacco for 9 months. Furthermore, the study demonstrated that if professionals in multi-disciplines intervened in quit attempts on various timing, the smoking cessation rate in the group intervened by multi-professionals was 2.5 times higher than that in the group intervened by a single clinician. If a clinician gave a brief 3-minute-advice, the rate of a 6-month-smoking cessation was 2% higher in the group having received advice than that in the group without advice. Similarly, if a clinician gave a 10-minute-advice together with nicotine replacement therapy, the rate of a 6-month-smoking cessation was 9% higher in the group having received advice and nicotine replacement therapy than that in the group given nothing. Therefore, in intervention in smoking cessation, active efforts not only by dentists and dental hygienists, but also by nurses, speech-healing therapists, and care workers are essential.



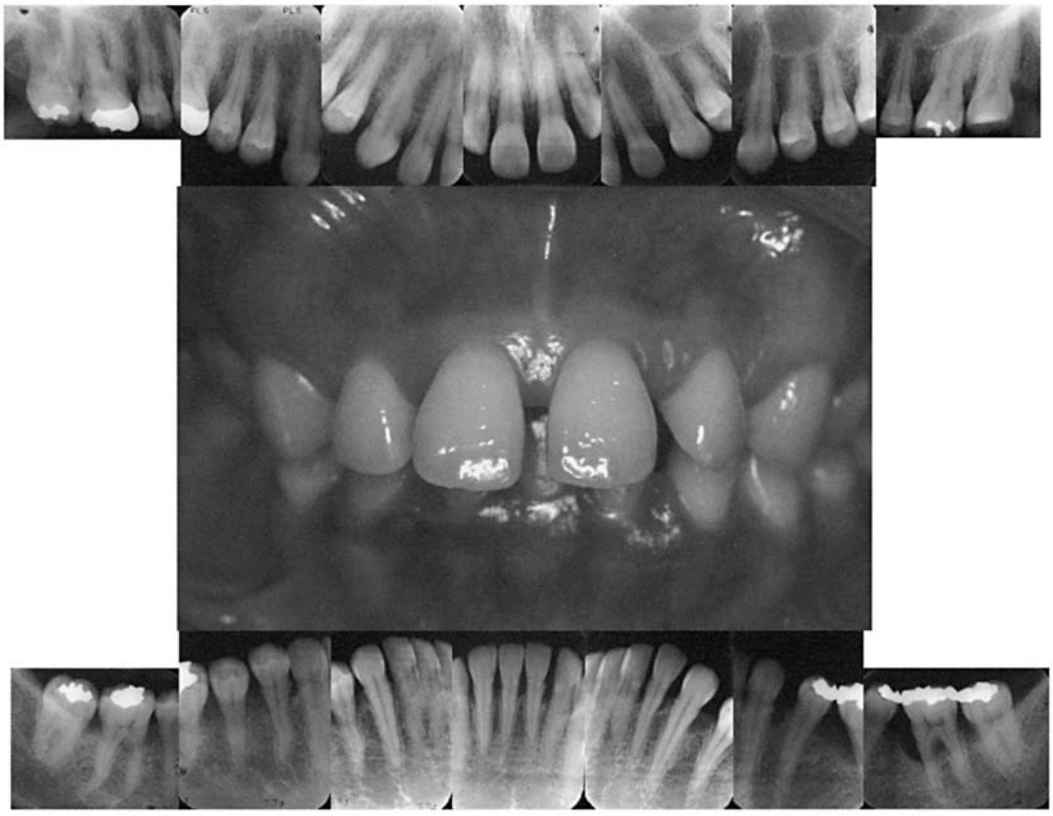
Case 1

Photo of the mouth and dental X ray radiographs at the first dental examination. male smoker of 40 years old with severe aggressive periodontitis (20 cigarettes a day for 20 years). Massive destruction due to smoking was seen. The patient was recommended to undergo examination for diabetes



Case 1 after treatment

Photo of the mouth and dental X ray radiographs at nearly the 22nd year after smoking cessation (April 2005). Since the patient quitted alcohol and smoking and tried to protect his health, the periodontium has remarkably been improved. The patient has undergone orthodontic treatment. The alveolar bone that was once terribly destructed has been improved without the onset of diabetes



Case 2

Photo of the mouth and dental X ray radiographs at the first dental examination (April 1998). A female smoker of 28 years old with aggressive periodontitis (10 cigarettes a day for 8 years). Melanin pigmentation in the gingival caused by tobacco smoking was clearly seen. Periodontitis had progressed

Case 2 after treatment

As the patient was told about malignant impact of smoking and periodontitis on her fetus, she quitted smoking in Dec. 1998. In Dec. 2001, she gave normal birth to a healthy boy (3,530g). Melanin pigmentation in the gingival is disappearing. However, because marginal gingivitis and periodontal pockets are left untreated, periodontal treatment should be performed completely in the near future

Case 3 Case 4

Effects of second-hand smoking are remarkably seen in children. The case 3 (left) is a girl of 7 years old who has melanin pigmentation in the gingiva due to smoking by her father (15 cigarettes a day). The case 4 (right) is a girl of 8 years old who has melanin pigmentation in the gingiva, which can be caused by smoking by her father (60 cigarettes a day)

Case 5 Case 6

Both cases are girls of 10 years old who have melanin pigmentation in the gingiva, which can be caused by father's smoking. In case 5 (left), her father smokes 50 cigarettes a day and in case 6 (right), 40 cigarettes a day

Case 7 Case 8

The case 7 (left) is a girl of 13 years old and the case 8 (right) is a girl of 15 years old. Both have melanin pigmentation in the gingiva, which can be caused by smoking by their fathers. Both of their fathers smoke 20 cigarettes a day. While girls got old, melanin pigmentation in the gingiva got more and more distinct

(Koji Inagaki, Toshihide Noguchi)

85. Relationships between periodontitis and its related lifestyle habits

1. Periodontitis is a life-style related disease

Periodontium is not destructed directly by periodontitis-related bacteria infecting periodontal pockets. The destruction is caused mainly by the indirect mechanism, that is, autodestruction. Autodestruction is that various stimuli produced by the infecting bacteria irritate organisms such annoyingly that organisms excessively react to stimuli to protect themselves. An alteration of systemic organism functions, especially an alteration of immune system functions give so significant impact on periodontitis, like the above, that relationships between periodontitis, and systemic diseases or lifestyle habits are vital important to understand the progress and cure for periodontitis.

In 1996, the Japanese Ministry of Health and Welfare (then) revised the definition of the diseases that was once called adult diseases to life-style related diseases caused by bad habits. The life-style related disease is defined as a disease that develops and progresses after pathogenic factors have been accumulated in the body because of various habits in daily life. It is said that among habits, especially lifestyle habits such as nutrition and dietary habits, physical activities and exercise, rest, tobacco smoking, and alcohol drinking are strongly related to life-style related diseases. Table 1 shows diseases included in life-style related diseases. Periodontitis is also included in life-style related diseases. The Ministry of Health and Welfare emphasized the measures of “primary prevention” to be implemented by people themselves to control their lifestyle habits, instead of emphasizing the “secondary protection” that aims at early detection and early treatment. The Ministry has been promoting the “National Health Promotion Movement in the 21st Century (Health Japan 21)” and set detailed objectives about oral hygiene including protection against periodontitis. Thus, the notion that periodontitis is a life-style related disease has widely been recognized.

Table 1 Lifestyle habits and life-style related diseases

Habits	Diseases
Dietary habit	Non-insulin-dependent diabetes mellitus, Obesity, Hyperlipemia, Hyperuricemia, Circulatory diseases (Cerebral hemorrhage, Brain infarction, Myocardial infarction, etc.), Large bowel cancer, Periodontosis, etc.
Exercise	Non-insulin-dependent diabetes mellitus, Obesity, Hyperlipemia, Hypertension, etc.
Smoking	Lung squamous cell carcinoma, Circulatory diseases (Cerebral hemorrhage, Brain infarction, Myocardial infarction, etc.), Chronic bronchitis, Lung emphysema- periodontosis, etc.
Drinking	Alcohol-induced liver disease, etc.

2. Lifestyle habits associated with periodontitis

1) Brushing practice

Development of periodontitis is attributable to bacteria. Hence, the most effective practice in daily life to prevent periodontitis is to brush teeth every day. If people neglect brushing, not only (do gram-negative bacteria, with which periodontitis is strongly associated, proliferate), but also (a plaque bulk, which induces deterioration of quality, increase). The study should that when subjects in the study group stopped brushing, slight inflammation was seen in the gingiva around the 4th day after stopping the brushing, though there was no visible change in the gingiva in the early stage of plaque accumulation. Then, 3-4 weeks later, the slight inflammation progressed to chronic gingivitis. If the time of no brushing is further

prolonged, gingivitis progresses to periodontitis and irreversible destruction occurs. Fundamentally, brushing should do every day. However, how much plaque can be removed per one brushing is more important than how many times a day teeth should be brushed.

2) Nutrition and dietary habits

Nutrition and dietary habits are lifestyle habits that affect periodontitis in many ways. Taking in a well-balanced nutrients and food leads to good conditions of systemic functions including the immune system and makes the body insusceptible to periodontitis. Association of Vitamin C with periodontitis has been investigated for a long time. Some study demonstrated that Vitamin C was involved in formation of collagen and it had potency to inhibit inflammation. It has been proven that Vitamin D and calcium induce bone formation. There are many other nutrients involved in prevention for periodontitis. People should maintain good dietary habits by taking in these nutrients in well-balanced manner.

Conversely, excessive intake of saccharides and lipid is a bad dietary habit because these are involved in the onset and progress of periodontitis. Saccharides-rich meals promote metabolism of bacteria in plaque and increase a bulk of plaque, so that saccharides-rich meals may be one of the factors to progress periodontitis. Further, duration of the high blood sugar level that can be seen in diabetes is the risk factors of the progression of inflammation in gingivae. Fat accumulation is known to increase the risk of obesity, diabetes, and periodontitis. Periodontitis is deeply involved in other life-style related diseases. Detailed remarks will be stated the following section.

3) Tobacco smoking

Many epidemiological studies have found that smoking habit gives strong influences on periodontitis. Components of tobacco smoke is thought to give influences on the periodontitis onset and progression while acting directly on periodontal cells including epithelial cells, fibroblast, and osteoblast, or acting on vasculature or immune system.

4) Stress

Stress is the state that homeostasis in the body is disturbed by mental or physical stimuli, which cause the imbalanced function of nervous system, immune system and endocrine system. Lifestyle with prolonged stress is a factor to get periodontitis aggravated. The animal experiment proved that remarkable alveolar bone resorptions due to the restraint stress occurred in rats. Neuropeptide is released under stress from the nerve ending. Substance P, one of the neuropeptide, is known to affect bone metabolism. Substance P is thought to be involved in the progression of periodontitis due to stress. Modulation of balanced immunocyte due to the disturbed autonomic nervous system and modulation in cytokine production due to the disturbed endocrine system such as glucocorticoid are thought to influence periodontitis. Although stress may be unavoidable today, the vital importance is to have sufficient rest to cope with stress.

5) Other lifestyle habits

Lack of exercises results in excessive calories, which invites elevation of blood pressure, blood sugar level, and cholesterol, and finally, reaches to obesity and diabetes. As mentioned before, lifestyle habits including obesity and diabetes are strongly associated with periodontitis. Therefore, lack of exercises may indirectly aggravate periodontitis. Excessive drinking may induce life-style related diseases such as high blood pressure, diabetes, and obesity and may be involved in the onset and aggravation of periodontitis. Refraining from the excessive drinking as well as practicing moderate exercise will lead to preventing and improving periodontitis.

3. Relationship between periodontitis and other life-style related diseases (Table 2)

1) Diabetes and periodontitis

Generally speaking, diabetes associated with lifestyle habits is type 2 diabetes (non-insulin-dependent diabetes mellitus). The U.S. study reported that the prevalence of periodontal disease in Pima Indians with diabetes was 2.6 times that observed in those without. In addition, there are many other reports about relationships between periodontitis and type 2 diabetes. Diabetes is thought to be a risk factor being most strongly involved in periodontitis. Today, periodontitis is considered to be the 6th complication of diabetes in the U.S.. Mechanism of it is that while elevating the blood sugar level, functional disorders of neutrophilic leukocyte and circulatory disorder in minute blood vessels occur, which results in deterioration of host defense function and healing-retardation in tissues. That is the reason of progression of periodontitis and failure of healing. Another mechanism presented is that AGE, which is a final product of protein-glycosylation, increases because of high blood sugar level. As the result, inflammatory cytokines are induced, which destructs periodontium.

Not only an influence that the diabetes exerts on periodontitis, but also a risk that periodontitis aggravates diabetes has gradually been known recently. Among inflammatory cytokines, Adipocytokines such as TNF-α draw insulin resistance that elevates blood sugar level. Thus, when production of TNF-α is accelerated because of periodontitis, blood sugar level is thought to elevate.

Periodontitis and diabetes influence each other, so that the relationships between the two diseases should be carefully observed.

2) Obesity and periodontitis

Obesity is the state that fatty tissues excessively accumulate in the body. Body mass index (BMI) and a percent of body fat are used as an index to assess obesity. Obesity is a risk factor of many life-style related diseases and is known to increase the risk of periodontitis prevalence and progression. The study of which subjects were adults in Hukuoka city, Japan, demonstrated that the higher BMI was, the more the prevalence increased. The prevalence risk of periodontitis in the group of BMI 30 and more was 8-fold greater than that in the group of BMI 20 and less.

It is said that adipocytokines including TNF-α and Adiponectine produced from fat cells is involved in the mechanism of obesity to influence the periodontitis onset. TNF-α is known to cause bone destruction in periodontitis, so that TNF-α caused by obesity may affect periodontitis. Likewise, Adipocytokines may affect the immune system of periodontium such as degradation of macrophage function.

Table 2 Systemic diseases and systemic factors associated with periodontitis

Diseases and factors affecting periodontitis	Diseases affected by periodontitis
Diabetes	Diabetes
Smoking	Cardiovascular diseases (Coronary heart disease and
Obesity	Cerebrovascular disease)
Stress	Birth of underweight baby and premature birth
Osteoporosis	Chronic respiratory disease

3) Cardiovascular diseases and periodontitis

Epidemiological studies about relationships between cardiovascular diseases and periodontitis have been seen many. The study conducted in the United State Department of Veterans Affairs showed that the morbidity risk of a coronary heart disease was higher in a group of severe alveolar bone loss than in a group of mild loss. So was stroke. Some prospective study for 10 years conducted for the Native Americans showed a high correlation between patients with established periodontitis at the initial time of the study and patients who developed coronary heart disease 10 year later. On the other hand, there is a report that periodontitis is not responsible for coronary heart disease. Although it should be proved with more studies, the result that periodontitis is involved in heart and cerebrovascular diseases has been creating a great sensation among people, since these two diseases are high-ranking causes of death.

In what mechanism periodontitis may induce cardiovascular diseases. Atherosclerosis is thought to be involved in the mechanism. Because bacteria related to periodontitis was found in atheroma, it is thought that these bacteria in blood attach to the endothelia of blood vessels and directly give damage to blood vessels. Another mechanism is that inflammatory cytokines produced from focuses activate endotheliocyte through blood, and macrophage in atheroma. Other theory says that stimuli of cytokines produce acute phase protein such as CRP in the liver and such protein operates upon atheroma formation. As seen the above, there are many theories to suggest the mechanism. Exact mechanism, however, is unknown yet. Detailed examination is expected.

(Jun-ichiro Hayashi, Toshihide Noguchi)

86. Oral care for a patient with periodontosis

Eighty to ninety percent of middle-aged and elderly people have periodontosis. When they are under the care, they cannot take care of their teeth by themselves. As the result, almost 100% of the elderly in need of nursing care have periodontosis. Periodontosis develops when plaque forms periodontal pockets, which results in inflammation along the gum line between teeth and gums. Therefore, for oral care for patients with periodontosis, removing the plaque (colonies of periodontal bacteria) is the requisite (Photo. 1).

The fundamental practice for oral care is to clean teeth mechanically with a toothbrush. Placing a toothbrush at a slightly less than 90-degree against a tooth surface is helpful for the toe of toothbrush reaching deeply enough into the tight inter-dental spaces. Moving toothbrush up and down gently in short strokes is effective for teeth cleaning (Fig. 1). Inter-dental brushes, dental flosses, gauze, and strings can be used to brush teeth as an aid (Photo. 2-4). Recently, an electric (sonic wave) toothbrush has been used to clean teeth in a short time. It is, however, recommendable to ask professionals to give advice so as not to choose wrong brushing kits or use kits in wrong manner. Otherwise, use of these kits may give teeth rather adverse effects.

If the elderly in need of nursing care cannot grip a slender toothbrush but can clean their mouth by themselves to some extent, caregivers have to find a way to grip the toothbrush easily (Photo. 5).

(Shinichi Hattori)

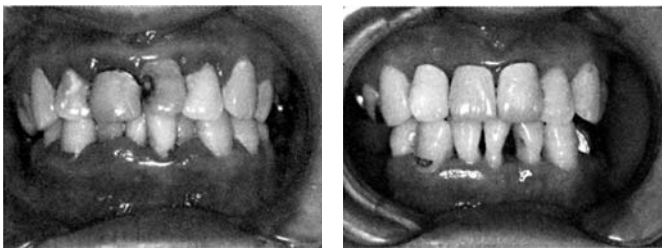


Photo. 1 Preoperational teeth (left), Post operational teeth (right)

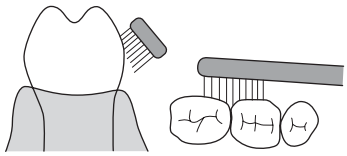


Fig. 1 Placing a toothbrush slightly tilting against a tooth surface is helpful for the toe of toothbrush reaching deeply enough into the tight inter-dental spaces. Moving toothbrush up and down gently in short strokes is effective for teeth cleaning.

Photo. 2 Inter-dental brush
Choose suitable kits for an inter-dental space

Photo. 3
Dental flosses that are used at tight inter-dental spaces

Photo. 4
Gauze and strings that are used for a wide interdental space

Photo. 5
A toothbrush converted to one easily gripped

VIII Bleeding

87. Causes of gingival bleeding, including malignant disease

1. Gingiva

The mucosa are vulnerable to damage, since, unlike skin, there is no stratum corneum and the epidermis is thin. Compared to skin, mucosa is highly vascular, resulting in the reddish-pink color. Oral mucosa, in particular, bleeds easily because of exposure to abrasion by food particles and foreign bodies. Constant flow of saliva onto the oral mucosa can make bleeding difficult to stop and determining the volume of blood loss is complicated by the blood mixing with saliva. In addition, gingiva can be affected by dental problems and gingivitis can develop due to the unique structure adhering to teeth. The sulcus (gingival crevice) lies between the tooth and gingiva, into which exudate is secreted. This exudate defends the local area against infections, as does saliva. However, without adequate removal of food debris and plaque accumulated in the sulcus, gingivitis or periodontitis can be triggered by oral bacteria. Inflamed gingiva bleeds easily and hemostasis can be difficult.

2. Bleeding and hemostasis

Bleeding can be defined as the flow of blood from damaged vessels or the heart. Swelling, for example, can occur when the only blood component penetrating the vessel walls to enter other tissues is plasma (the liquid component of blood) as a result of increased vascular permeability, but this represents edema rather than bleeding. Only when all blood components (including both plasma and red blood cells) flow out of the vessel can the event be called bleeding. With the onset of bleeding, hemostatic processes are spontaneously activated to prevent or control blood loss. Hemostasis involves the following four stages: (Fig. 1)

1) constriction of blood vessels (vascular factor)
2) formation of primary blood clot by platelets (platelet factor)
3) formation of secondary blood clot by blood clotting factors (coagulation factor)
4) fibrinolysis

Abnormality in any stage of this system that controls bleeding is called hemorrhagic diathesis, which can be categorized as congenital or acquired.

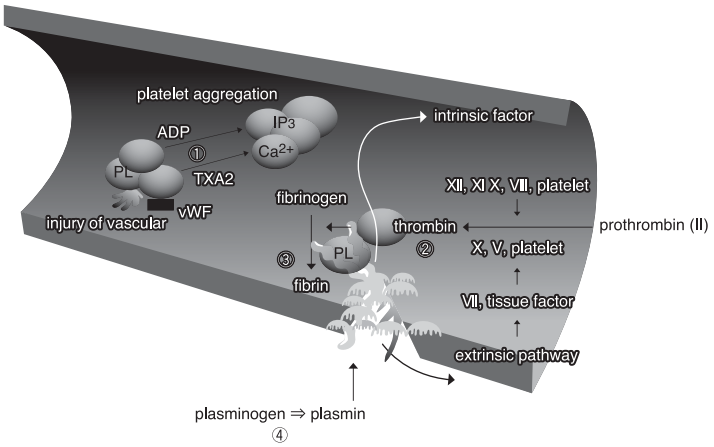


Fig. 1 Hemostasis

3. Causes of gingival bleeding

Gingival bleeding can be caused by tooth extraction, trauma, periodontitis, tumors, or systemic diseases (hemorrhagic diathesis).

1) Postextraction

Postextraction bleeding can usually be controlled by compressing the wound with gauze. When the gingiva is inflamed, stopping bleeding may be difficult. If bleeding persists, use of hemostatic agents and sutures may eventually be required, and the possibility of systemic causes (bleeding diathesis) should also be considered.

2) Trauma

(1) Trauma to the gingiva

Bites, excessive pressure from brushing, and improper use of a toothbrush or toothpick can all damage the gingiva. If the wound is minor and limited to the gingiva, bleeding can be stopped by compression with gauze and heals usually occurs without any problems. For deep or large lacerations sustained in traffic accidents, falls or other forms of severe, direct trauma, sutures may be needed.

(2) Trauma to the teeth

Bruising or luxation of the tooth can cause bleeding from the sulcus, but this usually subsides without treatment.

(3) Alveolar bone fracture, jaw fracture

When bleeding is vigorous, fracture should be suspected. If fracture is evident on radiography and bleeding cannot be stopped by compression with gauze, stitches, splinting teeth and immobilization of the jaw may be needed.

3) Periodontitis (infection)

① Bleeding associated with periodontitis usually occurs at the marginal gingiva or interdental papillae, and the gum appears red to dark red and swollen. Bleeding usually stops without treatment, but treatment of periodontitis can help reduce blood loss.

② Acute necrotizing ulcerative gingivitis and desquamative gingivitis may require assays of systemic disease factors and specific factors.

③ Other infections: pericoronitis and gingival abscess may cause the gingiva to bleed easily.

4) Mucosal diseases

Stomatitis, aphthous stomatitis, denture gingivitis, lichen planus and fungul infections can all be hemorrhagic. Specific treatment is not usually required. Ill-fitting dentures should be modified or replaced.

5) Tumors

Gingival cancer and malignant oral tumors are highly prevalent second to tongue cancer in terms of frequency. Gingival cancer presents with ulceration and swelling that can be hemorrhagic. Bleeding can be difficult to stop in advanced cases. The initial manifestations of acute leukemia are gingival bleeding and swelling (Photo. 1).

Photo. 1 Gingival bleeding of the patient with acute leukemia

Glossary:

Hemostasis: the mechanisms by which blood loss is controlled and stopped by repairing vessels immediately after injury. This process comprises a series of four factors: vascular factor; platelet factor; coagulation factor; and fibrinolysis.

Hemorrhagic diathesis: a disorder that involves easy bleeding and problems with stopping bleeding due to vascular or blood problems.

6) Systemic diseases (hemorrhagic diathesis)

Any abnormality of the hemostatic mechanisms (vascular factor, platelet factor, coagulation factor and fibrinolysis) is called hemorrhagic diathesis.

Major disorders according to the associated factors in hemorrhagic diathesis are as follows:

(1) Vascular factor

- Osler syndrome (hereditary hemorrhagic telengiectasia)
- Scurvy: vitamin C deficiency
- Allergic purpura

(2) Platelets

① Disorders involving platelet count

- Thrombocytopenia: idiopathic thrombocytopenic purpura (ITP); heparin-induced thrombocytopenia (HIT); aplastic anemia, acute leukemia, radiation therapy, antineoplastic.
- * Thrombocytosis: disseminated intravascular coagulation (DIC); thrombocythemia (essential thrombocythemia)

② Platelet dysfunction

- Thrombasthenia
- Antiplatelet agents: aspirin preparation (Bayaspirin, Bufferin)

(3) Coagulation factor

① Thromboplastin formation disorder

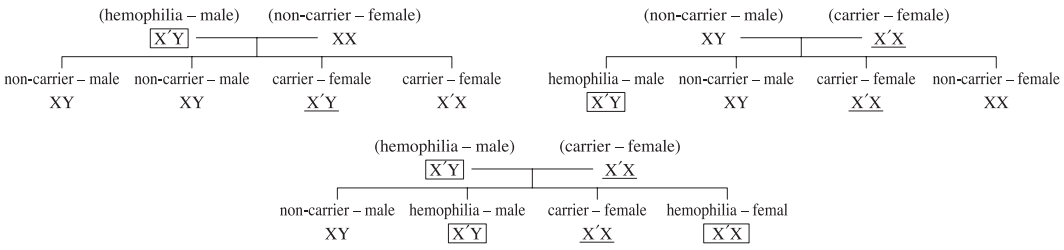
- * Hemophilia: X-linked recessive inheritance (See MEMO1)
- Hemophilia A: factor VIII deficiency
- Hemophilia B: factor IV deficiency
- Von Willebrand disease: factor VIII dysfunction

MEMO 1 The genetics of hemophilia

An estimated 1 in 5,000-10,000 male babies are born with hemophilia. The prevalence of hemophilia A is five times that of hemophilia B. Hemophilia is an X-linked recessive condition inherited in a Mendelian manner.

If a male is afflicted with the disease and has children with a female who is not a carrier, his sons will not be affected by the disease. His daughters, however, will be hemophilia carriers. When a mother who is a carrier and an unaffected father have a child, there are four possible outcomes for each pregnancy: a son without hemophilia; a daughter who is not a carrier; a son with hemophilia; or a daughter who is a carrier. With each pregnancy there is an equal 25% chance of each type. When a father who has hemophilia and a mother who is a carrier create a child, there are again four possible outcomes for each pregnancy: a son without hemophilia; a daughter who has hemophilia; a son with hemophilia; or a daughter who is a carrier. With each pregnancy there is an equal 25% chance of each of type. If a mother is affected with the disease and has children with a carrier father, all their sons will have hemophilia and all their daughters will be carriers. When both the father and mother are afflicted with hemophilia, all their progeny will have the disease.

【The genetics of hemophilia】



② Thrombin disorder (prothrombin deficiency)
- Hepatic cirrhosis: vitamin K deficiency
- Anticoagulant agent: warfarin, heparin

③ Fibrin disorder
- Hypofibrinogenemia
- Factor VIII deficiency

④ Acquired factor

(4) Fibrinolysis
- Excessive plasmin activity (α 2-plasmin inhibitor deficiency)
- DIC

4. Approach

Gingival bleeding is not always caused by poor oral hygiene. Patients with anamnestic atrial fibrillation or cerebral infarction often take antithrombotic drugs. Eliciting the previous medical history and medications is important (in patients taking warfarin, confirm prothrombin time- International normalized ratio (PT-INR) level). If bleeding persists without stopping spontaneously and gingival necrosis and swelling with halitosis are present, acute leukemia should be suspected. Acute leukemia can be detected at dental clinics because one initial symptom is gingival bleeding. In such cases, blood tests should be immediately performed and referral to a specialist is urgent.

However, in patients with bleeding tendencies caused by systemic disorder, the treatment of periodontitis needs to be combined with therapy for systemic disease. In so doing, the methods and type of treatment should be changed in accordance with the conditions of the patients. In patients with acute leukemia, minor wounds caused by brushing can progress to serious septic conditions. For the treatment of abnormal bleeding, the first tests that should be performed are platelet count and coagulation tests (prothrombin time (PT) and activated partial thromboplastin time (APTT)). If test results are normal, bleeding time should be measured next, along with factor VIII and α2-plasmin inhibitor (α2-PI) levels. If bleeding time is prolonged, a platelet disorder should be suspected and a platelet aggregation test performed. In addition, when DIC is suspected, levels of fibrinogen and fibrin degradation product (FDP) need to be measured.

(Ryouhei Adachi)

Glossary:

DIC: Activated coagulation mechanisms lead to the formation of small blood clots inside blood vessels throughout the body. As these small clots consume all the available coagulation proteins and platelets, normal coagulation is disrupted and abnormal bleeding occurs. Along with coagulation mechanics, fibrinolysis (the breakdown of clots) is activated. Excessive action of fibrinolysis breaks down normal clots, leading to abnormal bleeding. DIC is frequently a life-threatening condition.

88. Brushing for patients who bleed easily

The causes of oral bleeding, when limited to the oral cavity, can be: ① advanced periodontal disease; ② trauma such as fracture of the teeth or jaw; or ③ soft tissue diseases. In addition, oral bleeding can result from disorders in other parts of the body: ① anemia; ② medications; ③hematological disorders; ④ malignant tumor; or ⑤ radiotherapy.

Oral care should be given in the appropriate manner for the specific disorder. This chapter discusses methods for dealing with advanced cases of periodontal disease, as the most common cause of oral bleeding.

How to brush and key considerations

1) Patients with current bleeding, or who are at high risk of bleeding are advised by a dentist in advance of brushing. Preparing gauze saturated with a hemostatic agent such as Bosmin may be helpful.
2) Choose a soft-bristled brush with a small head (about 20 mm): the size of the head should be small enough to avoid unintended contact with the gum. In the past, the type and size of nylon-bristle toothbrushes was limited, and natural-bristled brushes using boar or raccoon dog bristles were considered to be better for patients with gingival bleeding due to their softness. Today, however, nylon-bristled brushes are available in a wide variety and offer better quality, usability, hygiene, durability and price.

   Toothbrushes for children have small heads, but are unsuitable for patients with gingival bleeding because these brushes are designed to remove plaque formed on the tooth to prevent cavities.

   New products have recently been developed for the elderly, including brushes designed for mucosal care, and brushes for nursing (Photo. 1). These soft-bristled brushes have a small head and can be effective for oral care.

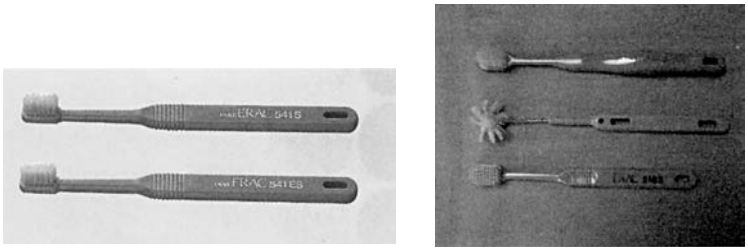


Photo. 1 brushes for nursing and brushes for mucosal care

3) When brushing, care must be taken regarding positioning of the brush bristles against the gum and how much pressure is applied, since mechanical irritation by tooth brushing can cause gingival tissue damage, which in turn can trigger bleeding at inflamed sites.
4) Use of an interdental brush and dental floss are essential in the treatment of gingivitis and periodontitis. However, when the interdental papillae (areas of gum between the teeth) become inflamed, use of such tools needs careful handling.

   If mucosal hyperemia and congestion are severe, the patient should refrain from using interdental brushes until healing has been achieved, using only a toothbrush during this period. Choosing a proper size (ranging from SSS ~ LL) of interdental brush is important.

< Procedure of Oral care >

Preparing Oral care goods

- Oral care goods should be selected depending on the degree and site of bleeding.

① Toothbrush (DentErac: 541S, 541ES), Kururi-Na Burashi, sponge brush, Chipped Gauze, cotton swab (see Fig. 1)
② Products for denture wearers: denture brush and storage container
③ Plastic cup, hand mirror, towel, tissue, gargle basin, mouthwash solution (e.g., green tea; water diluted with oxydol (10:1); Neostelin Green or Hachiazule; 10% lemon water), moisturizer, interdental brush (for use in bridge care: choose an appropriate size for the spaces needing brushing), plastic bottle of water (350-500 ml), disposable gloves, plastic bag

Rinsing mouth and removing denture

- Begin with gargling to remove food debris. If bleeding is present, rinse the mouth gently with mousewash (Neostelin Green or Hachiazule: use medicines according to instructions from a dentist).
- Any dentures should be removed after rinsing the mouth, then the mouth should be rinsed again. Dentures should be left soaking in water in a storage container or water basin.

Brushing teeth or cleaning buccal mucosa of the patient without teeth

- A plastic cup should be half-filled with mouthwash solution. Brush the teeth using a brush saturated in the solution in the cup. Repeat brushing.
- Replace the solution when it gets dirty.
- When assistance is needed, the use of a cotton swab may be helpful to avoid gum damage. A cotton swab can also be helpful to gently widen the lips and buccal mucosa, allowing a broader view of the oral cavity. The teeth can be brushed while protecting the gums with a cotton swab held in the left hand.
- The toothbrush should be gripped like a pencil, to allow more flexible brushing motions. First, finish either all of the upper teeth or all of the lower teeth, followed by the other (see Fig. 2), brushing teeth one-by-one in the correct order along the dental arch. Place the brush along the gum line while adding gentle pressure (about 100 g) on the brush. This “gentle pressure” can be defined as only that much pressure that prevents bending the bristles.

Brushing interdentium with an interdental brush

- The interdental brush should be gripped like a pencil and used in a manner similar to using a toothpick. To enable easy maneuvering of the brush, support the hand holding the brush by placing the little finger and ring finger on the lips and upper jaw. Perform brushing in the same order as with the toothbrushing above. After use, wash the brush with water, and keep it in a small container such as a tiny sake cup with the bristles upward. The patient needs to be careful not to break the brush during use and replace when broken. Tell the patient to brush with the aid of a mirror.

Rinsing mouth and/or brushing the denture

- Rinsing the mouth with green tea or water containing 10% lemon juice can refresh the mouth and provide temporary relief from and prevention of bad breath.

Clearing used goods

- All the goods used for oral care should be washed with running water and kept near a window with good sunlight and ventilation. As cups and toothbrushes easily gather dust and dirt, washing with a little dish-washing liquid is recommendable.

* Patients with dentures need to clean the dentures and take care of the oral mucosa.

How to make a rolled cotton swab and its usage

1. Usage
   ① Used when patients have difficulty in tooth brushing, tongue coating, oral bleeding, or damaged oral mucosa.
   ② Used when tooth brushing, to have a broader view of the mouth, to widen lips and buccal mucosa, or to protect the gums from damage by the bristle of a toothbrush.
   ③ Used to absorb saliva and fluid in the mouth, and also used for open bite.
   ④ Having soft texture, the rolled cotton swab can give patients safe and comfortable oral care.

2. Materials (for two)

・ chopstick	about the length of a toothbrush handle	1 set
・ cotton	cut in 5cm × 5cm	2 pads
・ gauze	cut in 7cm × 7cm	2 pads
・ surgical tape		

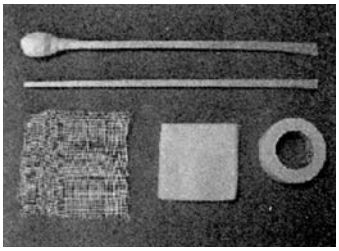
3. How to make

① Hold a cotton warpwise, and break the ends to form a triangle.

② Fold the upper end (about 1cm) to overlap the thinner end of the chopstick and roll it.

③ Place a gauze (7cm×7cm) on it and make a bud-shape.

④ Tape it to the stick with surgical tape.
   ・ Different sizes of cotton swab can be made with varied sizes of cotton and gauze pads.
   ・ For oral care, thumb-sized one and a little bigger one for open bite would be useful

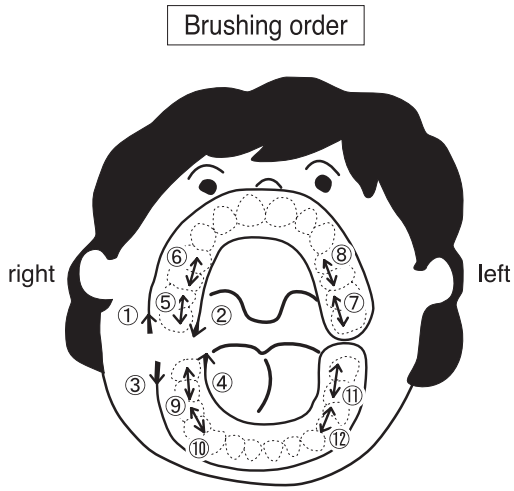


Materials

Fig. 1 How to make a rolled cotton swab and its materials

5) When bleeding occurs during oral care, stop brushing immediately. To stop bleeding, compress the bleeding site for several minutes using sterile gauze wrapped around a finger. If the bleeding does not stop after more than 10 minutes, seek professional assistance from a dentist. Following the instructions of the dentist, hemostasic agents and pressure should be applied to the site to stop the bleeding. After bleeding is stopped, provide the following guidance: do not touch the gum with unclean hands; and do not gargle violently or brush the teeth after meals. Instead, rinse the mouth gently after meals only to remove food particles using solutions of Isodine gargle (1:15-30) or oxydol (1:10)

6) In patients with repeated bleeding and previous hemostasis (blood clotting) in the gums, bleeding can be caused by serious systemic disorders such as liver disease, requiring specialist care. Compromised immune status can render the patient vulnerable to infections, so use of antibacterial mouthwash (Neostelin green, Azunol, Isodine, etc.) should be considered. A sponge brush or Kururina can be used to remove food debris and keep the mouth clean, and rinsing the mouth frequently with mouthwash is encouraged. Cold water is used for rinsing the mouth, as hot water may trigger bleeding. When assistance is needed, disposable gloves should be used to prevent infections and blood-stained gloves must be carefully handled and disposed of.



① Outside of the upper teeth: start with the right back teeth, brushalong the upper teeth up to the left ones
② Inside of the upper teeth: from the left back teeth to the right ones.
③ Outside of the lower teeth: from the right teeth to the left ones.
④ Inside of the lower teeth: from the left back teeth back to the right ones.
⑤⑥ Biting surface of the upper, right back teeth.
⑦⑧ Biting surface of the upper, left back teeth.
⑨⑩ Biting surface of the lower, right back teeth.
⑪⑫ Biting surface of the lower, left back teeth.

Fig. 2 Brushing order

7) Commercially available toothpastes contain sodium lauryl sulfate as a foaming agent, which irritates the oral mucosa and can damage the barrier function. Such toothpastes should thus be avoided for oral care in elderly patients with dry mouth and easy bleeding. In addition, since some mouthwashes may contain highly irritating disinfectants, knowledge regarding the key components of mouthwashes is essential. Patients can be given guidance on usage and dosage.
8) Ill-fitting dentures can damage the oral mucosa and trigger bleeding. When providing care, be sure to observe denture conditions, and recommend modifications by a dentist if any problems are found.

(Taeko Sasaki)

89. Oral care for patients with stomatititis or angular cheilitis

1. Stomatititis and angular cheilitis

1) Stomatititis represents an inflammatory lesion of the oral mucosa. These lesions often develop on the gums, the tongue, inside the lips, or at the labial commissure (corner of the mouth). Erosions or cracking at the labial commissure (corner of the mouth) are referred to as angular cheilitis (also called perleche or angular stomatitis), and this often occurs bilaterally (Photo. 1).

Photo. 1 Stomatititis on buccal mucosa

2) Symptoms

Vesicles, erosions, ulceration and white spots are the most common presentations. In addition, symptoms of perleche vary from the formation of scabs and splits to a white mossy coat.

In patients with mild symptoms (single, small area of inflammation), the lesion may be uncomfortable with certain foods or painful to touch. Patients with severe symptoms (multiple, larger areas of inflammation), however, may show fever, bleeding, swelling in the mouth, or even difficulties with food intake or speaking.

3) Causes

Stomatititis and angular cheilitis may be caused by caries (dental decay), hard brushing, mechanical irritation by dentures, bacterial or viral infection or systemic disease (diabetes, leukemia, etc.) affecting the oral mucosa, cancer treatments (chemotherapy, radiotherapy), side effects of medications, oral allergic reactions to certain metals, or nutritional disorder, but the cause remains unknown in many cases.

In some denture wearers, inflammation matching the outline of the dentures can be found in the mouth, representing denture stomatitis. Allergic reaction to resin (thermoplastic plastic) which is the denture base material, or Candida (a fungus) can be responsible. Candida has a strong ability to adhere to resin, and can overgrow plaque formed on the denture, subsequently causing inflammation of the adjacent oral mucosa.

In addition, in the treatment of cancer, chemotherapy (use of anticancer agents) and radiotherapy can be used. Anticancer agents and radiation can inhibit marrow function, thus decreasing the number of white blood cells platelets. A decrease in the number of white blood cells can make the patient vulnerable to infections, and bleeding tendencies can be increased by reductions in platelet numbers. These reductions in defenses against infections may affect the oral cavity. For example, patients who have undergone chemotherapy are likely to develop stomatitis after 5-10 days. In addition, exposure to radiation can damage the oral mucosa and salivary glands, decreasing saliva production. As normal flow of saliva protects the mucosa against a wide variety of insults, reductions in saliva production can cause dry mouth or atrophy of mucosa, contributing to stomatitis.

4) Healing process

In the absence of secondary infections, stomatititis and angular cheilitis tend to heal within 7-10 days after removal of the causes. Good oral care is essential to prevent secondary infection. However, patients tend to neglect oral care because of pain, and poor oral hygiene slows the healing process. Any symptoms that last more than 2 weeks should be examined by a dentist or doctor.

5) Treatment

Treatment is initiated when systemic diseases are known. Lesions resulting from local infection or irritants (caries, mechanical irritation from dentures, etc.) will be eliminated by dental or other treatments. Oral cleaning is also important to prevent secondary infections.

As symptomatic treatment to relieve pain and discomfort, rinsing or wiping the mouth with anti-inflammatory and antiseptic mouthwash should be performed first, followed by application of steroid ointment or tablets to the inflamed areas. Antifungal agents should be used for pain caused by Candida infection in the mouth, and antiviral agents should be used for viral infection.

Food that is very hot, hard, salty, acidic, or spicy should be avoided to minimize irritation of the lesion. When patients have difficulty eating due to severe inflammation, tube or intravenous feeding may be used to improve the nutritional state.

6) Prevention

Since good oral hygiene represents the best method of prevention, removal of plaque (including denture plaque), cleaning oral cavity and tongue coating should be performed. Preventing oral injuries and dry mouth is also important.

2. Care

Whatever the causes, stomatititis and angular cheilitis are treated in basically the same manner.

1) Tools

A toothbrush with a small head and soft bristles is used. Soft bristles are less likely to cause damage to the oral mucosa, but are likely to accumulate more waste material, so thorough rinsing after use is recommended.

Interdental brushes, dental floss, gauze, rolled cotton swabs, or swabs can be used as supplementary tools for oral care. However, excessive use should be avoided in patients with systemic diseases, receiving cancer treatment or anticoagulant drugs, or with bleeding tendencies.

Toothpaste can represent an irritant, and does not necessarily need to be used.

2) Methods of care

Oral care is basically performed in the following order: ① when angular cheilitis present, an ointment such as Vaseline can be applied to the corners of the mouth, and then the locations and status of lesions are checked; ② moisturization of the mouth; ③ brushing; ④ rinsing with mouthwash; ⑤ wiping the mouth; and ⑥ reapplication of ointment.

In patients with angular cheilitis, care must be taken not to open the mouth too wide, as splitting and bleeding can result. Before starting oral care, locations to watch during care should be identified along with observation of inflamed areas, inflammatory state, spread of lesions, and healing progress.

Brushing is performed gently and carefully in small motions, to avoid aggravating inflammation. The tooth cervix, area between the teeth and around the clasp on denture wearers need to be meticulously cleaned using supplementary cleaning tools as frequently as possible, since food debris and plaque easily form on and around these areas. If inflammation becomes too widespread for the patient to open the mouth, gentle brushing of the front and occlusal surfaces of the teeth is advisable. Extra care is needed so that tooth brushing does not cause further inflammation and bleeding in patients with systemic disorders or under cancer treatment, as such

patients can have difficulties with stopping blood loss. If the patient feels brushing is too painful, rinsing with mouthwash and wiping the teeth, buccal mucosa and back of tongue can help clean the mouth.

Rinsing with mouthwash is mainly performed to achieve mechanical cleaning with water power, rather than for any medicinal benefits. The rinse solution therefore does not always need to contain medication. If the solution is irritating, plain water can be used. Likewise, if the water is irritating, tepid water can be used.

If aspiration is likely, rinsing should be performed with care or the oral cavity should be wiped instead of rinsing. The teeth and oral mucosa can be wiped with a sponge brush, cotton ball or cotton swab frequently dipped in mouth rinse, water or tepid water. These should be used after removing excess water and scrubbing of the mucosa must be avoided.

Ointment can be applied, when needed, and in some cases moisturizer should be applied to keep the mouth from getting dry.

3. Denture stomatitis (oral candidiasis)

Denture stomatitis is commonly caused by infection with Candida species, particularly *Candida albicans*, affecting the oral mucosa. *Candida albicans* is usually present in the mouth in small numbers. However, use of certain medications or a change in overall health can disturb the normal flow of saliva protecting the oral mucosa, drying the mouth and allowing overgrowth of *Candida albicans* in the mouth, resulting in oral candidiasis. Oral candidiasis resulting from dry mouth is most often seen as a result of radiotherapy for oral cancer. In patients with cerebrovascular disorder, dry mouth is often a result of dysfunction (e.g., movement or sensory disorder) caused by paralysis. Such patients, particularly elderly patients in need of nursing care following multiple cerebral infarctions, are at risk of denture stomatitis.

Distinguishing oral candidiasis from the other forms of stomatitis is important (Photo. 2). In addition, an understanding of denture stomatitis, pseudomembranous candidiasis and hypertrophic candidacies is also necessary. Denture stomatitis can be treated using antifungal agents, but preventing recurrence and enhancing oral care to prevent dry mouth is obviously essential. Without addressing the issue of dry mouth, recurrence of oral candidiasis is unlikely to be prevented.

(Shuichiro Nagaosa, Mayu Saito)

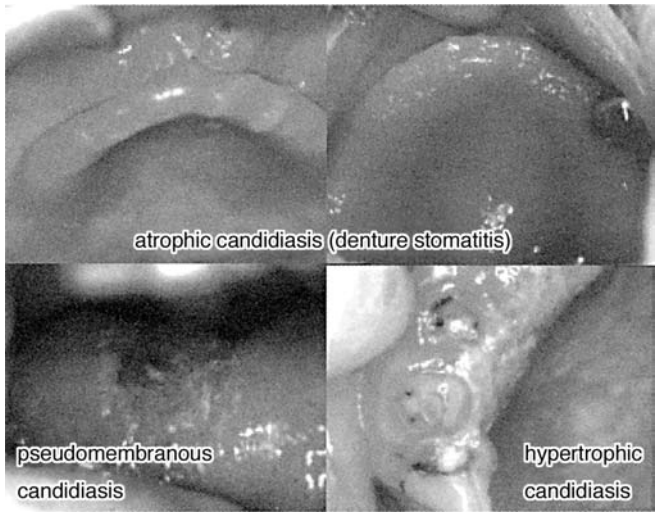


Photo. 2 Oral candidiasis in patients with cerebrovascular

90. Causes of gingival bleeding in the elderly

The gingiva is a region that bleeds easily, due to the presence of a large number of capillaries, and the fact that the area is subject to a wide variety of stimuli from actions such as eating, speaking, and brushing the teeth.

Causes of gingival bleeding are either systemic or local.

1. Causes of gingival bleeding in the elderly

1) High prevalence of gingival inflammation

Many elderly individuals have stress from occlusion for a long term, poor brushing habits and difficulty with oral cleaning, resulting in gingival inflammation. Moreover, denture use is often associated with reduced arm mobility and poor eyesight, which can limit tooth-cleaning and the ability to recognize areas requiring oral care.

2) High rate of denture use

The elderly often use denture, so the buccal cavities may easily become unclean, which may worsen gingival inflammation and/or cause ulcers due to ill-fitting dentures, both of which may cause gingival bleeding.

3) Presence of multiple systemic diseases

The elderly often suffer from multiple systemic diseases. If diseases causing hemorrhagic diatheses or thrombocytopenia due to functional insufficiency of the liver are present, to the risk of gingival bleeding is markedly increased.

4) Medications

Elderly individuals frequently take a large number of medications, which may influence gingival bleeding.

① The proportion of elderly individuals with a history of cerebral infarction or myocardial infarction is high. As a result, many elderly patients take anticoagulants (e.g., warfarin potassium) or antithrombotic drugs (aspirin or ticlopidine hydrochloride), which can interfere with hemostasis in cases of gingival bleeding.

② If the elderly patient has gingival hyperplasia due to long-term use of antihypertensive drugs (calcium channel blockers), gingival inflammation can easily progress to gingival bleeding.

5) Xerostomia

Many investigations have found little decrease in salivation with age, while the number of elderly individuals suffering xerostomia clinically has increased. This is assumed to be due to systemic diseases, medications, lifestyle problems, decrease of behavior of drinking water, or degradation of buccal cavity functions. For example, when decreased salivation causes xerosis of the buccal cavity, self-cleansing functions are decreased and gingival inflammation is exacerbated, resulting in gingival bleeding.

6) Reduction of vascular supporting tissue

Some elderly individuals, even if they are healthy, can suffer from senile purpura due to reductions in vascular supporting tissues and are subject to gingival bleeding.

(Masako Tsukagoshi)

91. Handling gingival bleeding at the time of oral care

1. Causes of bleeding

1) Local

① The major cause of gingival bleeding is inflammatory disease (marginal periodontitis). Even slight irritation can cause bleeding when gingival inflammation is present, due to the abundant capillaries in this tissue. Clinical observations in gingival inflammation include not only easy bleeding, but also redness and swelling.

② Bleeding is stimulated by malignancy (particularly gingival carcinoma) (Photo. 1).

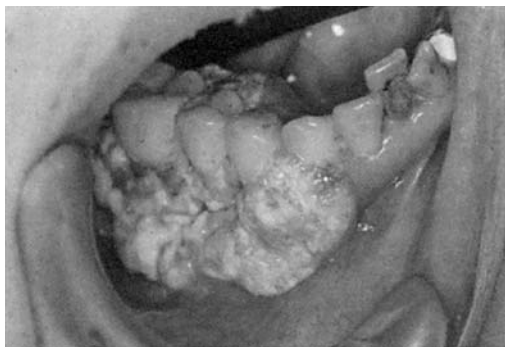


Photo. 1 Gingival carcinoma

2) General

Presence of hemorrhagic diathesis (bleeding tendency)

(1) Diseases with bleeding tendency due to hemostatic disorders

Photo. 2
Gingival bleeding (acute myelocytic leukemia)

Diabetes (due to increased fragility of vascular walls); vitamin C deficiency (increased capillary permeability); idiopathic thrombocytopenic purpura (ITP); decreased number of platelets; anaplastic anemia; acute leukemia (Photo. 2); reduced platelet production; hepatic diseases such as liver cirrhosis, cancer of the liver, etc., vitamin K deficiency (decreased blood coagulation factors); hemophilia (coagulation factor deficiency caused by congenital disorder), etc.

(2) Side-effects of medications: pharmacological destruction of hemostasis

Medications administered to patients with heart disease (myocardial infarction, atrial fibrillation, valvular disease, heart valve replacement, etc.), cerebral circulatory disturbance (brain infarction, etc.), thrombotic disease, dialysis, etc.

- Anticoagulants, such as warfarin (inhibition of vitamin K-dependent coagulation factors) and heparin
- Inhibitors of platelet aggregation, such as aspirin (Bayaspirin®), ticlopidine (Panaldine®), etc.

MEMO 1 Causes of bleeding tendency (abnormality of hemostatic mechanisms)

1. Vascular abnormality: increased permeability of capillaries; fragility of vascular walls
2. Platelet abnormality: low platelet count; abnormal platelet function
3. Abnormal coagulation: coagulation factor deficiency due to congenital or acquired causes
4. Abnormality of fibrinolytic system: fibrinogenolysis

2. Treatments to achieve hemostasis

Photo. 3 Pressure hemostasis with gauze

1) In patients with no disorder of hemostasis, bleeding from the marginal gingiva or gingival pocket caused by marginal periodontitis normally stops spontaneously, but recurs easily with slight stimulation. With oral bleeding, the volume of blood loss may be exaggerated by the blood mixing with saliva. Blood should therefore be wiped away with gauze and the bleeding site checked.
2) If spontaneous resolution of bleeding appears unlikely, pressure hemostasis should be initiated using gauze (Photo. 3). Pressure is placed at the bleeding site toward the bone using gauze after confirming the bleeding site. The caregiver should supply the pressure using their fingers. If the cause is inflammatory disease such as marginal periodontitis, bleeding may be stopped by applying firm pressure. However, attention must be paid to gingival injury and whether more bleeding might result if pressure is applied to the bleeding site at random. Supplying pressure on the bleeding site with gauze dipped in 3% H_2O_2 (hydrogen peroxide) is sometimes useful for achieving hemostasis.
3) If bleeding cannot be stopped even with pressure using gauze for about 10 minutes, a physician should be contacted immediately while continuing to maintain pressure on the bleeding site.

3. Attention at the time of oral care

1) Oral care must be performed after obtaining information about medical history and prescriptions (drugs, dosage) from the clinical records, attending physician and family.
2) The attending physician or dentist should also be informed when an intraoral lesion is identified.
3) For patients with hemorrhagic diathesis, more bleeding may result if oral care is neglected out of fear of causing bleeding. Cleaning of the tongue and mucous membranes with a soft toothbrush, sponge brush soaked with mouthwash or disinfectant, and gauze or cotton is therefore important. In addition, when such a patient displays oral dryness, risk of bleeding is increased due to cracking of the oral mucosa. Oral care using a moisturizer should thus be considered. For these reasons, patients with hemorrhagic diathesis should consult with a dentist or dental hygienist regarding methods of oral care, including tools for use in oral care, and regular oral care by a professional is warranted.

(Yoshiya Ueyama)

92. Post-extraction care

1. Extraction

Tooth extraction is the most common surgery in dentistry. Teeth are usually extracted when the damage to the tooth matrix is too extensive to repair, specifically in the following cases: decay of the crown by caries; serious looseness of the tooth; and serious periapical disease. Extraction is also performed when an impacted tooth is causing pericoronitis, caries or malalignment; as well as in orthodontic treatment. The standard procedure involves extraction using forceps, in which the dentist grasps and loosens the tooth crown with forceps, using a dental elevator to help with loosening. Post-extraction insult may not be very serious in these procedures. In cases of impacted or severely decayed teeth, or adhesion of the tooth root to the underlying bone, extraction can require an incision into the gum and periosteum, removal of bone tissue or splitting of the tooth into multiple pieces. Such additional procedures may prolong surgery, resulting in severe pain and swelling after the procedure.

2. Post-extraction instruction

After extraction, the wound can heal smoothly by minimizing post-surgery complications such as swelling, pain, and bleeding. Following the instructions described below will help to optimize the results of healing.

Instructions

1) For the first 24 hours after extraction, the patient should refrain from strenuous exercise, taking a bath (quick showers are recommended instead) and alcoholic drinks. These can all cause capillary dilation that may lead to swelling, pain and bleeding.
2) Sufficient rest is important: avoid intense work or long-distance travel.
3) Take medications as directed. If any abnormalities (rash, nausea, diarrhea or stomachache) are noted, the patient should contact the dentist as soon as possible.

3. Post-extraction oral care

1) Bleeding

After extraction, the patient should bite firmly on a gauze pad placed on the extraction site to stop bleeding. Bleeding normally begins to subside in about 30-60 minutes. Refrain from excessively rinsing the mouth or touching the extraction site, as these activities can disrupt blood clotting and cause recurrent bleeding. If bleeding occurs again, place clean gauze or cotton on the extraction site and bite down firmly for about 30 minutes. Use of a tea bag with gauze or cotton can be helpful.

In some cases, minor bleeding may last until the next morning (e.g., small amounts of blood mixed with saliva). It is normal for some blood to ooze from the area of surgery.

However, if bleeding is severe enough to fill the mouth even after maintaining firm pressure on the extraction site, the dentist should be contacted. When seeing the dentist, bringing all the gauze and tissue used at home to control bleeding can help the dentist to determine the amount of blood loss. In the event of a sinus communication, extracting a maxillary molar can cause nosebleeds. This bleeding usually stops without treatment. Placing pressure on the extraction site, such as by blowing nose violently, can cause bleeding and should be avoided.

2) Swelling and pain

Post-extraction swelling and pain is normal. If the surgery involves incision of the gum or periosteum,

bleeding and pain are likely to be increased. In such cases, application of a cold towel to the outside of the face in the swollen area can help to reduce pain and swelling. However, avoid cooling down the area too rapidly with ice bags or ICE-NON, as excessive decreases in blood flow can slow the healing process or increase the risk of infections.

Analgesics should be taken as directed by the dentist. Pain medicine may be more effective if taken before the onset of pain rather than after.

3) Others

Food should only be eaten after numbness has resolved, as eating while local anesthesia is in effect may result in the patient biting their tongue, lips or cheek without noticing and cause substantial damage to these structures (children should be watched particularly carefully). When eating is resumed, start with soft foods and avoid spicy or hard foods.

Smoking can inhibit normal blood flow and thus delay healing and increase the risk of infections, and should therefore be avoided.

(Mitsuyoshi Iino)

IX *Xerostomia*

93. Saliva

1. What is saliva?

Saliva is secreted from 3 pairs of major salivary glands (parotid, submandibular and sublingual glands), and numerous minor salivary glands in the fibrous connective tissue or muscle layer of the oral mucosa (labial, buccal, palatine, Carmolt's and lingual glands). Saliva is crucial for proper function of the oral cavity. Salivary glands usually include 3 types of glands: serosanguinous glands (mainly the parotid grand) that secrete fluid containing amylase; myxoid glands (some of the palatine minor salivary glands) that secrete fluid containing mucin; and complex glands that secrete fluid containing both serosanguineous and myxoid components (mainly the submandibular and sublingual glands, and some of the minor salivary glands, such as the labial and buccal glands).

The parotid gland is the largest salivary gland, secreting saliva through Stensen's duct exiting at the parotid papilla in the buccal mucosa. The submandibular gland is the second-largest salivary gland, secreting saliva from the sublingual caruncles through Wharton's duct. The sublingual gland is the smallest of the major salivary glands, secreting saliva via numerous ducts of Rivinus, the largest of which merges with Wharton's duct from the sublingual gland and opens at the sublingual caruncles. The remainder open into the oral cavity along the plica sublingualis on either side of the lingual frenulum.

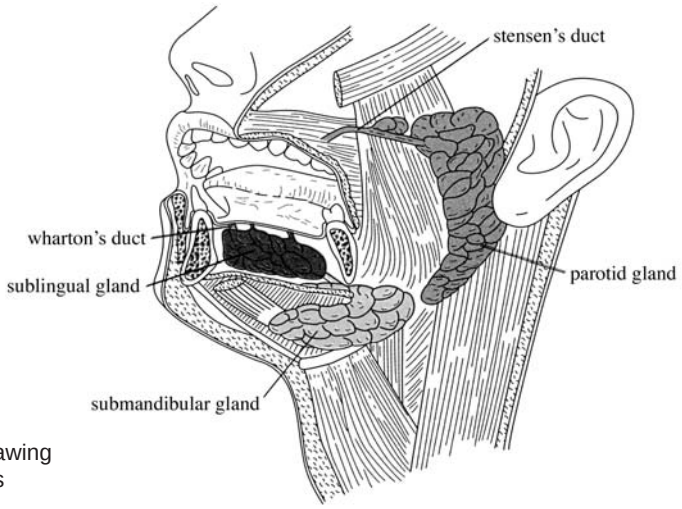


Fig. 1
Anatomical drawing
salivary glands

2. Secretory mechanisms for saliva

Saliva secretion is controlled autonomically, by both the sympathetic and parasympathetic nervous systems. Neurotransmitters facilitating secretion are mainly noradrenalin released from sympathetic nerves and acetylcholine released from parasympathetic nerves. About 1,000-1,500 ml/day of saliva is secreted from the average adult and 60-70% of this is from the submandibular glands. Another 20-30% is from the parotid glands, with 3-5% from the sublingual glands and the remaining 5% from the minor salivary glands. Two kinds of saliva are produced: resting (intrinsic) saliva, continuously secreted without any extrinsic stimulation; and stimulatory (reflex) saliva, secreted in response to stimuli such as chewing, tastes and smells. The quantity of saliva secreted from the major salivary glands, particularly the parotid gland, is significantly increased by such stimuli.

3. Composition of saliva (MEMO 1)

Saliva secreted from all salivary glands into the oral cavity is called whole saliva. The specific gravity is 1.000-1.008, pH is 6.2-7.6, and more than 99% of saliva is water, with the remaining 1% containing organic components such as amylase, lysozyme, lactoferrin, mucin, immunoglobulins (mainly secretory immunoglobulin A) and several hormones, and mineral components such as Na^+, K^+, Ca^{2+}, Cl^-, bicarbonate ions, and phosphate ions. Indigenous bacteria in the oral cavity, exfoliated epithelial cells from the oral mucosa and white cells also become mixed in with saliva.

MEMO 1 Components of saliva

1. Water (99%)
2. Organic components
   Amylase, albumin, catalase, lysozyme, peroxidase, lactoferrin, cystatin, histatin, mucin, glycoproteins, immunoglobulins (mainly secretory immunoglobulin A), defencin, urate, urea, lipids, vitamins, ascorbic acid, hormones (mainly nerve growth factor, epidermal growth factor, kallikrein, and rennin).
3. Inorganic components (Na^+, Ca^{2+}, Mg^+)

4. Function of saliva (MEMO 2)

Saliva plays various roles in the mouth. Physical functions include acting as a humectant, providing mechanical cleansing, and providing protection. Chemical functions include digestion, gustation (taste), acting as a chemical buffer, and inhibiting decalcification and promoting recalcification of teeth. Biological effects include anti-bacterial, antifungal and antiviral activity, excretion, and wound healing. Decreased flow of saliva can cause those reduce or inactivate such functions and effects, increasing the risk of several pathological conditions. In other words, saliva plays important roles in general defense mechanisms and homeostasis, not only for the oral cavity.

MEMO 2 Salivary function and main mechanism

1. Physical function
   ① Humectancy: Keeping humectancy with water
   ② Lubrication: Lubrication of mastication and swallowing and articulation with water and mucin
   ③ Cleanse: Cleanse of food residual
   ④ Protection: Protection of tooth and mucosa with water and mucin

2. Chemical function
   ① Digestion: Starch degradation with amylase
   ② Taste: Dissolution and solvent of tastants in foods.
   ③ Buffer: neutralization of acid and alkali with bicarbonate and phosphate, thermo palliation of ingestion
   ④ Inhibition of decalcification: facilitation of recalcification

3. Biological function
   ① Antibacterial, antifungi or antivirus: action by lysozyme, peroxidase, lactoferrin, cystatin, histatin, immunoglobulin, defencin
   ② Excretion: excretion of body components
   ③ Wound healing: action by epidermal growth factor and nerve growth factor

5. Relationships between diseases and dryness of the mouth

Dry mouth is caused by a decrease in or lack of saliva. The causes can be classified as: “salivary gland dysfunction”; “neurogenic or neuropsychiatric disorders and drugs”; and “systemic diseases or metabolic disorders”(MEMO 3). With any of these causes, chronic or continuous cases show clinical problems.

The typical example of salivary gland dysfunction is Sjögren’s syndrome. Other salivary gland disorders caused by exposure to radiation (typically as radiotherapy) and aging are also clinically important. This may occur with graft-versus-host disease (GVHD) after hematopoietic stem cell transplantation, sarcoidosis, acquired immunodeficiency syndrome (AIDS), malignant lymphoma, sialadenitis, sialolithiasis, salivary gland tumor, and extirpation of salivary gland tumors. Neurogenic or neuropsychiatric disorders include depression and disease caused from stress, and drugs include anxiolytic drugs, antidepressants and antihypertensive drugs. Neurogenic or neuropsychiatric disorders and drugs are thought to inhabit the central nervous system and superior salivatory nucleus of the facial nerve, thus decreasing saliva production. Systemic diseases and metabolic disorders include diabetes, nephropathy, anemia, and excessive oral vaporization.

MEMO 3 Classification of xerostomia

(1) Xerostomia caused by salivary gland dysfunction
1) Sjögren’s syndrome
2) Radiation-induced xerostomia
3) Xerostomia associated with aging
4) Graft-versus-host disease (GVHD)
5) Sarcoidosis
6) Acquired immunodefficiency syndrome (AIDS)
7) Malignant lymphoma
8) Idiopathic xerostomia

(2) Xerostomia associated with neurogenic or neuropsychiatric disorders and drugs
1) Xerostomia associated with neurogenic or neuropsychiatric disorders
- Psychiatric symptom of fear, excitation, stress, neurosis, depression, hysteria
- Central lesion such as encephalitis, brain tumor, brain injury
- Disorder of salivatory nucleus on the facial nerve and secretary brunch of facial nerve

2) Drug-induced xerostomia
Psychotropic drug, antianxiety drug, antidepressant drug, anticholinergiccal spastic drug, antihistamine, antihypertensive drug, diuretic drug, etc.

(3) Xerostomia associated with systemic diseases or metabolic disorders
1) Xerostomia associated with systemic and metabolic diseases
- Febrile infection, hyperhydrosis, dehydration, diarrhea, diabetes insipidus
- Diabetes, hyperthyroidism
- Heart failure, renal dysfunction, uremia
- Pernicious anemia, iron-deficiency anemia
- Intake of excess alcohol, smoking

2) Xerostomia induced by excessive oral vaporization
- Hyperpnea, mouth breathing, rhinitis, sinusitis
- Eating and swallowing difficulties

(Seiji Nakamura)

94. The measure for preventing from dryness of intraoral and lips

1. Removal of causes of dryness

It is an era of an aging and/or a high-prevalence population, there are many those who complain of thirst resulting from side effects of various physical diseases and medicines. For example, polyuria caused by diabetes, chronic renal failure and cirrhosis etc. often results in thirst. And also, antihypertensive, antihistamine, antidepressant, sleep-inducing medication and drugs for urinary incontinence have a side effect of thirst, but those are taken frequently. About one thousand kinds of drugs have a side effect causing thirst. But, it is impossible to stop taking or alter drugs in fact. Accordingly, the actual measures for removal of causes of dryness will be described here.

1) An increase of indoor humidity

It is efficient to moisten a room moderately for prevention from water-evaporation in oral cavity and lips. The most appropriate humidity is from forty to sixty percent. If ventilation alone is not sufficient, the use of a humidifier should be taken into consideration. On top of that the air is dry especially in the winter, it tends to get so dry inside because of the heater use that extra care must be taken.

2) An decrease of temperature in oral cavity

Without having a fever, patients sometimes aware a feeling of feverishness in oral cavity. In that case, taking a ship of cold water or an ice makes intraoral temperature down and prevents from dryness.

3) A use of mask

Even if salivation is within normal range, mouth breathing easily dries oral mucosa. In this case, wearing a mask should be directed. As a consequence, they always open their mouth in especially the elderly because of their mascular weakness of masticatory muscles, their mouths are inclined to be dried. If so, muscle function therapy also should be considered.

To cover lips with a wet gauze is useful for prevention lips from getting dried. Protection with lip balm, glycerin and Vaseline® is important as well.

4) refrainment from intake of stimulants

Excessive intake of salt and spices results in thirst. To put it concretely, coffee, tea and green tea, which contains much caffeine, needs to be with caution for overtaking. Because alcohol and nicotine has high diuretic effect, also drinking alcohol and/or smoking must be paid attention to.

2. Facilitation of salivation

Saliva gets secreted when physical stimuli such as mastication or stimuli due to taste occur. Though hyposalivation resulting from ageing or influences of complications is not avoidable, these stimuli enable to facilitate saliva secretion.

1) A mastication and taste

When foods, need to be chewed a lot or with taste, are taken, the salivation reflexively increases. If the meal is taken slowly, well chewed, the secretion is more facilitated. On the other hand, dried sour plums, lemons and vinegared dishes facilitate salivation by stimuli due to tastes. Chewing gums is effective for facilitation in saliva secretion through stimuli of mastication and taste.

During tube feeding, there are little stimuli toward oral cavity. If duration of tube feeding is extended, disuse syndrome occurs, resulting in more reduction of secretion. Therefore ingestion should be encouraged for the patients with feeding tubes, if it is possible.

2) A rehabilitation of oral function

Active oral gymnastics (massage on lips and mucosa of cheeks) and/or massage on salivary gland should be recommended. However, thermal massage needs to be directed, because cold massage conversely reduces amount of saliva.

3) A use of medicine

Some drugs facilitate salivation. If a medication is chosen in compliance with clinical symptoms, it is effective for dry mouth and hyposalivation syndrome. For example, Saligren®, Evoxac® and Velviten® are used for Sjögren's syndrome. Chinese herbal medicine, such as Byakkokaninjintou or Jiinkoukatou is also sometimes chosen. For use, diagnose by a specialist is required.

Glossary:

Oral gymnastics: such as a labial training, a lingual training and a cheek stretching exercise. In a labial training, orbicularis oris muscle and labial glands get stimulated. Take and stretch the lip with pulps of the thumb and the forefinger. Maintain the lip stretched for more than ten seconds, and then keep the lip shrunk for ten seconds or more. Repeat this a few times. In a lingual training, movements, for example, anteroposterior exercise, licking an angle of mouth, protrusion, lateral exercise and fluctuating systematically contained. When a patient cannot practice by him/herself, an operator conducts these exercises, holding the tongue with gauze.

3. External water supply

1) Water intake

The presence of dehydration, fever or sweating needs to be confirmed. When dryness of mouth is severe, enough water must be supplied. From 2 to 2.5 litters of water a day is required for adults in general. Though water intake is important, overhydration imposes such a burden on the heart and the kidney that consultation to a medical doctor in regard to amount of water taken is necessary in a patient whose renal function or heart function declines. When with ordinary meals, about between 0.8 and 1.3 litters of water intake may be the standard.

2) Gargle

Repetition of gargling keeps oral cavity moist. Caution is necessary when using a gargle solution. For prescription drugs, the gargles (ex. Hachiazule®) that contain sodium bicarbonate should be chosen. Because Isodine gargle® and Listerine® include alcohol and have dehydration effect, they conversely take water and facilitate dryness in oral mucosa. Because of combination with sodium hyaluronate in mouthwash which combined with humectant (ex. Kinusui® or Oralwet®), they moisten mucosa. For a refreshment, a gargle solution such as biotèn® MOUTHWASH includes flavor may be chosen. When it should be protected, because oral mucosa is rough, humectant jelly, Oralbalance® is most suitable. When a patient cannot gargle, artificial saliva is efficient. Although the artificial saliva, Saliveht®, is less efficient in humectation, it suits for a substitution therapy and improves oral dryness. Direct spray on mouth keeps oral humectation.

(Masaru Miyata)

95. The correspondence of a palate caked with expectoration

1. Sputum is caked on the palate

Sputum is the expectoration of increased airway humor and as such results in the secretion and exudation of blood plasma from the airway secretion cells when the airway descends into a clinical state, sputum on the palate is usually caked with saliva, blood, plaque and food residue etc. We consider that sputum adheres to palate as a result of intra-oral uncleanliness and dryness (Photo. 1). The factors causing intra-oral uncleanliness are typically poor cleansing due to lingual dyskinesia, and stagnation of sputum, saliva and blood due to dysphagia and enteral tube feeding. Although the causes of intra-oral dryness vary, above all, breathing primarily through the mouth is the most frequent cause.

Photo. 1 Sputum adhering to palate

2. Oral cavity care of the expectoration caked on the palate

Intra-oral moistness is important to remove sputum caked on the palate. If intra-oral moistness is maintained by gargling, then the adhered sputum gradually falls off. However, many of these patients are bedridden or attached to a respirator, hence they cannot gargle. In such cases, the oral cavity care should follow the procedure below.

1) Desensitization

Desensitization enables the likelihood of over-response to be mitigated. Over-response is the abnormal response of sensory/motor system to stimuli. Even if the patients' conscious condition is not clear, irritation around the oral cavity may remain in many cases. Accordingly, testing the sensitivity around the oral cavity instead of sudden intra-oral contact is recommended (Photo. 2).

Photo. 2 Desensitization

2) Massage

In regard to the parotid gland, it is recommended that the cheeks should be massaged from the outside for the purpose of stimulating saliva secretion. Second, massage the gums, inserting fingers.

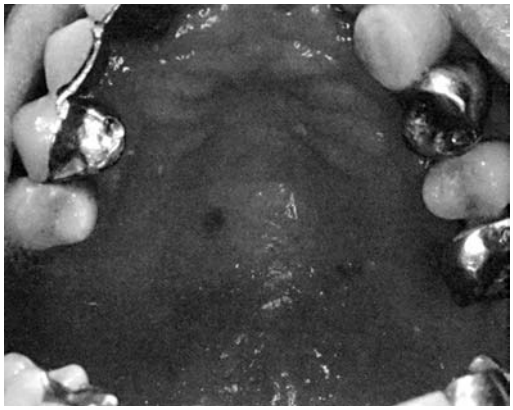


Photo. 3 Palate after Oral Care

3) Intra-oral moistness

Because the lips are commonly also dry, Vaseline application to lips may be recommended. A watered sponge brush is used to moisten a palate caked with sputum. Solutions such as mouthwash or glycerin containing humectant ingredients, not water, can be used.

4) Removal and cleansing of the oral cavity

If intra-oral moistness is maintained, instrumental removal of the sputum with a toothbrush or a sponge brush is effective. However, to avoid bleeding caused by exfoliation of a part of mucosa caked with sputum, removal should not be forceful. In cases where a caregiver is not present, it is recommended to alter between removal and cleansing, washing with water and suction after moderate removal. In cases where a caregiver is present, the caregiver should cleanse with water and suction while removal is carried out. In a patient connected to a respirator, a nurse or a dental hygienist should administer the procedure such as suction and holding the respirator tube.

In cases where the sputum cannot be removed by the means outlined above, use of a solution dissolving polysaccharidase (ex. Elase) in physiologic saline for an instrumental removal is effective. At our hospital, we make an Elase gargling solution, combining four bottles of Elase, 6.0g of MAZULENIN gargle powder, 8ml of 4% xylocaine and 500ml of purified water, and scour sputum off with a sponge brush soaked in the Elase gargle solution.

5) Humectation

After removal and cleansing, moisten the oral cavity using a intra-oral humectant (ex. FIT ENGEL).

(Tsuyoshi Sato, Tetsuya Yoda)

96. Artificial saliva

Artificial saliva is used to substitute saliva when the act of mastication, swallowing and communication was distracted by xerostomia due to impaired secretion of saliva. The artificial saliva is used to prevent atrophy and dryness by providing moisture to oral mucosa and to keep the oral function such as mastication, sense of taste, swallowing, and communication normal. There are gel types and aerosol types. In general, the use of aerosol type is more common as it is easy and convenient.

In Japan, the potassium hydrogenphosphate/inorganic salt air spray (Salivate), which is the aerosol spray type of artificial saliva, is often used (Photo. 1). Salivate is suggested to prevent dryness of the epithelial cells of oral mucosa and maintain normal cell functions1). Currently, it is sold as a "medicinal drug" in Japan. It works for the Sjögren's syndrome which is an autoimmune disorder, xerostomia, and the xerostomia caused by salivary gland disorder as a result of radiation therapy to the head and neck area (The Sjören's syndrome is common among women. It destroys the exocrine glands that produce saliva; thus it dramatically reduces the secretion of saliva and tears and causes dryness of mouth and eyes).

The artificial saliva is a clear and colorless liquid, has almost no smell, and has a slight sweetness. One can (50 g) contains 42.2 mg of sodium chloride, 60.0 mg of potassium chloride, 7.3 mg of calcium chloride, 2.6 mg of magnesium chloride, and 17.1 mg of dipotassium phosphate. These are the inorganic constituents similar to saliva. In addition to these main constituents, D-sorbitol to add sweetness, carboxymethyl cellulose to increase viscosity, and sodium benzoate and sorbic acid as preserving agents are included in the artificial saliva.

Normally, a person sprays for 1 to 2 seconds per application. The amount of spray per application (for 1 to 2 seconds) is approximately 1 mL (approximately 1 g). It should be used for 4 to 5 times per day, although the amount will be adjusted depending on the symptoms. It requires attention to the following; the can should be well shaken before use, and the can should be held vertically when being used. As mentioned above, its inorganic electrolyte components and physical properties are adjusted to almost match with the normal saliva of a healthy person. Therefore, it can be used for long term.

However, the administration of the artificial saliva should be stopped when the patients have symptoms such as rash, pruritus, nausea, taste change, sense of abdominal fullness, sense of abdominal discomfort, borborygmus, oral pain, and sense of discomfort in the throat. In such a case, the patients need to receive appropriate treatment at a medical institution. The reported major side-effects include nausea (including feeling of sickness and upset stomach) 1.1%, taste change 0.5%, and sense of abdominal fullness 0.4%. However, no changes in the clinical laboratory values were observed. When handling, attention should be given to maintaining the storage temperature (room temperature). It should not be kept for a long time in the place which can be over 40 Celsius.

Photo. 1 Salivate

Currently, there is no artificial saliva that has all saliva protein functions as normal saliva. Furthermore, artificial saliva does not have a great effect in improving the oral dryness condition of the severe xerostomia patients. In anticipation for the increase in the number of xerostomia patients as the population grows older, there is a high demand for the development of more effectively moisturizing artificial saliva. The hyaluronate sodium is receiving attention as a highly moisturizing component. It is hoped that new artificial saliva will be developed based on this component.

(Hajime Sunakawa, Akira Arasaki)

97. Dry mouth and oral care

It is required that various related symptoms are evaluated as well, because dry mouth results from not only reduction in saliva secretion but also decline in oral function. Because except dry mouth, symptoms such as stickiness of saliva, oral discomfort due to reduction in saliva secretion, glossodynia and pain in intraoral mucosa, denture inconformity or pain, the high frequency of denture ulcer, aphthous stomatitis and mucosal ulcer, mastication disorder, dysphagia, taste disturbance, and articulation disorder easily occur, among of all, the frail elderly with difficulties in communication must be observed with attention.

1. Saliva secretion and intraoral care

In oral care, it is important to focus saliva secretion at rest. Because the oral circumstance easily worsen, if saliva secretion at rest declines, even though saliva secretion at mastication is normal. Saliva secretion from submandibular gland is quantitatively most of all. In regard to quality of saliva, serosanguineous in parotid gland, mucinous in sublingual gland and mixed in submandibular gland, and thus viscidity of saliva tends to increase when saliva secretion at rest declines. Then the self-cleansing action of oral cavity tends to decline.

Because those frails cannot carry out either chewing-gum method or spitting method in evaluation of dry mouth, classification through clinical diagnostic criteria, saliva wetness tester and cotton roll method are useful. Caring plans according to the results of evaluation need to be chosen (Table 1).

Table 1 Clinical diagnostic criteria and oral care

clinical diagnostic criteria	symptoms and finding	main oral care method
degree 0 (normal) neither	intraoral dryness or facilitation in viscidity of saliva	no need in principle
degree 1 (mild)	facilitation in viscidity of saliva, slight reduction in amount of saliva. Saliva strings.	If symptoms, needs care.
degree 2 (moderate)	extremely few saliva. Recognizable small bubbles	salivary gland massage + oral care
degree 3 (severe)	no saliva on mucosa of tongue.	Positive humectation

2. Intraoral mucosa humectation

When there is a pain in tongue or oral mucosa caused by dry mouth, intraoral mucosa humectation is required. Because in especially the frail elderly, dried epithelium of intraoral mucosa is easy to be abraded by keratinization, abrasion epithelium membrane is often observed. Although it is apt to confuse those with sputum when abrasion epithelium membrane is adhered to palate mucosa, those will become not to be occurred resulting from intraoral mucosa humectation, because most of them is dried epithelium component of intraoral mucosa.

Mucosa humectation should be recommended for dry mouth care, using mouthwash such as Kinusui? or Oralwet? which humectant is combined. Sprays or application with sponge brush of mouthwash is effective. When dry mouth results from mouth breathing, to cover thinly moisten oral mucosa with jelly-products which are highly preventive in evaporation, such as Oralbalance?, is effective. Since dried mucosa is sensitive, it should be considered to consult to a dentist, when there is a sharp edge of denture or tooth. Because discomfort occurring from denture usually increases when oral mucosa or residual ridge is dried, humectation on sides of denture toward mucosa by mouthwash combined with humectant.

3. Correspondence to oral dysfunction

In normal oral function, humectation in oral mucosa is essential. However, humectation in mucosa with saliva becomes insufficient in patients with dry mouth, it is more frequent to choke and aspiration, because of limited smooth movement. When either mastication disorder or dysphagia related to dry mouth is recognized, oral care with oral humectant is of use. Application on mucosa using a sponge brush or a spray is effective.

In case of dry mouth, oral care before meal is effective in order to prevent from difficulties of oral function or swallowing. Oral care aiming mucosal humectation is clinically beneficial.

The oral care for a bedridden elderly, intraoral humectation is quite important as well as cleanse in oral cavity. When they take a medicine with side-effect causing reduction of saliva secretion, humectation is especially considered. Since communication often becomes difficult resulting from speech disturbance due to dry mouth, oral care of oral mucosa with sponge brush soaked with such as Kinusui? may be conducted. In this kind of case, regular humectation every two to four hours is effective.

In oral care for especially those who are bedridden among of all patients with dry mouth, water is not used in principle. The efficacy of oral mucosa humectation is little, and it is possible that an inflow of water may cause choking or aspiration, if the patient has difficulty in swallowing saliva. It is favorable to use humectant contains high-polymer hyaluronic acid (ex. Kinusui?) in patients with severe dry mouth. It has affinity with intraoral mucosa and does not flow on mucosa, so that oral care can be carried out comparably safely. When water is nevertheless used, it is important to securely suction water simultaneously.

4. An improvement of dry mouth by sound wave toothbrush

Efficacy of a massage to cheek and mucosa of tongue thorough vibration of sound wave toothbrush improves degree of moistness on mucosa of tongue has been recognized. It is conceivable that appropriate stimuli are effective for dry mouth. Thus, it is thought that this is one of the methods that should be applied to oral care for dry mouth.

5. Correspondence to dry mouth

Although water replenishment is common for dry mouth, it is sometimes not very effective in chronic symptoms. In this circumstance, micturition resulting from exceeding water intake often disturbs sleep at night reversely. This leads to intake of sleeping medicine, worsening dry mouth. If symptoms such as denture inconformity exist, positive mucosal humectation does decrease pain and wound caused by denture. If lingual papillae atrophy and become flat, they cannot retain water, even though secretion of saliva improves. As a consequence, patients are tend to complain of dryness of mucosa of tongue, oral care in order to adjust oral environment such as oral mucosa or saliva condition as well as cleanse is important.

(Yasuaki Kakinoki)

98. Oral care for people whose mouth and lips are easily cracked

When performing oral care, it is necessary to look inside one's mouth and to insert a cleaning device into one's mouth. Both actions require the mouth to be opened. Opening the mouth sometimes causes cracks to form on the lips and mouth. These cracks can cause bleeding and pain. This situation can make oral care very difficult. Furthermore, people with dentures can have difficulties wearing them if their lips and mouth are cracked.

1. Causes for the cracking of lips and mouth

The causes for the cracking of lips and mouth are varied and complicated. There are also many unknown causes. Table 1 shows major lesions that display symptoms on the lips and mouth.

Common to all of these lesions is the dryness of the lips. Licking and wetting dry lips can prolong the recovery of a lesion, and can sometimes make the symptoms worse. The easiest and most effective way to handle dryness is to apply lip balm or petrolatum. This method is also inexpensive.

Table 1 Major lesions that display symptoms on the lips and mouth

Lesions of lips and mouth	Granulomatous cheilitis		Viral infectious diseases	Oral (simplex) herpes
	Desquamative cheilitis			Herpetic gingivostomatitis
	Contact cheilitis			Herpes zoster
	Congenital lower lip fistula			Herpangina
	Angular stomatitis			Hand-foot-and-mouth disease
	Mucocele			Measles
Blistering diseases	Pemphigus	Pemphigus vulgaris		
		Pemphigus vegetans		
	Pemphigoid	Bullous pemphigoid		
		Benign mucous membrane pemphigoid		

2. The oral parts that are easily cracked

The corners of the mouth are the most easily cracked oral structures. The corners of the mouth can become moist, inflamed, blistered, ulcerated, or chapped. This condition tends to bleed and trigger pain. The nonspecific inflammatory disease is called angular cheilitis. There are several factors contributing to the formation of angular chelitis including bacterial infection, characteristics of saliva, and salivation rate. Increased number and depth of wrinkles around the corners of the mouth among old people, who experience lower dental articulation due to loss of teeth, can also be a reason for angular cheilitis. Other physical reasons include Vitamin B deficiency, diabetes, and iron-deficiency anemia.

Many elderly people wear dentures. If the dentures are improperly constructed or overly worn, then the vertical dimension of the denture is too low. If the vertical dimension is too low or inadequate, deep folds form at the corners of the mouth during articulation. These folds remain moist and promote bacterial growth, infection and chapping. Painful cracking of the skin in the folds can result. It is important that a denture fit properly to avoid such circumstances

Another cause of angular cheilitis is the infection by microorganisms, including bacterium (e.g. staphylococci), virus (e.g. herpes simplex), and mycosis (e.g. Candida).

If it is caused by microorganisms or mycete, antimicrobial drugs and antimycotic drugs, respectively, are known for effective treatment. The inappropriate use of antimicrobial drugs might increase the number of mycosis and the disease may become refractory. Therefore, they should be used carefully.

For symptomatic treatment, ointment containing adrenal cortical steroid is sometimes used. When the angular cheilitis is caused by Vitamin B deficiency, it is recommended that patients take necessary vitamin B2 and B6.

If the outbreak of the angular cheilitis is frequent and only treated by applying drugs, then the cure may be prolonged or the symptoms may worsen. The key to the treatment is to keep the diseased area clean. It is recommended to rub the diseased area with 3% Isodine or 20-fold diluted oxydol. Particular attention is needed if bleeding does not stop, the diseased part is swollen, or inflammatory effusion occurs. In rare cases, angular chelitis may be caused by an underlying systemic illness. In such cases a person needs to see dermatologist.

(Shinsuke Sadamori, Taizo Hamada)

X *Eating and deglutition disorders*

99. Eating and swallowing disorders

1. Eating and swallowing

Eating refers to both eating food and drinking, and swallowing (deglutition) involves the action of moving the ingested material out of the oral cavity and toward the stomach.

Dysphagia represents a disruption to this flow of ingested material from the mouth into the esophagus and toward the stomach. The processes of swallowing can be classified into five phases (Table 1).

Table 1 Eating and Swallowing Process

1	Anticipatory Stage	Judgment to witch and how to eat
2	Preparatory Stage	Chewing food and forming bolus
3	Oral Stage	Sending bolus from oral cavity to pharynx
4	Pharyngeal Stage	Sending bolus from pharynx to esophagus
5	Esophageal Stage	Sending bolus from esophagus to stomach

Major anatomical structures associated with swallowing are shown in Fig. 1. A schematic view of the shift of ingested material from the initial (cognitive) phase to the esophageal phase is shown in Fig. 2.

A series from the oral phase to the esophageal phase with going through the pharyngeal phase is swallowing. This motion is very rapid, with passage from the pharynx to the esophagus occurring within approximately 1 second in normal humans. The mandibular and maxillary dental arches are closely engaged during this phase. In addition, respiration is suspended for a short time (Deglutitive apnea).

1) The initial phase (cognitive phase)

Eating starts with cognizing foods at the initial phase (cognitive phase), and follows to use lips and tongue to take foods into mouth.

2) Seedtime (chewing phase)

Food and saliva are mixed and chewed, facilitating swallowing

Missing teeth and periodontal disease can affect this stage and influence swallowing function as a whole.

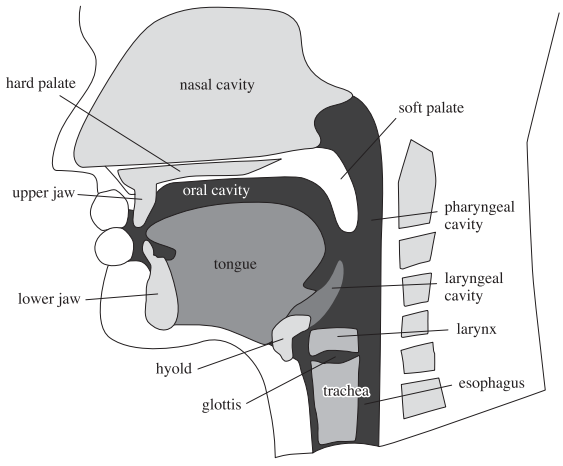


Fig. 1

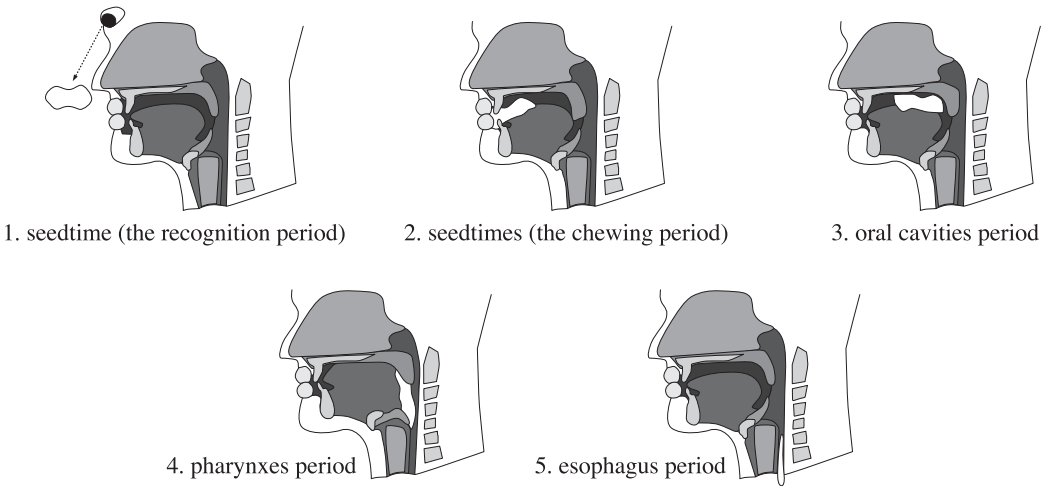


Fig. 2 Change of deglutition and the ingesta

The tip of the tongue is pressed behind the upper incisors or at the front region of the hard palate, and the edges of the dorsum of the tongue are pressed against the molar teeth and mucous membranes of the palate, allowing the tongue to push the food bolus toward the back of the mouth.

3) Oral phase

The tongue carries food to the back of the mouth to initiate the swallowing reflex. This action is under consciouscontrol.

4) Pharyngeal phase

Sending food from thepharynx to the esophagus involves the rapid coordination of numerous muscles. Dysphagia most often arises as a problem in this stage.

5) Esophageal phase

The esophageal sphincter is completely closed so that food does not enter the trachea and is instead carried by muscle contraction to the opening of the stomach.

The epiglottis and soft palate return to their original positions and the respiratory route from the trachea to the nasal cavity is reopened.

2. Causes of eating disorders and dysphagia

Diseases causing eating disorders and dysphagia can be categorized into three types.

1) Pathological causes

Structural problems disturbing the passage of food.

2) Functional causes

Passage of food is disrupted by disorders with the musculature allowing movement of the food bolus. Examples: cerebro-vascular disorder; neuro-muscular disorders; aging.

3) Psychological causes

Seen in patients who demonstrate an inability to eat or swallow, but who show no abnormalities on physical or neurological examination.

Table 2 shows details of potential causes.

Table 2 The causes of thedysphagia

Pathological Causes	・Glossitis, stomatitis, periodontal disease ・Tonsillitis, peritonsillar abscess, pharyngitis, laryngitis ・Oral / pharyngeal tumor (oral / tongue cancer, maxillary cancer, pharyngeal cancer), trauma ・After surgical operation in oral cavity and pharyngeal, and external injury ・Esophagitis esophageal ulcer ・Esophageal stenosis and diverticulumo esophageal ・Others
Functional Causes	・Cerebro-vascular disorder, Brain tumor, Traumatic cerebral damage ・Cerebral infantile palsy, Intellectual impairment (e.g., Down's syndrome), Motor development impairment ・Neuro-muscular disorders (Amyotrophic lateral sclerosis, Spinocerebellar degeneration, Parkinson disease, Muscular dystrophy, Myasthenia gravis, Striatonigral degeneration, Progressive supranuclear palsy) ・Multiple sclerosis ・Guillain-Barre syndrome, Diabetic peripheral neuritis ・Polymyositis ・Others, Aging
Psychological Causes	・Psychological anorexia ・Dementia, sitophobia ・Psychosomatic disease ・Hysteria, depression ・Others

3. Symptom of eating disorders and dysphagia (MEMO 1)

As patients and family members rarely report eating disorders ordysphagia, attention by other caregivers is required.

For example, the patient may aspirate material if they choke during a meal, and may show repeated coughing, pneumonia, fever and hoarseness.

Decreased appetite, dehydration and malnutrition may also be associated with eating disorders and dysphagia.

MEMO 1 Symptoms related todysphagia.

1. Important symptoms (medical history) need to suspect aspiration
   - ・Past diagnosis of aspiration
   - ・Repetition of pneumonia and fever
   - ・Cough and being choked after and during meal
   - ・Hoarseness after meal
2. Symptoms need to paying attention related to dysphagia
   - ・Dehydration (xerostomia, decrease of the urine flow)
   - ・Undernutrition (weight loss)
   - ・Sitophobia (the rejection of the fluid intake, the favorite change of the diet)
   - ・The change of the voice that sputum influenced
   - ・Meal time is longer than one hour
   - ・Cough while asleep

4. Aspiration

Aspiration of food or saliva may result in suffocation or aspiration pneumonitis. Among elderly individuals, aspiration is considered the leading cause of pneumonia (Table 3).

Aspiration does not always cause pneumonia in elderly individuals,with the frequency associated with oral cleanliness, depth and quantity of aspiration, acidity and type of the aspirate, and the immune function of the patient.

Symptoms that should raise suspicions of aspiration include coughing and choking at meals, but silent aspiration may occur in patients with a decreased cough reflex. Such a decrease in reflexes may be seen in about half of patients with eating disorders or dysphagia, and this possibility thus requires careful attention.

Generally, liquid is easier to be aspirated in comparison with pasty product, and the treatment required will vary according to the specific situation of aspiration.

Even if seriously ill patients are not ingesting much food or drink, aspiration of saliva remains possible. Maintaining oral hygiene thus remains important.

Table 3 Types and countermeasures of aspiration

Types of aspiration		Countermeasures
Chance Cause Aspiration	The patients sometimes aspirate with normal meal	・Adjustment to texture of food and drink (including addition of thickener) ・Aspiration prevention law, e.g. a device of the body posture while eat ・Direct deglutition training that actually take in food and drink, and indirect deglutition training that don't actually use them
Liquid Aspiration	The patients aspirate liquid frequently	・Adjustment to texture of food and drink (including addition of thickener) ・Aspiration prevention law, e.g. a device of the body posture while eat ・Direct and indirect deglutition training
Food Aspiration	The patients aspirate frequently even food and drink particularly controlled for patients with dysphagia	・Continuous or intermittent tube feeding is selected for restore moisture and nutrition ・Indirect deglutition training
Saliva Aspiration	The patients suspected to always aspirate saliva	・Continuous tube feeding such as gastric fistula ・Surgical operation such as surgery to isolate trachea and esophagus ・It is difficult even to indirect deglutition training

(Akitoshi Katsumata)

Glossary:

Pharyngeal shrinkage: The pharynx cavity becomes narrow and pharyngeal pressure increases by retrogression of the base of tongue and superior constrictor muscle of pharynx.
Hyoid and larynx elevation: A muscle on the hyoid shrinks, and hyoid moves to the ex-upper part, then a larynx goes up it to the top at the same time, and an esophageal entrance opens.
Tracheal choke: When bolus passes, epiglottis falls down downward and closes trachea with an aryepiglottic fold.

100. Oral care for patients with eating disorders/dysphagia

1. Eating disorders/dysphagia and oral care

The most common complication in patients with an eating disorder or dysphagia is aspiration pneumonitis. Causes of aspiration pneumonitis include cerebrovascular disorders, neuromuscular disorders, concomitant mental and physical disorders, and, particularly in the elderly, decreased immune function.

As the elderly often display multiple underlying diseases, resistance may be decreased, swallowing reflex may be delayed and the defense reaction of the cough reflex may be reduced.

Multiple infarcts result from the arteriosclerosis often seen with aging, making cerebral infarction common.

Even if bacterial pathogenicity is weak, pneumonia can result because swallowing function and the cough reflex are decreased due to vascular disorders affecting the part of the brain called the basal ganglia, and the increased presence of bacteria in the oral cavity and pharynx.

MEMO 1 Types of eating disorders and dysphagia associated with cerebral damage Bibliography

1. Unilateral cerebral damage

When the right or left side of the brain experiences bleeding or infarction resulting in unilateral injury to upper motor neurons, disorders will often appear in the contralateral lip or tongue. Disorders affecting the chewing phase and the oral cavity phase are characteristic of dysphagia. Intake of food is also affected by changes in functional ability of the lips, masticatory muscles, and tongue on the paralyzed side, and alterations in sensation.

2. Bulbar paralysis

When a lesion is present in the swallowing center of the brainstem, nucleus of the tractus solitarius, reticular formation or neurons associated with swallowing is affected. Lateral bulbar syndrome (Wallenberg syndrome) often produces rotatory vertigo, thermalgia of the face, trunk and extremities, mild disorders of the chewing phase and the oral cavity phase, and disorders of the pharyngeal phase. In addition, elevation of soft palate and larynx, contraction of the pharynx, opening the entrance to the esophagus are affected.

3. Pseudobulbar palsy

Upper motor neurons from hindbrain nuclei (bulbar swallowing center) may be affected by recurrent cerebrovascular events. The resulting disorders may be accompanied by disorders of higher brain functions, and symptoms such as affective incontinence, forced crying, and obligatory laughter are often seen in patients with severe dysarthria.

Coordination and strength of muscles of the tongue and other oral structures may be reduced. This may result in dysphagia showing characteristic flaws in formation of the food bolus, transfer of the bolus to the pharynx, early entry to the pharynx, delays in the swallowing reflex, and decreased pharyngeal peristalsis.

4. Multiple cerebral function disorders

Various disorders can affect the process of swallowing, from the precedence period to the esophagus period. In patients who have experienced multiple cerebral infarctions, dementia, and multiple clinical manifestations including cerebral trauma, clinical manifestations can be very complicated.

Cerebrovascular disorders, degenerative diseases of the central nervous system (including Parkinson's disease), dementia, diabetes, lack of hygiene in the oral cavity and pharynx, vomiting, gastroesophageal reflux, and depressed level of consciousness are complications associated with a high risk of aspiration. As a result, organic and functional oral care is required to prevent aspiration pneumonitis. The significance of the diet must be understood in terms of not only preventing aspiration pneumonitis, but also the meaning of diet for human being, and rehabilitation of eating and swallowing are important for improving quality of life.

Characteristics of eating disorders and dysphagia due to cerebrovascular disorder are shown in MEMO 1, and oral care should be performed with an understanding of each characteristic.

2. Organic / functional oral care

When oral hygiene is poor, the patient may feel unhealthy, and brain activity decreases under stress. In addition, attachment of viscous secretions and decreased production of saliva can result in delays in the swallowing reflex, and cause disuse function decrease of tongue and chewing motion. In particular, individuals who cannot ingest food orally show decreased saliva production, drying of the oral cavity, and increased bacterial counts due to reduced self-cleaning functions of the oral cavity. The resulting saliva will show increased acidity and bacterial contents, thus increasing the risk of aspiration pneumonia.

Organic and functional oral care conducted based on an understanding of the above issues and with rehabilitation of eating and swallowing is connected with infection prophylaxis. Furthermore, such care facilitates consciousness in the patient and promotes exercise of the lips, tongue, nasal cavity, pharynx, larynx and vocal cords.

1) Key points of oral care

We conduct extensive oral care that covers the type of eating disorders and dysphagia, the sites involved, the degree of functional decline, and psychosocial elements. The main points are as follows:

(1) Observation and evaluations such as disorders of the brain, oral cavity, pharynx and respiratory system resulting from disease
(2) Complications (prediction of likely complications)
(3) Treatment and intervention according to the type and level of the eating disorder or dysphagia
(4) Age
(5) Duration from onset/insult to the present
(6) Nutritional status
(7) Presence of infection
(8) Impacts on ADL
(9) Disorders of higher cerebral function
(10) Intentions of the patient and family regarding oral care and food intake

2) Matters requiring attention in oral care

Dental care should basically be conducted using a toothbrush. When xerostomia is present, an oral moisturizer can be used temporarily. However, in addition to using artificial materials, hypersalivation to stimulate the salivary glands can be achieved using tongue exercises while also improving muscular control. While the tongue can be stimulated by hand, oral cavity functions and self-care can also be improved using a toothbrush, tongue brush, gauze, or *ICU brush*, improving the oral cavity environment and the ability to eat safely. We also teach the patient with excessive production of respiratory secretions to perform oral care before meals.

MEMO 2 Matters that require attention of postcibal mouth care

- Provide cleaning with a drink such as tea to wash residual food and medicine from the tongue and oral cavity. Patients using partial dentures need particular attention.
- The residual material is washed out with a glass and a syringe, absorbed and removed (with a focus on the paralyzed side in particular). When the patient cannot take a sitting positsion, using a bent-over position or making face to sideway and residual material is carefully removed with an ICU brush and soft gauze.
- If a patient experiences choking during a meal, material may remain caught in the pharynx even if the patient recovers and reports no sensation of food in the throat after oral care.
- The patient should not lie down immediately after a meal, to prevent gastroesophageal reflux.
- The neck of the patient should be inclined forward for at least 1 hour if the patient must lie down and give a bed up around 45 degrees.
- If reflux occurs, the patient may easily choke, so the patient should propped up at an angle of about 30 degrees during sleep. Care must also be taken to prevent silent aspiration.

The key points for oral care are shown in MEMO 2. The point after eating is clearly removing residual food. In particular, close attention should be given to areas such as the buccal mucosa, where visual inspection is difficult. When paralysis of the facial nerve, hypoglossal nerve or trigeminal nerve is present, the patient may not be aware of residual material requiring removal. Residual food in the buccal region on the paralyzed side must be removed to prevent overgrowth of oral bacteria, and the resulting impacts on periodontal disease and cavities. Food materials (sugars, proteins) and saliva may remain behind, cleaning of the airway is planned for patients who cannot take care of their own oral cavity with *ICU brush.*

We teach the patient to gargle, and gargling is not only effective in basic training for the buccinator muscle, orbicularis oris muscle and vocal cords but also for prolonging the duration of exhalation and rehabilitation of eating and swallowing, and for removal of plaque and residual food.

(Tamami Koyama)

101. Matters requiring attention to improve dysphagia

1. Choice of training techniques for functional improvement

Two main methods are available as physical exercise: basic training not using food (indirect therapy) and training using food (direct therapy) .

When in acute phase, indirect therapy is mainly carried out.

With the development from convalescence to maintenance phase, ratios of direct therapy increase.

1) Disorders of the anticipatory stage

Training for the act of eating and improvement of cognitive function.

2) Disorders of the preparatory stage

Training (lip close training, and motor training for tongue and cheeks) for formation of the food bolus.

3) Disorders of the oral stage

Training for food bolus transportation and elicitation of the swallowing reflex for movement of the food bolus from the oral cavity to the pharynx.

4) Disorders of the pharyngeal stage

The cooling massage of the deglutition reflex instruction site, breathing exercise.

5) Disorders of the esophageal stage

Strengthening the pectoralis muscles and abdominal muscles, and training for opening of the esophageal orifice to lift the head from a supine posture.

When training patients directly, change the food texture and the posture of the body in accordance with swallowing function of the patient and to improve overall symptoms.

2. Methods to compensate for function

We aim to achieve functional improvement by training, and it is important that the patients show residual ability, but there is a limit in their ability.

Therefore, in addition to training, we aim to discover methods for compensating for lost function.

1) When use of a spoon or chopsticks is difficult due to limb paralysis, training can be provided to change hand dominance.
2) When chewing function is poor, we raise viscosity of the food and make the food into a thick paste beforehand to make bolus.
3) When the patient shows difficulty with transportation of the food bolus or a delayed swallowing reflex, or aspiration is considered likely to occur, the posture of the patient can be changed to facilitate swallowing.

3. Improving the eating environment.

Patients may not be able to achieve good oral intake even if chewing and swallowing function are improved. In such cases, support staff may be able to provide assistance with eating. However, this is likely to become problematic in terms of inefficient utilization of the work force if meals take more than 1 hour.

Also, the practical using of social resources such as nursing care insurance must be considered.

Introducing care from a third person can be helpful, and reduce the burden on the family if the patient is receiving care at home.

The care free of pressure by family member with using welfare service is important.

Changes in the severity of the eating disorder or dysphagia that may occur as a result of changes in the environment must always be considered.

4. Psychological situation

The desire to eat has a strong influence on achieving improvements in swallowing function. Factors affecting appetite must be examined from every angle, such as whether decreased appetite is due to swallowing function, or the environment, or the taste of the food.

When the patient and family have too much expectation for recuperation beyond the actual swallowing function, we should not flatly deny it and contact them with sympathy.

5. Risk management

If patients receiving training for improving swallowing function show frequent symptoms such as respiratory disorder or fatigue, training should be discontinued, or the speed of training reduced.

If a high-risk diagnosis such as aspiration is made, suction apparatus should be prepared, and cooperation with medical institutions should be established in case of sudden deterioration in the condition of the patient.

(Koichiro Ueda)

102. Wastes cannot be removed easily with artificial denture cleaning agent

1. Posture of the patient during oral cleaning

1) With the patient facing upward

Perform cleaning in a lateral decubitus position if possible.

When the patient has hemiplegia, posture is a foundation with the paralysis side is lower and the non-paralyzed side is upper.

In this position, secretions such as saliva flow into the pharynx and arrive at the piriform recess of the healthy side due to gravity, minimizing the risk of aspiration.

2) In cases of sitting down

With the helper standing, and the patients clean sitting down, the patient undergoes cleaning with the neck backward.

However, secretions containing contaminated material dislodged during cleaning that flow into the pharynx cannot be swallowed in this position.

Therefore the helper keep it that the patient take the posture with down their chin and receive the cleaning the oral.

2. Site of cleaning

1) With tube feeding, cleaning of the tongue and oral mucosa is required

When patients who do not usually ingest food through the mouth and have few opportunities to talk, oral self-cleaning does not work and mucosal metabolism becomes difficult.

And mucosal epithelium remain on tongue and palate.

So patients require removal of the epithelium residuum of the tongue and palate using a special brush for cleaning soft tissue and mucosa.

2) For patients with hemiplegia

Patients with hemiplegia as a result of stroke can show paralysis in the oral region. As a result of malar tension and decreased sensation, plaque and residual food attached to the teeth and buccal mucosa can be increased on the paralyzed side. The focus of oral cleaning must therefore be on the paralyzed side.

3. Appliances for cleaning

We usually use nylon brushes for cleaning the teeth, and specialized brushes for soft tissues (e.g., tongue, gingiva, palate, buccal mucosa).

If increased pressure with a toothbrush still cannot remove plaque and residual material without causing bleeding, to remove coatings of the tongue and mucosal epithelium, end once and tries it on the next time.

4. Medications for oral cleaning

To improve inflammation and prevent cavities, various approaches are available, including moisturizer for xerostomia and gargles. The overall state of the patient must be considered when selecting medications for oral cleaning.

When inflammation such as aspiration pneumonitis progresses, medications are clearly needed, but long-term use should be avoided.

Overuse of medications can cause drug resistance and an imbalance in the bacterial environment of the mouth, and may thus cause worsened inflammation of the mouth in the long term.

Some medications also include alcohol, which can promote xerostomia.

A clear understanding of the potential effects of different agents is required when using medications as an adjunct for cleaning with a toothbrush.

(Koichiro Ueda)

103. Issues regarding patients with dysphagia (including those living at home)

When treating patients with dysphagia, it is ensure their safety while eating by preventing aspiration.

The patients start an oral nutrition, after to improve in disorder to a certain extent.

Before eating can begin, the following conditions must be met:

1) Consciousness
2) No fever, sputum, or cough
3) Presence of a deglutition reflex
4) A good appetite

When patients eat, we must pay attention to safety (eating without aspiration), posture, the texture of the food, and the method of assistance.

For all practical purposes, we evaluate the level of consciousness, physical dysfunction, such as ADL levels, the psychic functions, such as consciousness, and the endodontic situation (oral hygiene state, an oral cavity function state). Although VF/VE is effective, it is sometimes difficulty to apply. In such cases, it is important to observe the patient eating. In particular, when patients are in their home without a healthcare worker present, they must be aware of and deal with several aspects of eating and care (table 1). Below, we comment on some points related to ingestion.

Table 1 Major problems and support methods in the home

Symptoms	Measures
Cough while eating	・Put thickener to drink and soup ・Avoid dry food ・Concentrate on ingestion and confirm deglutition every time ・Swallow twice per mouthful ・Two dry swallowing at a mouthful ・Swallowing with neck rotation and chin down ・Alternative swallowing ・Take a break in ingestion time ・Regulate the angle of the patients' body
Cough	・Examine how and when the patients cough in detail ・When they turn over on their back, raise a bed by approximately 30 degrees ・The patients are absent from a face in sideways-facing for a bottom ・When suspected respiratory disease, tell a physician and a nurse immediately
There is some food which they can't eat	・They have some problem with oral, consult with dentistry ・ Think about a nutrient balance menu with food which the patients can eat ・When they have dysphagia, consult with a physician
Getting thinner	・Calculate the calorie that the patients took in ・In the case of nutritional deprivation, feed dietary supplements ・Consult with a physician
Wet hoarsenes	・Swallowing with neck rotation, before and after eat ・Thermal stimulation before, after, and during eat ・Dry swallowing ・Absorption under a consultation with a physician

1. Support methods and issues to be addressed while eating

1) Posture

The appropriate posture for patients when they eat is determined according to the degree of dysphagia.

The time allowed for eating per meal is about 30 minutes. When the patients can sit down, it is possible for them to eat sitting in a wheelchair or on a chair.

However, when they have severe dysphagia, it is frequently necessary for them to eat lying in bed, and low endurance increases the risk of aspiration

The pleasantness of being with family or friends increases patients' appetites. If possible, patients should leave the bed with a wheelchair.

(1) Postural issues that must be addressed when patients eat sitting on a reclining wheelchair or in a wheelchair.

① Confirm that their lower limbs are stable on the floor or that the foot rest of the wheelchair is stable.

② Position their pelvis and backbone at the center of the wheelchair to ensure a stable posture. Also, adjust it with a cushion as needed.

③ In the case of patients with hemiplegia, position the paralyzed arm on the table, or use a cushion to prevent poor posture.

(2) Postural issues that must be addressed when patients eat in bed

① Use a pillow to fix their head with the chin slightly down.

② For patients with hemiplegia, fix their body with a cushion so that their body does not incline to the paralyzed side.

2) Assistance methods and instructions

① Perform dry swallowing (saliva deglutition and thermal stimulation), and confirm the deglutition reflex before eating.

② At first, select food that is easy to swallow (e.g., jelly).

③ Increase quantity of food little by little to avoid aspiration. However, for patients with dementia or reduced sensation in the oral cavity, reduced quantity may disturb bolus creation and cause a deglutition reflex; therefore, it is important to think about the correct quantity of a mouthful.

④ Perform feeding while confirming the deglutition reflex for each mouthful. Promote the spontaneous deglutition reflex thorough the Mendelsohn treatment method.

⑤ If we talk to the patient when the patient has food in his or her mouth, the patient may aspirate when responding. Therefore, do not talk until after confirming that the food has been swallowed.

⑥ When patients eat in the semi-Fowler's position, they can not observe the dining table. Therefore, we must tell them what food will be served, or show them the food. Furthermore, the spoon should be positioned below their eyes so that they can see the food, thus increasing their appetite.

MEMO 1 The selection of tableware according to the patients' ability

1. Select the size of spoon that is nearly quantity of mouthful. The deeper dish is easy to scoop up food than the flat one.
2. The drinking water with a glass make the patients' neck stretch, as a result, it is easy to aspirate it, therefore cut the part which put to their lips. When the quantity of mouthful increases too much use a drinking device Drinking water with straw needs caution because there is the risk to aspirate when the timing of suction and the deglutition shifts.
3. When it's difficult to hold a dish for the patients with paralysis one side of body, use the nonskid mat.

⑦ At first, do not put food deep into the mouth with a spoon or chopsticks. Open the mouth while touching the lips in order to trigger the natural movement of the lips to take food in.
When the patients have hemiplegia, put food in the healthy side of the mouth so that it is easier for the bolus to pass through the pharynx.
When they have decreased tongue function, beware of poor transportation of the food and put the food on the back of the tongue and push the tongue slightly to promote tongue movement.

⑧ When a helper assists with eating from the high position, the patients' chin moves up and the neck arches back, which increases the risk of aspiration.
Therefore, the helper must promote a stable posture by remaining at the same height as the patient.

2. The observation while eating and the correspondence to the problem.

Table 2 shows the main symptoms and problems that occur while eating according to the transportation stage of the food. It is important to observe these symptoms carefully and follow a set of basic action methods depending on each disorder.

Table 2 Classification of the main symptoms and problems that occur while eating

Stage of eating and swallowing function	main symptom	Problems and disorders
Anticipatory stage	Looking around , being dopey, and Dozing Eating by the hand The eaten speed is fast	Dementia Impaired consciousness A side effect of the medicine Mental disease Higher brain function disorder
	Food is straightened to the mouth	Oral sensory degradation
Preparatory stage Oral stage	Food spills Slaver occurs	Closing lips disorder (facial paralysis)
	Spit out or avoid a solid food	Oral diseases (apraxia of oral, face, and chewing)
	Food remains in the mouth after deglutition	Forming bolus disorder Functional disorders in tongue and cheek (facial paralysis and hypoglossal paralysis)
Pharyngeal stage	A cough Avoiding a shapeless food Gargling voice before and after eating	Aspiration
	It is felt that the throat is blocked after deglutition. It is felt that food remains.	Remaining the food in vallecula and piriform fossa
	Like fluid food Deglutition in upward Food doesn't pass the throat easily.	Difficulty in creation the deglutition reflex Delay of the deglutition reflex due to the oral function disorder
Esophageal stage	Nausea and vomiting	Dilatation deficiency of the esophagus orifice Reflux oesophagitis Esophageal peristalsis decrease Other organic problems
Others, ability of the eating activity	It is unskilled to use the tool for eating. spill food, when carry it to the month.	Apraxia, Agnosia (higher brain function disorder) Ataxia
	Tiredness after eating It takes time more than 30 minutes for eating.	Decrease of the systemic stamina Reduction in ADL level Inappropriate physical posture while eatig Other complications

We describe the concrete response to each problem below.

1) Anticipatory stage

When patients have a problem with concentration, it is necessary to create an environment in which they can concentrate on eating. Especially for the cases with dementia, aprosexia, or higher brain function disorder, it is important to have a quiet environment while eating. It is necessary to use a curtain or partition to hide distractions so that their attention remains focused on eating, not movement of people or the sound of a television.

When their level of consciousness fluctuates, oral cavity stimulation is provided by performing oral care, thermal stimulation, and icing in order to increase the level of consciousness and prepare for eating. When there is a problem with eating movements due to mental deterioration, food must be divided into containers in small quantities and distribution must be paced using a small spoon.

2) Preparatory stage

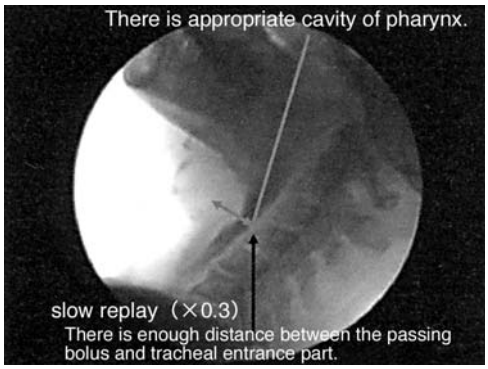
Decreased oral function is suspected when food spills from the patients' lip, saliva flows from the edge of the mouth, food remains in the month after deglutition, and there is a difficulty in forming a bolus. Particularly for patients with dysphagia due to cerebrovascular disorder, oral physical exercise is required because of facial paralysis and hypoglossal paralysis. Also, the improvement of oral function leads to the stability of the deglutition reflex.

When the patients perform exercises, it is important that their oral cavity be kept clean. Therefore, we observe their oral cavity well before performing physical exercise and confirm gingival redness and swelling, the presence of caries, and the condition of dentures. Effective exercises include sucking cheeks in, stretching the tongue out, projecting the lips out, squeezing the lips together, and massaging the facial muscles.

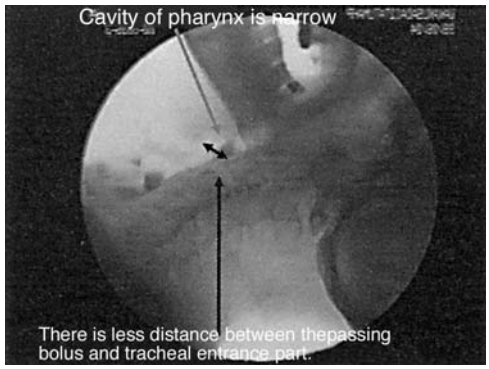
3) Oral stage and Pharyngeal stage

When the patient has severely reduced oral function in the pharyngeal stage, it is often necessary to start feeding while the bed is positioned at 30 degrees. By inclining the bed, they can easily send food in the oral cavity and can prevent aspiration. When they can maintain anteflexion of the neck, cervical frontal myotonia relaxes, and the epiglottis is easy to elevation (Photo. 1).

After identifying the bolus passage in the oral cavity and pharyngeal and deglutition reflex, raise the bed angle little by little from 45 degrees, to 60 degrees, to 90 degrees.



a: Normal deglutition.
Tilting the next down slightly creates adequate space for the pharynx and epiglottis facilitating food passage



b: Aspiration.
When the patients take a head back posture, their pharynx cavity becomes narrow, and movement of the epiglottis and other organs is disturbed. In addition, distance between the passing bolus and tracheal entrance is reduced, increasing the risk of aspiration

Photo. 1 State of deglutition with an elongated posture with the neck tilted down slightly in front

When the patient has dysphagia, the first mouthful is the most dangerous because they are not used to eating. Therefore, we must perform mouth care before eating to encourage saliva secretion by stimulation of the oral organ in order to retain oral moisture. Also, doing lip/tongue/malar exercises, head/ neck/ trunk stretches, deglutition exercises, thermal stimulation, and dry swallowing makes the patients relax their entire body and makes them conscious of the start of eating. Thus, we coordinate the cooperation of the oral exercise and deglutition, in order to make a smooth bolus and facilitate deglutition.

4) Esophageal stage

When the patients present with food reflux, vomiting, and regurgitant aspiration, it should be considered that they have problems with the digestive organs, including the esophagus. As testing (VF, gastrocamera), and specialized treatment are necessary, we generally consult a medical institution early.

Patients maintain their physical posture after eating to prevent food reflux and rest quietly in bed for around 30 minutes.

3. Food selection and a device of the cooking

Because the viscosity of liquid is low and it is difficult to hold in the oral cavity, thickener food additive is useful. The quantity of the thickener should be adjusted to the degree of the patient's disability. As the first stage food for patients with dysphagia, jelly is considered the safest. However, it often becomes the critical food when a milk ingredient in the gelatine is mixed in saliva as the gelatine jelly becomes water-soluble. Also, as it is easy to aspirate, it therefore requires attention because agar and foods that are easy to break up after becoming stuck, and have low cohesiveness.

Foods that are hard to swallow are summarized in table 3. When we use these foods, mix them with an egg or yogurt to achieve the desired coefficient of viscosity, or shape the jelly after using a food processor. Also, viscosity increases when foods like potatoes and pumpkins are mashed. When cooking, it is important to consider the properties of the ingredients carefully.

Table 3 Foods that are commonly difficult to swallow

texture	Example of food
Liquid with low viscosity	Water, tea, Coffee, Soft drink
Food which is too hard to be chewed easily	An octopus, A cuttlefish
Dry food	Bread, Sponge cake, a Boiled egg, A baked potato
Food with low cohesive property	A peanut, A cookie
Food which is easy to stick in an oral mucous	Laver, seaweed, foliage plant vegetables
Food with high viscosity	A rice cake, potatoes, hard mash-shaped food
Food with strong acidity	Food using the vinegar, citrus fruits
Food which is divided into solid and liqui	Soup, rice porridge
Food which is ate by breathing in	Noodles

4. Correspondence when the patients cannot eat

Eating at an appointed time is an important habit. However, nutritional supplements can be used between meals when a patient does not receive adequate nutrient intake because of a low level of consciousness, a reversed day and night pattern, poor physical condition or depression. Caloric content of nutritional supplementary foods are included on the packages, and should be used when necessary.

(Mikiko Ito)

104. Actions to be taken for patients with trouble eating

When eating disorders and dysphagia are improved and oral intake is restarted, the major problems to be considered are suffocation and aspiration. Prevention of these problems is therefore important. The ability of the patient to eat must be ascertained and the potential risks clarified. However, aspiration may occur even if extreme care is taken with these issues. Overall status at the table should be observed, with eating suspended if aspiration seems very likely.

We comment on measures to get, when suffocation or aspiration occurs unfortunately.

1. Signs of aspiration

Aspiration should be suspected if the following symptoms are identified.

1) Continued coughing after choking during or after a meal

Coughing is a defensive response to the entry of solid or liquid material into the trachea.

2) Hoarseness after a meal

As the vocal cords are located in the upper trachea, aspiration of saliva or food can result in hoarseness.

3) Recurrent pneumonia and fever

4) Meal time lasting more than 1 hour

5) Sitophobia (aversion to food)

However, even if these symptoms are not found, aspiration may have occurred in the form of silent aspiration. Few examinations or signs are effective in identifying silent aspiration, but aspiration of some form should be suspected if a change in pulse oximetry results is seen during a meal.

2. Actions to be taken in response to aspiration and suffocation

Aspiration and suffocation may occur even extreme care is being taken. (Suffocation cases represent more emergency situation).

As a result, homes, hospitals, and institutions dealing with patients who have eating disorders or dysphagia, elderly individuals, or individuals at high risk of suffocation should install an aspirator.

1) Actions to be taken for suffocation

(1) If the material blocking the trachea can be seen from the oral cavity, attempts should be made to remove the material by the fingers

(2) Perform the Heimlich maneuver if removal is unsuccessful

(3) Use an aspirator, if available

2) Actions to be taken for aspiration

(1) Lead to cough by patting on the back (tapping method)

(2) Suction

(3) Extrusion and removal of aspirated material using an endoscope

(4) In addition, eating/deglutition rehabilitation, surgical treatment

(Masataka Itoda)

105. The utility of dentures for preventing aspiration

There are two kinds of dentures for patients with dysphagia who have a high risk of aspiration.

The first is the usual denture treatment that is performed in dentistry. The first purpose of this type is to return missing teeth and improve chewing function, however, there are few dentures made in consideration of deglutition.

The other kind of dentures are deglutition assistance dentures, which are designed to smooth the deglutition of the alimentary bolus after chewing.

1. The effect of wearing dentures on aspiration

Normal dentures are often manufactured with the intent of improving the ability to chew and make a bolus, at each stage of the deglutition function. However, in the case of the patients with dysphagia, dentures that do not inhibit their ability in the preparatory stage are required.

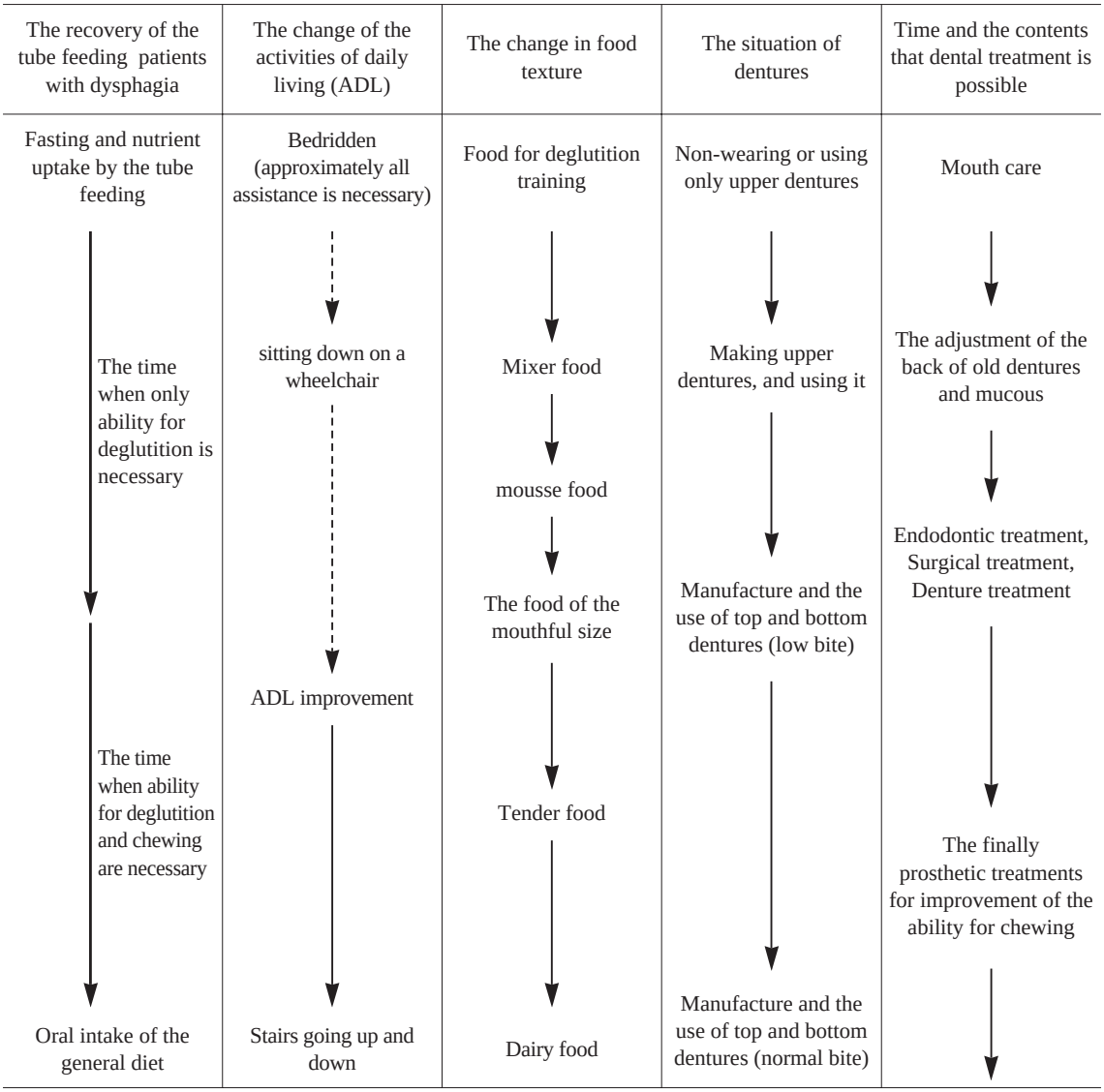


Fig. 1 Temporal relationship of eating, physical exercise and dental treatment

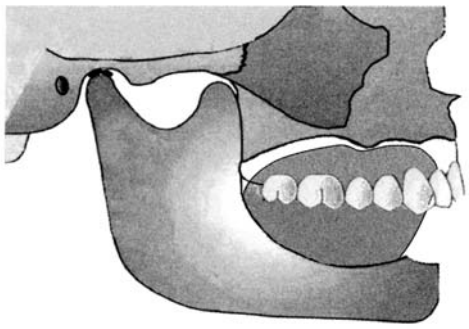


Fig. 2
Imaging of the deglutition when only an upper jaw complete denture is used. The tongue is pushed against the palate, and deglutition pressure is easily achieved

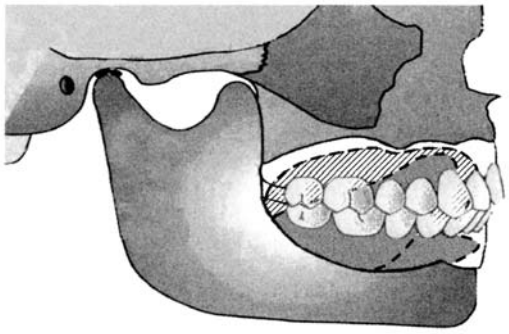


Fig. 3
Imaging of deglutition both upper and lower jaw complete dentures are used. It is difficult for the tongue to push against the palate when using both upper jaw dentures and lower denture and the occurrence of suitable deglutition pressure may be inhibited. (The tongue can not be pushed to the angled line in the figure)

Patients and families often think that if they wear dentures and become able to chew, then they can eat; however, the risk of aspiration may rise adversely when patients with dysphagia use dentures.

As shown in Fig. 1, for patients with dysphagia in the recovery phase, we must first aim at recovery and improvement of deglutition. After they are able to swallow food safely without aspirating it, we change to food that must be chewed.

For patients in the recovery offstage, deglutition requires adequate pressure to send the bolus into the pharynx is the result of pushing the tongue to the palate. This movement acts as a trigger for the formation of the bolus and sending it into the pharynx. To ensure safe feeding without aspiration, it is necessary to improve the oral environment and function by raising deglutition pressure.

For improving deglutition, there is a time when the development of higher deglutition pressure is possible using only maxillary dentures, and it is often possible for safe, smooth deglutition.

However, the risk of aspiration increases without appropriate deglutition pressure because lingual movement and muscular strength do not improve when both top and bottom dentures are used (Fig. 2, 3).

Normal dentures can prevent aspiration to some extent through appropriate dentures use for recovering from dysphagia. Furthermore, the deglutition movement is activated when enabled by stable chewing with lower dentures while changing the form of the food (Photo. 2, 3).

2. Dentures to assist with deglutition

The manufactured deglutition assistance dentures are distributed as follows to smooth deglutition of the alimentary bolus after chewing. When these dentures cannot be made, or cannot be worn, the risk of the aspiration rises.

1) Dentures and devices which are manufactured to fill the tissue deficit in the oral cavity, jaw, or face, after head or cervical surgery (prosthesis of the jaw and face)

2) Dentures and devices which are manufactured primarily to deal with disorders (e.g. ariticulation disorders, dysphagia)

3) Dentures and devices made for the above-mentioned purposes

In articular, we focus on dentures and devices that are manufactured to deal with disorders.

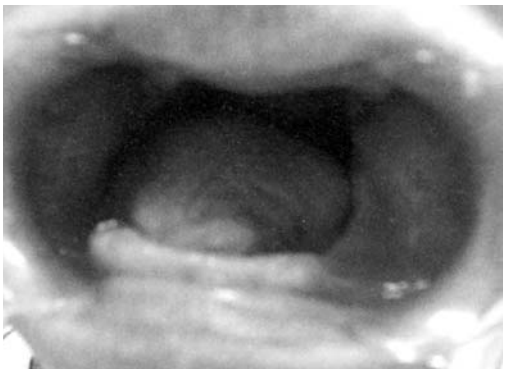
The following devices are made for correcting dysfunction of the jaw and face.

(1) Velopharyngeal insufficiency (dentures and a device corresponding to articulation disorders and dysphagia)
   ① Soft Palate Obturator = SPO
   ② Speech Bulb = SB
   ③ Palatal Lift Prosthesis = PLP
(2) Articulation disorders, vocal disorder, decrease of deglutition pressure = Defective contact with the lingual palate
   ① Palatal Augmentation Prosthesis = PAP

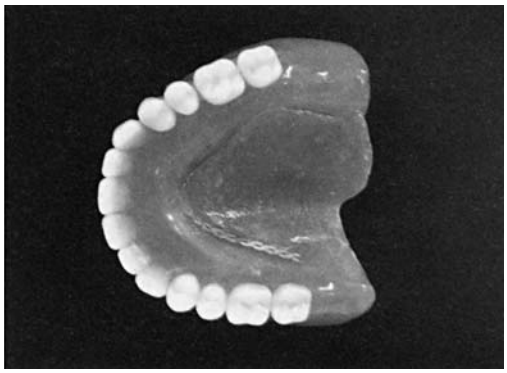
Articulation disorder is one of the symptoms of velopharyngeal insufficiency, and these devices are often made to deal with these disorders. However, the organ used at utterance is similar to the organ used at deglutition, and when patients have articulation disorders they may also have dysphagia. In other words, improving articulation disorders can facilitate eating/deglutition function and prevent aspiration.

In addition, not only palatal choking, velopharyngeal or nasopharyngeal closure function, and articulatory function, but also the devices are often made to compensate for deglutition function or to prevent aspiration, by spreading awareness of dysphagia and aspiration pneumonitis,

Palatal Augmentation Prosthesis (PAP) is manufactured when adequate deglutition pressure is not achieved because of deficit of tongue tissue after the surgical operation and movement disorder due to disease or aging (Photo. 1).



a: Inside of the mouth



b: Dentures to assist in deglutition

Photo. 1 After a surgical operation for tongue cancer. One-third of the left, front side of the tongue was resected. The device was manufactured by adjusting normal dentures to assist in deglutition function by compensating for the deficit in the tongue

Photo. 2 The state of deglutition without wearing dentures (videofluorography image)
Food flows into the pharynx while chewing because the food is not held in the oral cavity

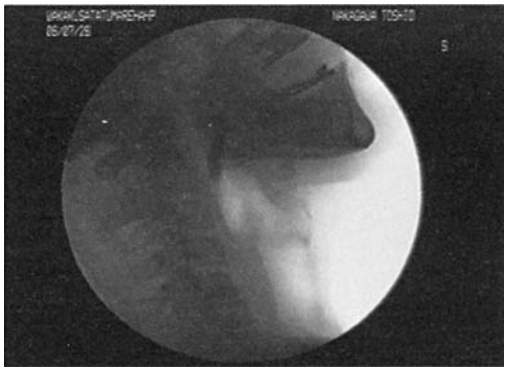


Photo. 3 The state of deglutition while wearing dentures (videofluorography image)
Deglutition pressure is easy to achieve when wearing dentures, and bolus creation and swallowing are facilitated

The advantages and disadvantages of these devices are as follows.

Advantages

① Function is improved without surgery
② It is possible to make the device again, and modify it to suit the patient
③ It is made primarily for improving pronunciation function, but also improves chewing and deglutition function
④ When it is used as pre-treatment before surgery, postoperative results improve

Disadvantages

① In children, growth of the jaw necessitates multiple appliances over time
② Adjustment takes time
③ Transformation and damage may occur
④ When worn for a long time, tooth disorder may occur
⑤ When the pharyngeal reflex is strong, they may be difficult to put in

(Masataka Itoda)

106. Examination of dysphagia

Below, Fig. 1 shows the basic flow for evaluating and diagnosing dysphagia.

We ask patients about their condition and observe their physical state before beginning testing, and subsequently, choose the appropriate method.

The basic flow in assessment and diagnosis is from interview to testing.

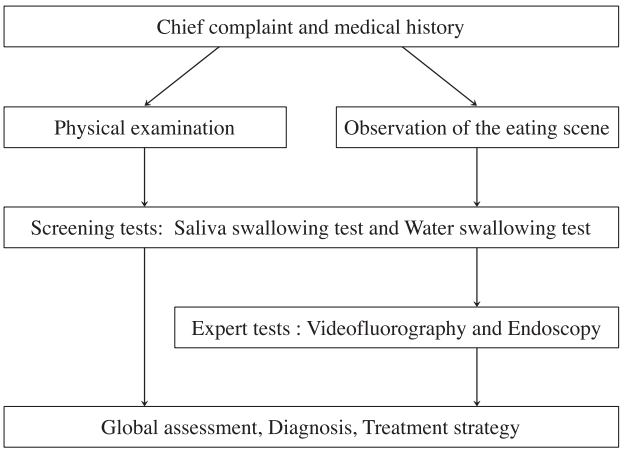


Fig. 1 The flow of the diagnosis and evaluation of dysphagia

1. Medical examination by interview

The situations in which patients with dysphagia consult a hospital include having choked during a meal, experiencing difficulty with deglutition, having had repeated pneumonia, and taking a long time to eat. We summarize endpoints by diagnosis by asking the patients the questions in MEMO 1.

When providing care, it is important that we fully understand their life history, ADL, family background. Furthermore, it is effective to hear the situation from not only the patient, but also their family and caregiver. We ask them when deglutition first became difficult and the subsequent progress.

When treating patients with dysphasia, the most important problem is aspiration. Asking questions allows us to determine the presence or absence of signs of aspiration. We enumerate signs of aspiration in MEMO 2. Choking is an especially important sign; however, because of repeated aspiration or paralysis, the respiratory tract mucosa may be damaged. Consequently, sensation in the airway decreases, and there are many patients who do not choke even when they aspirate. This aspiration without choking is called Silent Aspiration and cannot be diagnosed by asking questions or testing (we will describe the diagnostic method later).

Because Silent Aspiration is not noticed by the patients and those around them, they often continue to eat. Therefore, quantity of aspirated food increases, and pneumonia is often caused by slight, but repeated aspiration. When diagnosing Silent Aspiration by asking questions, it is necessary to confirm the presence of pneumonia and choking.

Here, we give a detailed account of points to be assessed during questioning.

1) Anamnesis

The following issues should be addressed in the medical history.

MEMO 1 Diagnosis points by interview

- A subjective symptom at swallowing
- The state of appearance and progress of dysphagia
- A history of pneumonia
- Using medicine
- A consciousness level
- An eating state: A method, quantity, time
- A life history
- A family history

(1) Causative disease of dysphagia
(2) Pneumonia
(3) A history of the radiotherapy and experience of head and neck surgery
(4) Other basal disease: respiratory disease, neuromuscular disease, diabetes

MEMO 2 Clinical observations with suspected aspiration

- A cough and being choked occur frequently after and during eating
- wet hoarseness after the meal (change in voice)
- Pneumonia and the fever that are repeated
- A cough at sleep
- Sitophobia
- Dehydration and undernutrition

Of particular importance is (1) the causative disease of dysphagia. It is very important when making a treatment plan that information about this period be available.

2) Daily use of medication

The elderly people often use medicine regularly, but some medications may cause dysphagia, and it is necessary to note these.

Medications that cause dysphagia are as follows.

(1) Medicines that have a sedative effect on central nervous system (delayed deglutition reflex): major-minor tranquilizer, antispasmodic
(2) Medicines that cause xerostomia: diuretic, tricyclic system antidepressant, sympathicolytic drugs, major-tranquilizer, antihistamine
(3) Others

In particularly, medications that cause xerostomia often affect the process of eating, from chewing movement to deglutition.

3) Level of consciousness

Eating and deglutition function is influenced by the level of consciousness. Rehabilitation is often performed during the day, and we must know the time when the patient is at their most alert in order to perform rehabilitation without problems. We must be careful about come-from-behind behavior and insomnia in the night and day when mental deterioration (dementia) causes somnolence and disturbance of consciousness, which is also diagnosed by asking questions.

4) Meals

We must ask about eating methods, quantity, and duration.

For patients ingesting food, it is necessary to be diagnosed by asking questions about food texture, physical posture, location and assistance.

As decreases in the quantity of meals resulting from dysphagia may decrease weight, it is important to have information on weight change.

A duration of more than one hour for each meal may indicate cognitive impairment or an endodontic problem.

2. Physical examination

We must observe eating ability, a deglutition function and the oral state, both visually and by palpation (MEMO 3).

1) Eating ability

First of all, using palpation, the range of motion and physical limitations (paralysis, ataxy, involuntary movement) are identified, and a clear understanding of swallowing function is developed. Also, observe disturbance of consciousness carefully, witch have a large influence on eating and deglutition function.

In higher brain function disorders, particularly affective incontinence, aprosexia, and disorder of behavioral rhythm, the disorders affect the preparatory stage (a cognitive stage), and must be observed carefully. Moreover, be careful about paralysis and ataxy of the upper and lower limbs influencing and its effects on eating motion.

2) Deglutition function

At first, observe the lips and cheeks at rest and in motion. It is important to confirm whether there is a chewing movement disorder associated with closing and pouting the lips, and puffing out the cheeks. Also, examine the presence or absence of hyper nasality, and evaluate the function of the velopharyngeal closure.

Sometimes, medication may reduce saliva secretion. Therefore, it is important to confirm whether the patient is taking medicine, because saliva affects chewing and alimentary bolus formation.

Also, because the speech organ and deglutition organ are the same, through observing utterance, we can identify articulation disorders.

It is necessary to examine the trigeminal nerve, facial nerve, glossopharyngeal nerve, and vagus nerve, which are concerned with mastication, autokinesis and reflex movement of tongue.

3) Oral state

Pay attention to the number of teeth, the use of dentures, oral disease (carious and periodontal disease), gingival and lingual state, food residue, xerostomia, and halitosis.

When there is functional decline, the oral cavity is often dirty. In the case of patients suspected of having aspiration, it is important to perform mouth care before evaluation. Also, if possible, examine the results of the medical examination at the same time. In addition, the observation of the eating environment is important.

MEMO 3 The observation to a physical state

Observation of the ability for eating

- Neck joint mobility
- Presence and degree of disturbance of consciousness
- Abnormal presence or absence of feelings control / intellectual ability: Affective incontinence, Aprosexia, Dysrhythmia of the diet movement
- Presence or absence of paralysis and ataxy of upper lower limbs: Effect to be given to eating movement, Homeostasis of the sitting position

Observation of the deglutition function

- Lip and cheeks: Flexibility, choke function, presenc of twitch
- Presence of hyper nasality
- Salivation
- Pharyngeal perception and presence of vomiting reflex
- Articulation disorders: maintenance of cooperation between tongue and oral neighboring muscular
- The organic abnormality that the lower cranial nerve / trigeminal nerve / facial nerve / glossopharyngeal nerve / vagus nerve influences

Oral state

- An oral hygiene state: A gingiva / a tongue / tunica mucosa pharyngis, Endodontic food remaining, Halitosis, Xerostomia
- Teeth and an occlusal state, chewing state
- An adaptation of dentures state

3. The main screening test for dysphagia

Many methods for screening for dysphagia have been reported; therefore it is necessary to select a suitable method. In general, a screening test distinguishes a disease and disorder without subjective symptoms using methods that can be performed. Furthermore, it is used for follow-up because it is simple, low cost, and has little risk.

We describe each test below.

1) Repetitive Saliva Swallowing Test: RSST

(1) Method

This test method requires palpitation of the elevated larynx, and can quantitatively measure the creation of the deglutition reflex. It is important to screen for dysphagia first, because of the high appropriateness, sensitiveness, and correlation with aspiration. This method is easily performed in a bed without using a special appliance, but requires patient cooperation.

Basically, give a checkup while adjusting the patient's neck forward slightly, and sit the patient down in the basic position. Then, make the patient swallow saliva repeatedly, and pay attention to the number of times. The checker palpates the laryngeal prominence of the patients with the first or middle finger. For deglutition, the laryngeal prominence and the hyoid come back to the initial position after climbing over the finger during movement. We observe this exercise for 30 seconds and record the number of times deglutition is confirmed by palpation. This test is performed after having moistened the oral cavity with artificial saliva in patients with xerostomia.

(2) Judgment

It is said that normal elderly people can swallow saliva three times in 30 seconds. It is consider abnormal if this can only be done twice. However, because silent aspiration cannot be detected using this method, further attention is necessary.

2) Timed Water Swallow Test (Kubota method)

(1) Method

Serve the patients 30 ml of water with a glass and observe their state. Before testing, confirm the patient's condition by serving 2 to 3 ml of water. Measure the time required for deglutition and the number of times of deglutition. Also watch for the presence or absence of choking at the same time. It is possible to examine a deglutition function quantitatively at this time. Because 30 ml of water is used in this test, it is conducted only for patients with slight illness, and not for the severely ill. Also, use of the cervical auscultation provides more accurate results.

(2) Judgment

When the patient can drink without choking within five seconds, it is considered to be normal. As for other cases, the presence of dysphagia (disorder of oral stage and pharyngeal stage) is suspected.

3) Modified Water Swallow Test: MWST

(1) Method

This method that can be used for patients with severe dysphagia. In consideration of the patient's safety, pour 3 ml of cold water in their oral cavity and make them swallow it. We examine presence or absence of deglutition reflex, choking, or respiratory change. When possible, make them swallow it more than twice. The poorest test result is accepted. If there are more than 4 evaluation points, the patient is considered to have no problems.

(2) Judgment

1 point: There is no deglutition. Choking or difficulty breathing

2 points: There is deglutition. With difficulty breathing (suspicion of silent aspiration)

3 points: There is deglutition. Breathing is good. Choking or wet hoarseness

4 points: Breathing is good. Breathing is good. No food remains in the oral cavity

5 points: An addition symptoms of 4 point, possible dry deglutition twice within 30 seconds

4) Iced chip swallow test

We can perform this test safely even for patients at a high-risk of aspiration. Make the patients swallow an ice chip and assess the deglutition reflex, choking, and presence or absence of endodontic effusion. Diagnostic precision is increased if cervical auscultation is used at the same time. What ice chip gives the patients a low temperature stimulation, and as a result, it is expected that the deglutition reflex is induced. Furthermore, this is an appropriate method for the start of eating training, because patients can become conscious of the position of the ice chip.

5) Food Test: FT

(1) Method

This test was developed to use pudding or rice porridge instead of water for a swallowing test. Examine the presence or absence of deglutition reflex, choking, and respiratory change. Put 3 to 4 grams of pudding or rice porridge on the front of the patient's tongue, and allow the patient to transport and swallow it. Make the patient dry swallow and observe for 30 seconds. Observe the dorsum and palate of the tongue. The lowest evaluation point is accepted.

(2) Judgment

1 point: There is no deglutition. Choking or difficulty breathing

2 points: There is deglutition. With difficulty breathing (suspicion of silent aspiration)

3 points: There is deglutition. Breathing is good. Choking or wet hoarseness

4 points: Breathing is good. Breathing is good. No food remains in the oral cavity

5 points: An addition symptoms of 4 point, possible dry deglutition twice within 30 seconds

6) Cervical Auscultation

This method examines the deglutition and breathing sounds before and after deglutition which produced by bolus swallowing. We observe the cervical deglutition sound, appearance and length, and listen to the timing of breath sounds. This test can primarily identify dysphagia in the pharyngeal stage. This can be performed at the patient's bedside, therefore, it is used in clinical settings as one of the means to help diagnose dysphagia, The points to be examined are outside of the laryngeal prominence and right under the cricoid cartilage.

(1) Method

① Normal auscultation

② A microphone, a recording device and acceleration pickup meter, a sound analyzer

(2) Judgment

① The change in breath sounds before and after swallowing, prolongation of the deglutition sound

② It varies according to the method

7) Pulse Oximeter

(1) Method

This test screens for aspiration and is a method for monitoring arterial oxygen saturation using a pulse oximeter. When a patient has completed the other tests, a pulse oximeter should be used. When oxygen saturation decreases, there may not be always aspiration; however, it is a superior method for detecting aspiration during eating.

(2) Judgment

When oxygen saturation (SpO_2) is less than 90% or more than 3% below the initial value (resting), feeding is stopped.

8) Examination of deglutition elicitation (an examination of deglutition reflex)

(1) Method

This test is a method for removing the bias of oral cavity function. It is actually a test that is conducted to prevent pneumonia caused by silent aspiration during sleep, and is easily performed at the bedside and in the home. Using a thin tube (less than 8F), we inject water from the nasal cavity into the oropharynx and measure the time until a deglutition reflex occurs.

(2) Judgment

When 0.4 ml of normal temperature distilled water is injected, the mean duration is 1.7 ± 0.7 seconds, and three seconds or more is considered abnormal.

9) Color Water Test

(1) Method

This test is used for tracheostomy patients, and is used to observe the presence of aspiration from tracheostomy hole. A pigment, such as methylene blue or trypan blue, is injected into the patient's oral cavity. After they swallow, the amount of pigment remaining in the oral or pharyngeal cavity is measured. However, in most cases, the pigment flows out when it is passed after more than five minutes.

(2) Judgment

When the pigment leaks from the tracheostomy hole within 2-3 minutes, there is an abnormality.

As noted above, there are various laboratory procedures. However, it is necessary to choose and combine the appropriate methods according to the symptoms of each patient. Multiple evaluates should be performed before and during eating rehabilitation

4. Technique using special instruments

The screening test allows the observation of the presence or absence of deglutition reflex, choking, and respiratory state. However, videofluoroscopic examination and deglutition endoscopy are required when there may be silent aspiration because it is difficult to judge. Therefore, we explain these testing methods below.

1) Videofluoroscopic Examination: VF

VF is a method that provides the most useful information as a specialized deglutition function test. Although it includes radiation exposure and the risk of aspiration, a great deal of information can be obtained and does not require a complex technique. Because the deglutition is fast and complicated, VF is the optimal technique for physiologically examining it.

(1) Objectives

The purpose of VF is classified roughly into diagnosis and treatment. The purpose of testing for diagnoses is to determine the relationship between the symptoms and pathology; therefore, VF examines malformation, dysfunction, aspiration, and remaining food. In examining the oral environment, the purpose of the testing is to identify a treatment that decreases aspiration and increases the safety of eating. Furthermore, this method can lead to coordination of food, body posture, and eating method.

We investigate the method without aspiration while changing the position of the trunk and conditions such as the cervical angle, the quantity of a mouthful, the eating method, and the texture of

the food. We can evaluate the passage of food from the oral cavity to the pharynx, valvular function associated with deglutition (the epipharynx, larynx, and opening of the esophageal entrance), and esophageal peristalsis.

(2) Method and points to note

① Conduct the testing efficiently in a short period of time to reduce fatigue and exposure to radiation

② At first, look through them by the side and then by the front. Furthermore, check the state of the passage at the middle and lower esophagus

③ Start an examination in the usually posture. In the case of patients with severe dysphagia or those who have not eaten in a long time, for safely, we adjust their posture to the 30 degrees dorsal position with their chin positioned down. Also, we devise a chair and devices that maintains an appropriate posture

④ Barium sulfate formulation is generally used, 3-5 mL is used, however, the quantity is decreased for patients who cannot hold contrast media to the oral cavity and for whom aspiration is expected. When serious aspiration may occur, a hyposmotic nonionic iodo preparation is used. For other patients, contrast media containing a thickener or food including contrast media are used

⑤ Assessment is performed in reference to the end-point of the Committee of the Eating and Deglutition Rehabilitation Society

2) Videoendoscopic examination of swallowing: VE

VE is a method for observing the shape of the deglutition organ (oral/pharynx/larynx) and detailed movement of the food is easily observed using the fiberscope. This method is superior because it allows the observation of the cavity of upper pharynx in particular. Furthermore, we can observe the positional relationships among the piriform dimple, such as epiglottis, vallecula, ary-epiglottic fold, inlet of larynx, and larynx organ. It allows the direct examination of food and secretion in the larynx and pharynx using color three-dimensional images.

It is often performed in the sitting position, but it can be performed at the bedside. It can be performed repeatedly and in different positions. However, fiberscope insertion can sometimes cause some local mucosal injury and pain. And the sense of incongruity that that fiberscope gives to the nasal cavity and pharynx may have a negative affect on deglutition. Also, we cannot see the moment of deglutition. Therefore it enables the evaluation of a more detailed dysphagia to perform with VF.

The characteristics of VF and VE are compared in Table 1.

Table 1 A comparison of VE and VF

	VF	VF
Disorders in chewing and making bolus	×	◎
The alimentary bolus transportation to depths tongue	×	◎
A velopharyngeal or nasopharyngeal closure function	○	△
Larynx increase	×	◎
Pharyngeal helminth	△	○
An epiglottis choke	×	○
A glottis choke	◎	△
The delay of the deglutition reflex	○	○
Aspiration	△	◎
The food remaining in the pharynx	◎	○
Alimentary bolus transit time	×	◎
Sense	○	×
Dysfunction of the cricopharyngeus muscle	×	◎
A state of pharynx and larynx mucosa	◎	×
Structure	○	○
Esophagus	△	◎
Radiation exposure	−	+
The pain of the patients	△	△
Simplicity	◎	×
The evaluation while eating	◎	×
The evaluation in the bed	◎	×
Biofeedback	○	○
Flexibility of the deglutition	×	△
Quantitative testing	×	×

◎ : an optimal evaluation method ○ : appreciable
△ : appreciable partly × : not appreciable
+ : exist − : not exist

(1) Objectives

The diagnoses of organic defects such as tumors, the diagnosis of functional defects, means of compensating for dysphagia, the confirmation of the effects of rehabilitation, and education of patients, family members, and staff can all be performed using videotape recordings.

(2) Method

A fiberscope is inserted from the nasal cavity and the nasopharynx, oropharynx, hypopharynx, and larynx are observed over time.

① Firstly, carefully observe the pharynx and larynx, then observe organic diseases, the presence or absence of involuntary movement such as motor paralysis and dyskinesia

② Assess swallowing movement by observing dry deglutition and food deglutition. Because contrast media is not required, testing using normal food is possible; therefore, it is available for testing eating and the effects of food texture

3) Other tests

(1) Ultrasonography: US

Hold a small tool to the lower chin and watch the tongue and hyoid movement during deglutition. The strong points are simple, noninvasiveness, and no exposure to irradiation. Because it can be performed using normal food, it can be used as an evaluation of oral exercise in the future. Examine the motor function of the tongue in the sagittal plane and the maegashira section using a supersonic wave probe from the bottom of the jaw. Because the pharynx is heterogeneous tissue consisting of bone, cartilage, and muscle, it is difficult to examine.

(2) Measurement of deglutition pressure (esophageal pressure)

This is not currently a common method, but it can quantitatively and longitudinally measure changes in the inner pressure by muscular activity during deglutition. It is very useful because it can measure the slackness of the esophagus entrance, which is the most important activity in the pharyngeal stage, based on the inner pressure from the pharynges and esophagus at rest and while swallowing. In particular, it is the most suitable test for examining the superior esophageal sphincter. If we can determine the pharyngeal maximal pressure, standstill and the pressure changes of the esophagus entrance at deglutition, from a clinical perspective, it can help elucidate the mechanism of dysphagia, select the ideal training method, and evaluate the training effect. However, the measurement apparatus is expensive, and a standard method and machine parts have not yet been established. Furthermore, the sense of incongruity of the probe is large; therefore it is not widely used.

(3) Scintigraphy

Make the patients swallow a fixed quantity of radioactive material, and measure the accumulated site and quantity. Observe radioactive material with still images taken using a gamma camera. The volume of aspiration and material remaining in the pharynx can be quantified precisely. However, we cannot determine the cause of the aspiration or the material remaining in the pharynx because we cannot observe the oral cavity or pharynx dynamically using this method. However, this method is useful for close inspection at the esophageal stage, and is superior for diagnosing gastroesophageal reflux. Recently, scintigraphy has been used to measure oral transit time and pharynx transit time in a short time.

(4) Electromyography

We can evaluate the shrinkage and relaxation of the muscular activity and cricopharyngeus muscle associated with deglutition. Generally, a specific muscle is pierced with an electrode in order to measure the timing of muscle contractions and changes in the action potential. However, this testing

is injurious because of the use of needle electrodes. Also, it requires mastery of the skill of piercing a muscle with an electrode. Therefore, it is not used in the daily clinical setting.

Finally, when we conduct testing using these specific appliances, we should explain the purpose, methods, and risk, to the patients and their families and obtain their consent. Whenever possible, it is desirable to obtain written consent.

There are various examination methods, and choosing one method the ground of necessary information for an evaluation and treatment of the dysphagia. The reliability of a single test result is not high, but by combining multiple methods, a sensitivity of 90%, which is comparable to VF, can be achieved. Therefore, it is important to choose the examination method that has the smallest burden on the patient, depending on the patient's clinical condition.

(Masataka Itoda, Masako Kishima)

XI Home oral care

107. Oral care for care recipients who are unwilling to open their mouth

1. Consider reasons for not opening the mouth

The ability to open and close the mouth represents the beginning point of oral care, and is key to providing effective care. When providing oral care, two matters need to be confirmed in regard to opening and closing the mouth.

First, many people feel reticent to showing the inside of their mouth. This could be due to animal-like instincts. The mouth is not an organ that is in constant contact with the outside world. Rather, it is designed to insulate itself from stimulation from the external environment. Being reticent to show the inside of the mouth and taking actions to avoid this action can be considered an essential defensive instinct of human beings.

Secondly, in terms of the physiology of the mouth, even a small wound on the mucous membranes can cause problems with eating and articulation. A small amount of pain can have various influences. The mouth can be closed to prevent pain, protect from stimulation and prevent dryness. Opening and closing the mouth can be consciously controlled, but instinctive and unconscious responses are all involved.

These issues are probably understood by many professionals and caregivers. In actual care situations, however, oral care for patients who are unwilling to open the mouth is difficult. From the perspective of the patient, retaining a sense of control over care is very difficult, as care essentially requires the recipient to be passive. The caregiver must therefore pay close attention to not only three situations previously mentioned, but also other situations of the individual receiving care, so that the care is not unidirectional.

2. Basic causes of not opening the mouth

Causes of a lack of mouth-opening can mainly be categorized into three kinds (Table 1): physical inability to open the mouth (functional factors); desire to avoid opening the mouth (psychosocial factors); or a lack of understanding of what is requested (cognitive function-related factors). If no functional factors are evident, psychosocial factors may be involved in many cases, and cognitive function-related factors may be relevant in a smaller number. Factors to assess in patients who are unable to open the mouth as well as examples of treatment are listed in Table 1.

1) Functional factors

In cases where “the mouth does not open”, physical problems should be suspected first, and a physical assessment conducted. Unless factors such as wounds, disturbance of consciousness or insertion of tubes are evident, problems inside the mouth involving the gums, mucous membranes, and teeth need to be ruled out. The patient must be asked to open the mouth as wide as possible to allow observation of the following points. If full observation is not possible, pain is likely preventing the patient from opening the mouth properly, and consultation with a dental professional is warranted.

2) Psychosocial factors and cognitive function-related factors

To assess psychosocial and cognitive function-related factors, the basic stance of professionals and caregivers to oral care should be assessed before performing further evaluations and providing care. By the caregiver checking their own attitude, this attitude upon assessment and care, these factors can be clarified in many cases. Basic attitude should thus be confirmed upon providing care.

Table 1 Factors of “not opening the mouth” and coping examples

	Factors	Coping Examples
Functional Factors	Temporomandibular dysfunction syndrome, oral sores, tumors, etc. External injury, post-oral surgery, etc. Disturbance of consciousness, under anesthetic[1)], etc. Tube insertion from mouth or nose, such as edotracheal intubation and transnasal catheter	・Receive consultation at dentistry, oral surgery, etc. ・Assess to ease pain. ・Confirm the level of consciousness. ・If there is unnecessary muscle tonus, conduct relaxation or muscle stretch before providing care. ・Confirm the purpose of use of tubes, etc. and pay attention to operation. Try to fully understand the situation of whole body.
Psychosocial Factors	Ashamed of opening the mouth. Uneasy about halitosis. Worry about surprising those who see (e.g. under orthodontic treatment). Afraid of and anxious about what will be done. (Will it hurt?) Worry about something wrong being pointed out. Strong tension. Dislike the person who see (is near); cannot trust the person. Dislike the place of showing (environmental factor). Care goods and methods are unpleasant.	・Understand the living history, habits, preference, and patterns of a care recipient. ・Listen to and sympathize with the feeling of a care recipient. ・Understand the fear and surprise that an unknown person wearing a mask and gloves suddenly appears in front of the eyes. ・Lower the tone of voice and talk slowly and in a relaxed way. ・Handle with constant smile. ・Create trust relationship. ・Avoid care that causes aches or pain as much as possible. If it is not avoidable, explain fully. Incorporate pleasant stimulation after pain whenever possible. ・Don’t force. ・Select appropriate care goods depending on the individual’s situation of the inside of the mouth.
Cognitive Function-related Factors	Don’t know what to do (dementia, etc.) Don’t understand the language (instruction is not clear). Anxious and afraid.	・Utilize non-verbal communication methods such as facial expressions and gestures. ・Talk with gentle words. Begin with greeting. ・Confirm the level of hearing and vision. ・Confirm understanding. ・Explain with easy-to-understand words. ・Touch gently. ・Allow to get accustomed to the caregiver little by little without forcing. ・Utilize stimulation that is not unpleasant. ・Keep in mind that dementia patients don’t lose memories and rather remember unpleasant memories.

1) Under the situation where intensive care is necessary, the state of hypnosis might be intentionally maintained using anesthetics, etc. in cases other than the time of surgery.

3. Basic attitude upon providing care (MEMO 1)

1) Create a trusting relationship.

First, creation of a trusting relationship between the caregiver and care recipient is important. As mentioned earlier, people are generally unwilling to open their mouth to an unknown person for no reason. The body detects and responds to danger consciously and

MEMO 1 Basic attitude upon providing care

1. Create trust relationship.
2. Minimize pain accompanying care and maximize exhilaration.
3. Do not enforce care.

unconsciously due to basic instincts. Accommodating the life pace and rhythm of the patient is important in creating a trusting relationship. For example, the timing of visits can be set to minimize any disturbance to the regularly scheduled activities of the patient. Visits or close contacts can be made after obtaining permission from the patient. The speed of conversation or actions of the patient can be considered when trying to determine the optimal speed for the patient. The mouth should never be opened hastily. Shibata notes that "touching the mouth or area around the mouth from the very start should be avoided, irrespective of how quickly you would like to see inside the oral cavity". Kuroiwa states that "it is important to detect the psychological situation and background of the care recipient by using the five senses to understand the care recipient, before inserting a finger or toothbrush into the mouth" and further describes that "it is essential not to intrude on the inside of the mouth without permission, just like one should not enter another person's house with shoes on".

2) Minimize pain accompanying care and maximize positive feelings

The next step is to provide comfortable oral care by minimizing any pain accompanying care and maximizing positive feelings. Oral care should essentially be a pleasant experience. The process should not be associated with accompanying pain or the need for the care recipient to be patient. However, alveolar pyorrhea or dental caries can easily cause pain just by touching and care may result in bleeding. Mucous membranes may also be easily damaged with aging, and wounds might be caused without knowing because instruments such as tooth brushes can accidentally touch unintended surfaces at the time of care. Proper tools such as cleaning tools comprising soft brushes, sponges, etc. should be selected depending on the situation observed inside the mouth. For this purpose, full observation before and after care is essential to confirm the presence of wounds or sores. In addition, if the patient has experienced pain or forced treatment or care in the past, resistance to the caregiver may have become a conditioned reflex. A patient who is comfortable and relaxed will naturally be able to relax the mouth wider and more easily.

In this regard, consideration must also be given to patients with dementia. As described in detail later, dementia involves the deterioration of cognitive functions such as memory and judgment. However, the caregiver needs to fully understand that cognitive function is never completely lost, even in cases of severe dementia. Furthermore, dementia can show as a wide range of presentations. Repeated actions become habitual even with dementia, and even if the name of the caregiver has been forgotten, the face and atmosphere might in many cases be remembered. Particular attention should be given to the fact that negative experiences and associations are often remembered the most clearly. Care should be provided in consideration that the orientation of the patient, such as the sense of date and time, can differ from the range of procedural memories such as sensory perceptions associated with the physical body. However, an easy judgment of severity or presentation in regards to dementia is a taboo. Discrimination between depression and delirium is particularly difficult in the case of elderly patients. Professional diagnosis is necessary in unclear cases.

3) Do not provide care against the wishes of the patient

Third, care should never be forced on a patient. If the patient displays a strong sense of fear or resistance, just letting them see the face of the caregiver and finishing care without touching the patient's body is acceptable. After meeting several times, care may be able to be initiated gradually, beginning from the edges of the body or by shaking hands, and approaching the shoulder, face and mouth, while letting the patient set the pace of acceptance. At the time of beginning oral care, begin with introductions or greetings, and politely ask the patient to open their mouth while observing whether the patient is prepared to take this step. If necessary, beginning with actions such as massage of the salivary glands or cheek muscles, or relaxation of shoulders may be useful.

Opening the mouth can be considered to lead to opening the mind. That is, the mouth will only open to a person whom care has been entrusted. Oral assessment and care must be provided without forgetting that the human relationship remains as the fundamental basis of care.

4. Things to keep in mind when providing oral care to patients with dementia

Dementia is not simply aging, but rather represents a disorder of the brain. Major symptoms include dysfunctions involving semantic memories (agnosia), procedural memories (apraxia), language (aphasia), judgment, and orientation. These disorders can cause various symptoms, such as wandering, delusions, sleep disorder, anxiety, and confusion. Upon receiving oral care, various symptoms can be observed due to these major symptoms of dementia.

Various examples can be given in which oral care is difficult in the case of dementia patients. Instructions in oral care may not be fully or even partially understood and care may be rejected. Water for gargling may instead be swallowed. The patient may be unwilling to open their mouth, might not recall how to hold a toothbrush, may attempt to brush with something other than a toothbrush, may bite the toothbrush, or may begin to get angry. Understanding that such difficulties may arise due to a lack of understanding of the meanings of words, situations or procedures may facilitate an understanding of the confused world of dementia patients.

Since dementia symptoms vary widely, identifying clear causes and effects for each symptom is difficult. Since the dementia patient is often unable to explain their feelings or actions, the caregiver needs to be able to imagine the world of the dementia patient to some degree. While several methods for dealing with dementia are provided, attention is required because the optimal methods of care are likely to differ between individual cases. If the meaning or method of toothbrushing is not understood because of agnosia or apraxia, toothbrushing might be achievable after showing the motion of toothbrushing or gargling or by utilizing gestures or pictures. Depending on the patient, placing a toothbrush on the lips or having the patient hold the toothbrush in their hands might be effective in some cases.

Some cases will remain in which toothbrushing cannot be performed independently or is rejected. In such cases, areas not brushed might need to be checked and brushed later, after the care recipient performs brushing as best they can. Even though resistance may initially be encountered, the mouth may later be opened without resistance if having someone brush the teeth can be identified as a pleasant experience. The caregiver must constantly have an attitude of acceptance and sympathy, as disorders such as aphasia may cause irritation because of an inability to speak words despite sufficient understanding by the patient. Temporary confusion may also be seen at times. Help may sometimes be required even, if it is not usually needed. The caregiver needs to have the ability to flexibly change the methods of care depending on the mental and physical situation of the patient.

Furthermore, dementia patients receiving care should not simply be written off as “dementia patients”, but proper consultation with a physician should be recommended if necessary. The caregiver needs to understand that progression of dementia can be stopped with early diagnosis and treatment.

5. Dealing with reasons for not opening the mouth in cases other than dementia.

Many pathologies can result in reduced mouth-opening, such as wounds in the mouth, oral dryness, swelling of the gums, dental caries, alveolar pyorrhea, and sores. Reducing such intraoral pain is very important, but situations in which pains remains unreported also need to be considered. Difficulties such as dementia, speech dysfunction and disturbance of consciousness can result in insufficient assessment of the inside of the mouth and loss of opportunities to consult with dentists. In such cases, timely

cooperation with dental professionals is needed, rather than forcefully proceeding with care.

In cases with transnasal catheters or endotracheal intubation, small motions in the throat or larynx can cause pain or discomfort. Some patients with these tubes grimace, display tension in the shoulders or cheeks, may appear to be chewing on the tubes, or may keep the mouth open for extended periods. The caregiver needs to fully understand the objectives of using these tubes, and then must address any sense of discomfort, pain or oral dryness. Any sense of discomfort or pain due to motion or handling of tubes will vary significantly between individuals. Wounds might arise due to the methods used to fix tubes, or from stimulation caused by the tubes. While many patients remain unaffected by these issues, small motions can causes pain in some patients.

Care may also be rejected due to unpleasant methods or products used in care. Diluted antiseptic solutions can be used for care to prevent infection, but may sometimes promote allergies or dryness in the mouth. Proper selection of care products is thus imperative. Cooperation with care might be obtained simply by selecting proper products depending on the individual situation inside of the mouth, such as the hardness and size of a toothbrush, type of sponge, etc.

In any case, full assessment of individual factors and consideration of methods to cope with each issue are crucial to patient care.

(Naoko Hara)

108. Guidance to caregivers (family members or home caregivers) when oral care is provided at home

1. Background of homecare

Until relatively recently, recuperation at home was common, with families and relatives providing the majority of care. In modern society, however, the family structure has changed dramatically. Trends toward a nuclear family have progressed, and many people do not live with their children even in their old age, instead living on their own or with an aged spouse. In some cases where care becomes necessary, cohabitation with children or relatives can result, but implementation of care insurance in 2002 has facilitated the provision of care services if certification of the need for long-term care can be provided and the degree of need is judged sufficient. Cases of at-home recuperation receiving some kind of care range from infants to the elderly. The level of disability involved and the care provided also varies. In recent years, cases of death at home have been observed, as people live on their own until the end by utilizing care insurance or employing a caregiver. Care situations vary, and each care recipient has a different situation.

For this reason, some cases cannot be readily understood according to values and beliefs on the side of care service providers. Life at home is comprised of the values and beliefs of the patient and their family. A care service provider must therefore propose care that will maintain and recover health while respecting the values and beliefs of the patient and protecting their dignity. Continuation of care can only proceed by keeping in mind that acceptance of this care situation is dependent on the acceptance of the patient and their family.

2. Difficulties of oral care at home

Oral care is one of the key components of daily care, along with care for meals and going to the toilet at home. However, it does not directly influence maintenance of life, unlike physiological drives such as appetite and egestion. For this reason, oral care often receives a low priority unless there is a strong desire from a care recipient or strong oral odor, and the need of care is not recognized in some cases.

Proper oral care significantly influences the physical, mental and social aspects of the care recipient, and might enhance the motivation to fight against a disease or promote independence. Progress can be easily made if both the care recipient and caregiver recognize this to some extent and are interested in oral care. However, if such consensus is lacking, it is essential to proceed with caution. First of all, since trust in the relationship is the first priority, care service providers should be comfortably off to the patient.

3. Supporting oral care at home (MEMO 1)

1) Assess the abilities of the patient and caregiver

The first point in supporting oral care at home is to assess the ability of the patient to perform oral self-care. An understanding of the level of ability is necessary: what the patient can or cannot do on their own; whether they can brush fully; whether brushing is sufficient if they brush on their own; whether the patient cannot move independently, but can brush once taken to the washroom; whether or not the patient can apply a method if provided with instruction, etc. The methods of support required needs to be reviewed in detail, focusing on the ability of the patient to understand and their cognitive functions, as well as the presence of limb palsy. Even when the degree of care required is severe and the patient is unable to perform many actions, the care plan should be prepared to maximize their participation in accordance with the available ability and to complement the areas that they are unable to contribute to.

In particular, the range of what the patient can do might possibly expand in the case of homecare, because living in the familiar surrounds of their own house rather than at an unfamiliar hospital or care facility eases the tension in the care recipient and facilitates rehabilitation (the process to regain functions that have deteriorated as a result of a disorder). A familiar washroom and dining table might help to reawaken lost functions in dementia patients. The possibility of functional recovery needs to be sought, while focusing on healthy areas of the patient and what they can do, even under situations in which functions have deteriorated as a result of diseases or disorders.

MEMO 1 Points to support oral care at home

1. Assess the ability of a care recipient and caregiver.
2. Prepare a plan in consideration of care burdens and economic burdens.
3. Support self-decision by a care recipient and caregiver.
4. Create support network by professionals.

The second key point in providing support is to understand who is responsible for or able to be responsible for support and to understand the abilities of that individual contributing to care. At the same time, the caregiver needs to assess acknowledgment and skills of oral care, as well as the ability of care. The priority of oral care changes depending on the recognition of the caregiver. The caregiver needs to be involved as a leader with proper acknowledgment of oral care depending on the situation of the patient.

2) Prepare a plan in consideration of care burdens and economic burdens.

Burdens on the caregiver tend to increase with increasing severity and duration of the patient's disorder. Also, as described above, the form of families has been changing significantly in recent years, and in a significant number of cases the caregivers themselves are aged and suffer from various diseases or disorders. Some caregivers work and care for their own children at the same time, and sufficient care cannot be achieved by the caregiver alone in many cases. Furthermore, as the burden of care increases, caregivers can feel a greater sense of depression or isolation. Guidance and distribution of responsibilities associated with care thus need to be handled with caution.

Oral care needs to be performed several times a day. Care as expected by a caregiver might not be possible, including difficulty opening the mouth or chewing the toothbrush in some cases, resulting in increased stress on the part of the caregiver. For this reason, it is necessary to address the situations of the care recipient and caregiver, including care details and method, sharing of responsibilities, etc.

In addition, although various oral care products have been proposed and developed, many are costly in the long run. Various economic burdens can be expected concerning oral care, including dental consultation, medical expenses, care expenses, etc. Proper products need to be selected in consideration of costs in addition to effects and efficiency of care, as well as time and effort for care, and to recommend or propose these to care recipients and caregivers.

An individual care plan for oral care needs to be proposed, particularly in the case of homecare. As the overall objective for the patient is confirmed through discussions at a care management company or among caregivers, common recognition also needs to be reached regarding the objectives of oral care.

3) Support self-determination by the care recipient and caregiver.

Care recipients and caregivers have been conducting oral care using methods they have learned throughout their lives or learned on their own. When such methods need to be changed, acceptance may depend on the approach used, while it could cause backlush to the methods changed that can result in problems with other kinds of care. Even if the priority or urgency is high, nothing should be initiated without adequate communication with the care recipient or caregiver. Unless these participants feel like selecting such a method, no transformation of behavior will result. For successful care, self-determination that will lead to actions must be supported.

4) Create support network by professionals.

Proper professionals might be needed, depending on the individual situations. Information will thus need to be collected on services and human resources that can be utilized locally, and a line of personal contacts must be created. Informal associations such as the family, relatives, friends and acquaintances can be considered, as well as formal support including professional visiting nurses, visiting dentists and dental hygienists, home helpers, speech therapists, occupational therapists, physical therapists and other service providers. Creation of human environments that can enhance independence and quality of life for the patient as well as creation of networks will significantly influence not only oral care, but also their overall life.

4. Oral care skills required at home

In the case of oral care at home, the care environment must be maintained by utilizing tools and products available at home. For example, when an aspirator is needed, a simplified aspirator can be obtained in some cases, but other situations may require some degree of creativity in achieving methods to clean the inside of the mouth without using suction. Depending on the care needs for the patient, items that "must be used" have to be obtained, but flexibility such as replacing some items with alternatives or using other creative methods should be expected.

Skills to be kept in mind for providing oral care at home include "position of the patient", "standing position of the caregiver", "arrangement of products", "confirmation of necessary products", "methods for cleaning inside the mouth", etc.. These will change depending on the muscular power and range of joint motion of the patient, as well as the presence of assistance from a caregiver. In particular, home caregivers often tend to use an improper standing position due to limitations of space in the household. The arrangement of furniture should thus be reviewed so that physical strain on the bodies of family members and caregivers are minimized when providing care. In a private household, hot towels, hot water, ice, etc. may not be readily available in some cases. Preparations in advance or requests for preparation in advance of required materials are therefore needed.

5. Support to enhance evaluation and satisfaction of care

Finally, not limited to oral care, burdens on caregivers who provide care at home are significant, both physically and mentally. However, caregivers typically provide a service with deep affection for the patient. They are willing to sacrifice their time and energy to make efforts to maintain the life of patient. Continuation of such activity is not possible without affection. Although their affection is not typically the kind that desires compliments or recognition from others, providing positive reinforcement, compliments, encouragement and respect will strengthen the efforts and help to relieve the psychological burden experienced by these caregivers.

Sharing the joy of the accomplishments of care among the patient, caregiver and other providers of support will also reward the efforts of the patient and caregiver. Timely discussion of the meanings of any changes that are noticed, however small, is important. If the change leads in a positive direction during the course of care, such improvements will create joy and confidence. If the change is unexpected, some form of corrective action might be needed, or it could be an unanticipated good change. Professionals who are able to provide objective assessment need to be able to deliberately evaluate and report the results, in order to not only turn the care objectives into accomplishments, but also to enhance the self-esteem and satisfaction of both patients and caregivers.

(Naoko Hara)

109. Training for improving oral functions (for home care)

Oral care at home varies according to the state of the person requiring care. Variations can also be seen according to the cooperation of caregiver, such as family of patient, and also their abilities. Therefore when designing the care system, situations of the patient, family, and caregiver in charge, need to be considered. Covering all the contents of this subject in a single chapter is difficult. For more information about each subject, please refer to the bibliography.

General ability (knowledge, behavior, and technique) of the person in charge of oral care at home is very important. In many cases this individual not only supervises oral care, ingestion/swallowing, but also functions as the instructor for the rest of family.

The goal and expected effect of oral care at home is simply more than improvement and prevention of oral disorders such as xerostomia, halitosis, decay, and periodontal disease. Prevention of aspiration pneumonitis, improvement of the level of consciousness, development of a stable pattern in life, and overall positive effects on life as a whole are also aimed for.

1. Philosophy of care

When conducting visits, evaluations and improvements should always be kept in mind. Generally, we collect information and determine the present condition of the patient using criteria appropriate to their age and pathology, using the results of evaluations to set new goals and suggested behaviors as countermeasures. In such cases, the role needing to be filled to achieve care and people who can potentially provide support are indentified. The will to attempt improvements is reinforced by setting achievable goals.

1) Assessment of patients after transfer to home care

The processes and present status that led to treatment at home must be understood. In particular, clarifying whether there is sufficient swallowing function is important and depends on what kind of care is necessary. When ingestion is not possible, we confirm whether ingestion by methods such as tube feeding or gastric fistula is feasible.

2) Family assessment of patients

The major role of care at home is the family, with whom the patient resides. However, large differences can exist in the family's motivation for providing care, degree of understanding, and ability to enforce decisions. The adequacy of home care is not easy to evaluate. Several visits may be needed to evaluate the situation and make the necessary change in method of home care. The number of visit and method of home care should be designed by this evaluation. Diet is major part of home cares, as to a bath, and dejection. Oral care is crucial to make meals more enjoyable. Hygiene of the oral cavity is very important, but can be difficult for the family to maintain. Specialist oral care thus provides good care while relieving some burden from the family. The family therefore does not need to be caught up with all the details of care and focus can be placed on the most essential part of home care. As for professional who provide the oral care, listening family hardship, and counseling them is important part of their work.

Also, through the counseling of the family helps professional to exchange more information about their patient with family.

3) Assessments for daily care

Methods of evaluation at home include a water swallowing test and a food test. These tests examine swallowing ability, and evaluation does not require special equipment. However, testing swallowing ability has the risk of causing aspiration pneumonitis. Therefore evaluations (testing) can be performed in

an institution with the necessary equipment is prepared and doctor is attending. For the person in charge of oral care, the focus in evaluating the state of care is the oral hygiene situation. Cleaning of areas such as residual teeth, gingiva, tongue, and prostheses is observed and the presence of abnormal findings such as inflammation and sores is determined. Mobility of the lips and tongue can also be examined and speech (including volume and acuity) in conversation while performing oral care.

4) Assessment of daily activities

The loss of daily activities can cause transition to bedridden status and dementia.

Spending time at day center once a week is should give a change in life of the patient. It is important to create a "pattern" in the patient's life, such as regular, predictable times for sleep and meals during the day. It is desirable that a pattern is formed in activities repeated every day, which pattern the patient can follow for future daily function. Daily activities should be initiated after considering the times at which the family is able to maintain care in addition to the personal schedule of the patient. Consistent cooperation by the family will be easier to obtain if such considerations are made. Training while at home must be able to be repeated in the long term, day after day. Creating such a system will relieve the burdens on the family (physical, temporal and economic).

2. Direction according to the situation of each patient

1) Maintaining a basic oral function

The best outcomes will be obtained with the cooperation of the family. However, in many cases the family will have difficulty spending sufficient time. Therefore, we conduct basic speaking exercise by using television or radio program as a teaching material. Television and radio programs are easy to fit into a daily schedule.

If the programs are unavailable at a time required for care, the patient's favorite program, can be recorded and replayed at the time required for care. Also enjoyable TV, or radio program can help the patient to practice speaking more often. Such activities may be effective in stimulating the cerebral functions of the patient as well as providing a positive experience with family members. Exercise of articulator muscles and structures such as the lips, tongue, and soft palate can be achieved with speaking, simultaneously providing natural training for the pathways shared by swallowing.

Advantage of this training is that it can be provided without annoying other people.

2) When patient can take sitting position

The patient and family may naturally desire to finish care at home. However, patients may easily become bedridden. In the bedridden state, aspiration pneumonitis and decubitus ulcer may easily develop, and dementia may represent an even larger problem in the long term. The patient should thus be encourage to get out of bed whenever possible, particularly at meal times or least try to eat at sitting position. However, the patient will require a safe position that not only minimizes the risk of aspiration, but also is easily maintained by the patient without causing fatigue or pain. For example, although aspirate is considered difficult using the Farrar position or semi-Fowler's position, positioning should switch because both are tiring positions, and maintaining a safe position is important. Also, during care, we must be careful to not stress the neck muscle.

3) When hemiplegia is present

Any dyskinesia on the paralyzed side is presumably remaining after previous rehabilitation, so further improvements are likely to be difficult. As a result, methods that can compensate for lost function or develop new function in the non-paralyzed side are therefore needed. In particular, endodontic cleaning can be used for training and supporting cleaning motions by the non-paralyzed side and can help the patient to realize that some degree of independence can be regained.

4) When the patient cannot perform brushing independently

Oral care is obviously a vital problem. Autopsies among elderly individuals have shown silent pneumonia in more than 70% of patients. However, oral care can inhibit the onset of aspiration pneumonitis with or without symptoms. Care must be taken regarding oral care in patients receiving tube feeding in particular. That is, tube-feeding obviates the need for swallowing function, so numerous functions of the oral cavity are bypassed and decrease due to disuse. As a result, the inside of the mouth easily becomes overgrown with bacteria and the risk of aspiration pneumonitis by bacteria-rich saliva is greatly increased.

The patient needs to be informed when starting and ending oral care, to obtain cooperation. Because, some of the patient may expresses dissatisfaction not cooperating the oral care. In such case, caregiver should search for the cause of dissatisfaction to improve oral care.

5) When the patient can perform brush independently

Some training is necessary to achieve good brushing technique, even in healthy individuals. While the patient may be able to perform basic cleaning of the oral cavity, plaque and residual food may be left on the paralyzed side, therefore the caregiver should brush the unreached areas. If the family is not achieving proper care, techniques need to be taught to improve cleaning.

Good brushing technique also helps to remove causes of halitosis from the teeth and lingual surface and prevents taste disturbance. When identifying whether proper brushing has been performed, the presence of cavities (as staining or pitting) can also be determined and requests for visits to a dentist can then be made as necessary.

6) When oral care is necessary

When performing oral care at home, preparation of suitable instruments is necessary. For example, a bite block and sponge brush can be prepared to clean the mucosa, tooth surface, even in patients who are unable to fully open the mouth (these instruments should be prepared for each individual and must be disinfected after each use).

First, all prostheses (e.g., denture) must be removed and cleaned. In case of partial denture, removing this kind of denture can be difficult even for patient themselves, their family and caregivers. Therefore oral care provider must consult to dentist or dental hygienist to remove prostheses.

Consultation with a dental hygienist can assist with oral cleaning by improving the selection of the toothbrush and identifying areas that are difficult to clean effectively. In any case, planning is required regarding when oral care is needed so that examination and care by specialists such as a dentist or dental hygienist should be provided once a week.

7) When oral ingestion is possible

In order to provide effective oral ingestion training, shape, form, and the nutritional content of the food must be consulted with doctor, dentist, and dietitian.

Also, when start the oral ingestion training, we must regard the patient’s feeling for dejection. Because some of the patient feels shame about their dejection being take care by their family and caregiver. Such a feeling makes patient to hesitate oral ingestion and resulting malnutrition.

Also, fluid intake must be considered in terms of possible dehydration with nutritional management. Fluid intake facilitates oral cleaning. In particular, if the patient can gargle, gargling with a small amount of water between the cheeks and tongue can help with oral cleaning and moisturize the oral cavity. Training of muscles such as the orbicularis oris and buccinators muscles, and the soft palate is also achieved by gargling.

8) When training for dysphagia is necessary

Swallowing training must be performed under specialist supervision. Training that can be performed at home is thus considerably limited.

Yet it is important to maintain and improve current swallowing ability by performing indirect training.

In order to do so, conditions such as willingness on the part of the patient and their family, degree of understanding, ability of the caregiver, and support from the family doctor is necessary.

As for swallowing training by the improvement that is in direct deglutition training and a graded food form, specialized assistance is often required. Indirect deglutition training to conduct at home in preparation is important.

9) When ingestion is difficult

When the patient becomes unable to ingest food properly, oral hygiene often decreases. Such deteriorations in oral hygiene increase the risk of aspiration pneumonitis. However, insufficient nutrition can be fatal. Therefore providing nutrition via a gastric tube or nasal tube feeding is important if oral ingestion is difficult. But still we should consider oral ingestion once a day to maintain oral function.

Also, not only the oral cavity, but also the pharynx and paranasal areas need care when the patient cannot ingest food orally. For example, when performing tube exchange, swallowing training meals such as gelatin-based foods can be provided. Trying Swallowing induction training such as low temperature stimulus method is sometimes important.

3. Summary

Oral care at home starts from the maintenance of basic, safe function and is performed as part of a regular daily pattern of activities. In addition, some of the professional training can be done by the family of the patient and cooperator.

But it still relays on willingness of patient’s family, cooperator and also level of patient’s handicap.

Maintaining the person motivation of the patient and their supports in an appropriate direction is important, and can be maximized by setting goals that are easy to accomplish.

(Ritsuo Takagi)

XII Others

110. Correspondence to sialorrhea

1. Sialorrhea

Sialorrhea is when saliva retained in the oral cavity overflows from the mouth. About 1-1.5 liters of saliva is secreted each day, and secreted saliva is spontaneously swallowed by pharyngeal reflex when retained in the oral cavity. The condition can be categorized into either true or pseudo-sialorrhea. True sialorrhea is a condition of increased saliva secretion due to an abnormality of the involved reflexes or the central nervous system, while pseudo-sialorrhea is the inability to retain saliva within the mouth and/or problems with swallowing saliva due to anatomical abnormalities of the mouth or pharynx or cerebrovascular disease. The cause of sialorrhea is determined by differential diagnosis based on the results of interviews, inspection, palpation and other examinations.

2. True sialorrhea

Treatment involves restricting saliva production. In cases of inducement by physical or chemical stimulation from foods, those foods should be avoided to decrease saliva secretion. In cases of oral disease such as dental caries or stomatitis, stimulation is decreased by treating the disease. Oral cleaning and oral care are performed in cases of poor oral hygiene with dental plaque and/or coated tongue. In the cases of central hypersalivation due to rabies, drug intoxication or cerebrovascular disease, diagnosis and treatment by a specialist is needed. Anticholinergic drugs are effective for decreasing saliva secretion. Ice massage at the skin surface of the submandibular and/or parotid gland is also effective. For surgical treatment, extirpation of the salivary gland or transfer of the orifice of the salivary ducts is occasionally performed.

3. Pseudo-sialorrhea

Oral and facial dyskinesia associated with various causes can compromise the ability to retain saliva within the mouth or adequately swallow saliva and cause saliva overflowing. In cases of dysfunction of lip closure and difficulty retaining saliva, treatments include training the patient in lip closure, ice massage of the orbicularis oris muscle and avoidance of a looking-down position. Practice in consciously swallowing saliva is useful for patients with dysfunction of the swallowing reflex who show intraoral retention of saliva. Such direction is necessary for patients with frequent spitting out and/or wiping away of accumulated saliva. In cases of incomplete swallowing function, indirect swallowing training can be adapted. Training must be performed carefully and without hurry in order to avoid microaspiration, as saliva is difficult for swallowing for the patient with dysphagia.

(Akihide Negishi)

111. Care for elderly patients with serious bruxism

1. What is bruxism?

Bruxism refers to mandibular movements made during sleep and resulting in unpleasant sounds. As bruxism occurs during sleep and is an unconscious habit, affected patients do not notice the activity until informed by sleeping partners or a dentist.

There are three types of bruxism. Grinding involves lateral movements grinding the upper and lower jaws together. Tapping involves up-and-down movements of the jaw, similar to movements. Clenching represents inaudible tooth contact such as forceful chewing and biting unaccompanied by mandibular movements. The International Classification of Sleep Disorders classifies sleep bruxism as a parasomnia, referring to the condition as “a stereotyped movement disorder characterized by grinding or clenching of the teeth during sleep”.

2. Why does bruxism occur?

Bruxism can be caused by unbalanced occlusion, psychological and physical fatigue or stress, and psychoneurosis. However, some researchers have noted that this is a physiologic phenomena that even healthy people can display during sleep. As a result, in many cases, the etiology of bruxism remains unclear. Since bruxism in elderly people can be caused by sleep disorders, dementia, or involuntary movements, psychiatric or neuro-internal medicine treatment should be provided before or at the same time as dental treatment.

3. How serious is the damages from bruxism?

In addition to the unpleasant sounds preventing sleeping partners from healthy sleep, sleep bruxism places pressure on muscles around the jaw as strong as during eating. Consequently, bruxism can result in serious damage to the teeth, such as abnormal abrasions and fracture, destruction of alveolar bone supporting the teeth (contributing to periodontosis), and fatigue of the joints and muscles of the jaw, leading to temporomandibular disorders. Damage can be particularly serious in the elderly, who often have few teeth left.

Glossary:

The International Classification of Sleep Disorders: As an aid in the diagnosis of sleep disorders, criteria of sleep disorders are shown in the International Classification of Sleep Disorders set by the American Sleep Association (ASA) and others.

Parasomnias: Sleeping disorders that occur when falling asleep, sleeping, or on arousal from sleep

Temporomandibular disorders: Disorders including all chronic diseases in which major symptoms include pain in the temporamandibular joints and masticatory muscles, articular crepitus, lockjaw, or abnormal jaw movements. Disorders of the masticatory muscles, articular capsule, ligaments or articular disk, and joint inflammation are included in temporomandibular arthrosis.

Premature contact: A state in which only few teeth of the upper and lower jaw show occlusal contact when closing the mouth before stable occlusion is achieved.

Occlusal adjustment: A state in which stable occlusion is achieved by dispersing biting forces into many teeth and by keeping correct contacts between the upper and lower teeth.

4. How is bruxism treated?

As mentioned before, the cause of bruxism is unknown in many cases, making treatment difficult. When one of the causes is premature tooth contact due to an unbalanced bite, the patient should undergo occlusal adjustment using oral devices such as a night-guard or splint, with follow-up to see whether bruxism is improved. Japanese health insurance covers these dental therapies. Dentists, however, should not perform irreversible therapies at the beginning of treatment, such as extensive occlusal adjustments or prosthetic therapies involving the whole jaw. As elderly patients with advanced dementia may bite the lip, tongue, or buccal mucous membranes during bruxism, dentists should recommend the patients to wear oral devices as soon as possible to prevent such biting.

To prevent bruxism, reducing causes of psychiatric stress is important. For that purpose, diagnosis and treatment should be performed by specialists in psychiatry and neuro-internal medicine. Many elderly individuals, in particular, have underlying psychiatric and neurological diseases, so cooperation with specialists in psychiatric and neuro-internal medicine is indispensable.

(Masayuki Fukuda, Youji Miyamoto)

112. Treatment of temporomandibular joint (TMJ) luxation

1. What is TMJ luxation?

TMJ luxation represents deviation of the mandibular condyle from the fossa, and can be categorized as either transitory or habitual. This condition is particularly prevalent among the elderly.

Habitual TMJ luxation might be seen on opening the mouth with activities such as yawning or eating meals. Other generalized diseases (e.g., movement disorder due to brain tumor, cerebrovascular accident, Parkinson's disease, psychotropic drugs etc.) are likely to be related to habitual TMJ luxation.

2. Anatomical Structure

Dislocation is caused by morphological changes in the mandibular condyle and fossa comprising the TMJ, resulting in disharmony with the actions of the masticatory muscles.

3. Clinical symptoms

Anterior luxation of the TMJ results in an inability to close the mouth, and difficulty with chewing and swallowing in general. Luxation is accompanied by pain in the TMJ, sialorrhea, long face and collapse of the anterior ear (Photo. 1). Such luxation is easily diagnosed by the dysfunction of occlusion in patients with teeth. Conversely, diagnosis may be difficult in edentulous elderly patients. Luzation of the TMJ may be uni- or bilateral. Cross bite is observed in unilateral luxation of the TMJ.

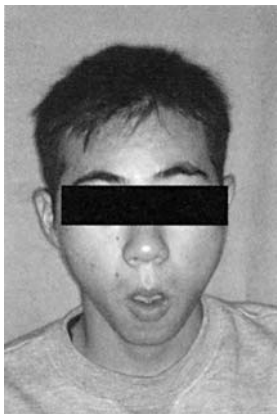


Photo. 1
Face findng of the luxation of the TMJ

4. Diagnosis

Luxation can be diagnosed clinically, but should be confirmed on radiography (Photo. 2, 3).

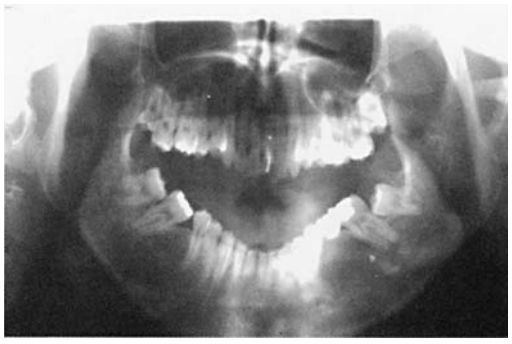


Photo. 2 Panoramic photograph

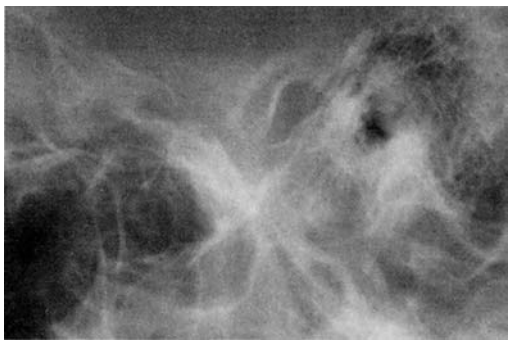


Photo. 3 Photograph of lamination

5. Treating luxation of the TMJ

Manipulative reductions are generally applied as treatment methods. The Hippokrates method is performed standing in front of the patient. Borchers method is performed standing behind the patient. The head of the patient should be stable not to move. The operator binds his thumb with gauze in order to prevent damage during repositioning of the operator's thumb joint. In the Hippokrates method, the surgeon stands in front of the patient and places the thumb on the molar of the mandible while holding the mandible firmly. Reduction is performed to slip past each articular eminence individually after pulling downward on the mandibular head, rather than attempting reduction of bilateral TMJs at the same time. Local anesthesia is used in the TMJ region to minimize patient discomfort. Intravenous sedation can be used to relax the muscle tone.

Fixation of the mandible and limited opening of the mouth after reduction are often needed for habitual TMJ luxation, such as with use of a chin cap and elastic wrap (Photo. 4). Fixation should typically be maintained for about 7-10 days.

Photo. 4
Face finding of the reduction

(Hideaki Sakashita)

113. Causes of and treatments for stomatitis

1. What is stomatitis?

Stomatitis is a generic name for an inflammatory disorder that involves the oral mucous membranes (tongue, gingiva, cheek, palate, floor of the mouth), with varying causes. The oral mucosa consists of stratified squamous epithelium and the lamina propria of connective tissue, and the epithelial cells are very thin compared with the skin. Numerous capillaries are present in the epithelium, giving the mucosa a characteristic red color. It is no exaggeration to say that the mucosal surface is constantly being damaged by physical, chemical and mechanical insults, particularly with substances of varying hardness, temperature, and chemical properties ingested during meals. However, the oral mucosa has a natural ability to recover rapidly from such insults, due to the abundant circulation and constant creation of new cells.

The causes of stomatitis are unclear. In general, bacteria and viruses in the oral cavity are thought to infect small wounds in the mucosal surface. However, various conditions seem related to such infection, such as side effects from medications or allergic reactions. Stomatitis seems to occur when the healing capacity of the oral mucosa is exceeded, either due to the strength of the insult, or reductions or delays in factors associated with recovery.

Various kinds of stomatitis are recognized, including aphthous, catarrhal, allergic, viral, candidal, and necrotic. Aphthous stomatitis represents the most common form.

2. Symptoms of stomatitis

Aphthous stomatitis, as the principal representative of stomatitis, can occur in various forms, such as single, multiple or recurrent. The shape of the stomatitis is typically circular, with a central pseudomembrane surrounded by erythema. At first, spontaneous pain is felt at the affected area. When the pain is severe, stomatitis will cause swelling and tenderness of the submandibular and cervical lymph nodes, and pyrexia as a physical symptom.

Symptom will usually improve spontaneously within 7-10 days.

The pain gradually reduces, erythema disappears, and the redness margin becomes unclear. Recover occurs with no remnant scarring. However, recovery is often delayed by systemic influences. Delayed improvements in pain, poor diet and secondary lymphadenitis can all contribute to stress the patient, further delaying recovery and forming a vicious circle.

3. Other diseases that must be considered

Simple stomatitis should heal within 2 weeks. Stomatitis that has not resolved within a month requires attention. The possibility of oral cancer should be considered. An ulcerated lesion associated with cancer may appear similar to stomatitis. However, palpation will show no induration with stomatitis, whereas a cancer-related lesion will often show induration. If stomatitis is recurrent, Behçet's disease should be suspected.

Other possibilities include lichen planus with both white and red lesion, pemphigus with easy sloughing of the mucosal epithelium, erythema multiforme exudativum with strong redness and pain involving the entire oral mucosa and decubital ulcers from chronic stimulation by ill-fitting dentures.

4. Treatment of stomatitis

Given the various conditions that can contribute to stomatitis, improvements need to be made to not only the oral environment, but also general physical status.

First, oral hygiene is clearly important. Mechanical cleaning with a toothbrush and tongue brush and chemical cleaning by gargling are effective. Gargling should be performed immediately after brushing. The patients should be consulted to a dentist if symptoms include pain on touching teeth and on biting. If xerostomia is seen, a humectant, artificial saliva, or saliva stimulant might be effective. However, pay attention to how to use because humectants or artificial saliva have adheasiveness and become unpleasant. Should be applied ointments containing steroids and spray medications to the area of mucous inflammation.

In cases of multiple stomatitis, use of xylocaine and ethyl 4-aminobenzoate in a gargle might allow the patient to eat, although taste is likely to be reduced. Meals should be designed with consideration of mucosal irritation due to factors such as salinity, hardness, temperature, and spiciness. When painful stomatitis is present, the patient has difficulty eating and nutritional state may thus be adversely affected. Their factors exacerbate the stomatitis. You pay attention to dirtiness of mouth by not to eat. Rest and nutrition need to heal the stomatitis. It is important to rest, sleep, avoid stress and maintaining a regular lifestyle. When pain from stomatitis is combined with symptoms such as lymphadenitis, use of analgesic and antimicrobial agents is considered. An understanding of the contributing factors is necessary to avoid the vicious circle between stomatitis and general condition of the whole body.

MEMO 1 Situations in which stomatitis can easily arise

1. Taste of the meal and bad habits
   - Willingly eating hot, hard or pungent foods
   - Unbalanced diet
   - Improper use of toothbrush
   - Smoking
2. Oral factors
   - Poor oral hygiene
   - Sharp edges on tooth or prosthesis
   - Occlusal relationship resulting in unintended biting of mucosa
   - Stimulation due to dentures
   - Xerostomia
3. Physical factors
   - Stress
   - Nutritional depletion
   - disorder sleep
   - Cold
   - Overwork
   - Allergies
   - Immunodeficiency
   - Use of steroid medications
   - Radiation therapy

(Hideki Mizutani)

114. Differentiating between oral cancer and stomatitis

1. What are oral cancer and stomatitis?

Ulcerous lesions of various sizes are often seen in the mouth. Different causes may result in a similar clinical picture. Conversely, the same disease can show different signs and symptoms. Diagnosis based on macroscopic findings alone is thus difficult. It is therefore necessary to compare oral cancer with stomatitis for eliciting a detailed history of the present illness, pre-existing medical conditions and properties of the morbid change.

1) Oral cancer

Squamous cell carcinomas of the oral cavity can show a variety of histological types. Tumors can be classified according to differentiation, from poorly differentiated to well-differentiated. Classification can also be made according to the anatomical site involved, such as lip cancer, carcinoma of the oral floor, carcinoma of the buccal mucosa, gingival carcinoma, carcinoma of the hard palate, and tongue cancer. Early-stage carcinoma of the oral cavity can also be difficult discriminate from stomatitis according. As the timing of beginning cancer therapy can be crucial to the prognosis, attention is required. For instance, early-stage tongue cancer can appear as an erosion, small ulcer, or nodule, and discrimination from stomatitis can be difficult. However, ulceration and induration of the surrounding tissues extends with tumor progression. Discriminating tumor from stomatitis thus becomes comparatively easier with time. Tumor can be characterized by a roughened surface and easy hemorrhaging. Cases can show induration and erythema existing side by side. Gingival carcinoma might have no symptom in the early stages, and might only be identified due to symptoms such as ulcer formation due to ill-fitting dentures, swelling of the gingiva or tooth mobility. Cases might only be referred to a specialist after initial misdiagnosis as periodontitis and stomatitis, with the condition of the patient deteriorating while interventions such as tooth extraction or adjustment of the dentures are performed.

2) Stomatitis

Stomatitis is an inflammatory condition of the oral mucosa in a wider sense, with classification according to anatomical site and cause. This condition may be called gingivitis or cheilitis in specific parts of the mouth, i.e., the gums and lips. Apththous, catarrhal, ulcerative, necrotic, and pseudomembranous stomatitis are categorized according to the pathological changes identified.

Stomatitis results from both general and local factors, and the cause is often unclear. Viral infection, immunocompromised status, and decreased general resistance can all contribute to this pathology. Identification of the cause can facilitate treatment.

Aphthous stomatitis is typically circular, with a central pseudomembrane. Aphthous stomatitis occurs only on the mucosa, not on the vermillion border. In addition, care must be taken to distinguish ulcerative stomatitis from oral cancer. Clinical conditions in ulcerative stomatitis are mainly characterized by the formation of a whitish-yellow pseudomembrane, erythema of the surrounding mucosa and ulcer formation. Spontaneous pain and contact pain are strong, and halitosis and burning sensation may also appear. Fever, general fatigue feeling and swelling of regional lymph nodes might be apparent. Moreover, the induration seen with malignancy is not usually seen with stomatitis.

2. Diagnosis of oral carcinoma and stomatitis

Differentiating between oral cancer and stomatitis is very important, and requires sufficient diagnostic information.

1) Suspected stomatitis

When stomatitis is suspected, local causes such as ill-fitting dentures and sharp teeth should be addressed. Blood testing can reveal factors such as viral infection. Improving oral hygiene using methods such as gargling and administering anti-inflammatory analgesics can improve symptoms. Local cleanliness and rest are warranted. Moreover, application of steroid ointment may be useful, and the clinical course followed for 1-2 weeks.

2) Progression of symptoms and signs

(1) Cytodiagnosis

Malignant tumor should be suspected if symptoms do not improve, and any deterioration warrants further close inspection.

Cytology is a helpful screening test. The involved area should be swiped with a swab stick and thin brush, to gather cells on the surface. These cells are then spread onto a glass slide, fixed. And they examined and diagnose under microscopy. Anesthesia, excision and incision are not needed. Specimens are then classified into five stages, Class I-V. However, cytology is only a screening test, and is not diagnostic.

(2) Histopathological diagnosis

A cytology finding of Class IV or V requires histopathological examination. It is important to do biopsy after straightening the system of malignant treatment.

3. Images of carcinoma of the oral cavity and stomatitis

Photo. 1 Stomatitis (Lt-buccal and gingiva)
Oral photograph of the patient. Multiple aphthous stomatitis with the boundary plain is shown

Photo. 2 Stomatitis (Palatal mucosa)
It is a virus stomatitis in the palatine mucosa shown multiple

Photo. 3 Stomatitis (glossitis)
Stomatitis generated in tongue. The cause seems for the bite wound to have become a trigger. The glossitis was accompanied by a strong contact pain, and surroundings of the ulcer were a little hard by scar. It was Class Ⅰ in the cytodiagnosis from the central portion of the ulcer. It has recovered by the steroid content ointment

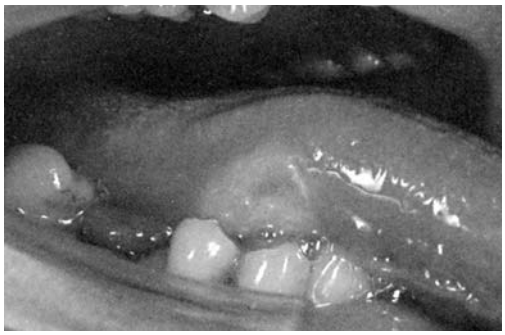


Photo. 4 Ulcerous lesions generated in tongue
Stomatitis generated in right tongue edge. The epithelium is lacked though the ulcer has the pain, and the boundary is plain. The tongue cancer was doubted, and the biopsy was enforced though a clear induration was not shown in surroundings. The atypical cell was not shown, and diagnosed as the ulcer of the tongue in the pathology. Generally, the ulcer of the malignant tumor is an infinite form, and it to comparatively deep, and the feature to cause the induration in surroundings

Photo. 5 Tongue cancer
In the left tongue edge, a near edge was indistinct, and observed the prominence and a morbid state of a surface rough. The induration was observed in surroundings. It was diagnosed by well-differentiated squamous cell carcinoma in the pathology and operated by partial removal of tongue treatment

(Hideto Saijo, Tsuyoshi Takato)

115. Ointments and patches for oral use

1. Purposes of oral ointments and patches

Individuals regularly performing oral care including oral cleaning and maintenance of dentures are likely to display relatively good oral conditions. However, if oral care is ignored, or cannot be performed properly due to age or disability, or pharmacotherapy results in adverse effects, abnormalities of the oral mucosa such as rhagades on the lips or angles of the mouth, aphthous stomatitis, oral candidiasis, or oral xerosis may result.

Ointments and patches are often used for the above diseases affecting the oral mucosa. Ointments and patches are medicines requiring basic knowledge before application. This chapter provides information about how and for what diseases these medications should be used.

2. Cheilitis and angular cheilitis

Petrolatum is often used for rhagades caused by cheilitis and/or angular cheilitis. Petrolatum should be applied to the affected area 3-4 times a day. For cheilitis, applying petrolatum to the whole lip at regular intervals is recommendable. Wetting the dry lip with the tongue is likely to exacerbate inflammation and rhagades. Although lip creams are useful for chapped lips, even petrolatum alone is useful in many cases, by improving moisture retention. Although petrolatum is indicated for lesions on the lips or angles of the mouth, patients tend to dislike using it, as saliva easily washes the product away or results in unpleasant taste and feelings of sliminess when used on the oral mucosa.

Attention should be paid to the fact that oral candidiasis causes rhagades when patients have cheilitis or angular cheilitis. Elderly people and people with immunodeficiency, in particular, are susceptible to candidiasis. If patients display persistent symptoms, a dentist should check whether the patient has candidiasis. If a patient is diagnosed with candidiasis, ointments containing antifungal agents should be used.

3. Aphthous stomatitis

Although stomatitis appears in various forms, the most common is “aphthous stomatitis”. Oral steroid ointments such as triamcinolone and dexamethasone (Kenalog for oral use and Dexaltin ointment), and patches (Aftach and Waplon) are often used for stomatitis. Over-the-counter drugs for stomatitis are also available from drugstores.

Ointments for oral use have some advantages. The adhesive base of the ointment is not easily washed away by saliva. As a result, the ointment shows durable efficacy. Moreover, patients can easily judge the proper amount of ointment to apply to the affected region.

Patches are useful for physically blocking stimuli caused by contact if the patch can completely cover the affected area. However, if the patch cannot completely cover the diseased part, the corners of the patch may stimulate the ulcerated surface, causing lingering pain.

Before applying ointments and patches, the patient should carefully clean the affected areas.

Steroid ointments should not be applied for stomatitis on the basis of oral findings alone. If the stomatitis is caused by a virus or candida infection, application of a steroid ointment may exacerbate the lesion. Furthermore, careless use of ointments can disturb the balance of oral bacteria, and may thus cause oral candidiasis.

4. Oral candidiasis

Patients with oral xerosis and the elderly tend to be susceptible to repeated episodes of oral candidiasis. In such patients, a solution of 2% baking soda may be used to wash the mouth or 0.1% chlorhexidine or nystatin ointment may be applied onto the affected areas instead of steroid ointments. However, the following medications should be used primarily with accurate diagnosis by professionals. Thoughtless use of medications by nonprofessionals should be avoided:

Gels containing miconazole, an antifungal medicine (Florid oral gel), holding the gel on the required part of the oral mucosa for as long as possible before swallowing;

Amphotericin B, used as a gargle or held on the affected oral mucosa for as long as possible before swallowing; or

Itraconazole, held on the affected oral mucosa for as long as possible before swallowing, or used as an internal medicine.

5. Oral xerosis

The elderly often complain about oral dryness caused by decreased saliva production. When the oral cavity becomes dry, the mucosal surfaces become vulnerable to injury and infection. Oral dryness also causes hypogeusesthesia and ill-fitting of dentures. Decreased saliva production weakens the self-cleaning ability of the oral cavity, increasing the risk of periodontal diseases. This is the significance of oral care. Some may say that drinking water is a good remedy for a dry mouth, but holding cool water or ice in the mouth is actually more effective. Jelly, a kind of ointments, is commercially available and commonly used for dry mouth. Unlike ointments, jelly is not uncomfortable even if applied to the dry surfaces of the oral mucosa. Such products are thus quite useful for patients with dry mouth.

Finally, mouthwashes are also available for treating dry mouth. As mouthwashes containing a high concentration of alcohol may irritate the mucosa, mouthwashes with no alcohol are preferable. Glycerin has been considered by some to absorb water from the mucous membranes, thus exacerbating dehydration rather than moisturizing, while others say that the substance promotes dental decalcification and thus should be avoided.

6. How to use ointments and patches

Ointments and patches have been clinically demonstrated to show excellent effects on diseases of the oral mucosa. However, oral clinicians should not use these products without care or based solely on oral findings. Otherwise, various problems may arise, including development of oral candidiasis with oral ointments containing steroid, a change of bacteria due to ointments containing antibacterial agents or bactericides, and appearance of drug-resistant bacteria due to overuse of antifungal agents. Correct use of oral ointments and patches on the basis of accurate diagnosis and sufficient basic knowledge is important.

Petrolatum and gelatin products can be very effective for oral care. Dentists should perform effective oral care based on a sound understanding of the differences between over-the-counter drugs and therapeutic medicines for oral diseases.

(Noriaki Yohkoh)

116. Improper application of steroid ointment for stomatitis

Stomatitis appears as inflammation in various areas of the oral mucosa.

When determining treatment, the condition of the patient needs to be clarified in terms of nonspecific or specific causes (such as viral infection) and immune status. Steroid ointments are generally used for nonspecific stomatitis. However, steroid ointments are inappropriate for herpes-related or pseudomembranous stomatitis.

1. Herpetic stomatitis

Herpetic stomatitis results from primary infection with herpes simplex virus. This appears most commonly in infants, but is not rare among adults at 20-30 years old. It seems aphthous stomatitis that appear in the front half of the oral cavity. Furthermore, inflammation spreads to the mucosa of the lips, the tip of the tongue and the gingiva. The tongue may show a thick white could markedly reduce swallowing function for a wide range of painful tongue and mouth sores, increased salivation, and bad breath.

No specific, effective treatments are available for herpetic stomatitis, but rest, supplementary liquids, and adequate nutrition are necessary. For serious cases, antiviral drugs or gamma-globulins may be used. Locally, good oral hygiene needs to be maintained. To improve contact pain in the oral cavity, gel products containing a local anesthetic may be effective.

2. Pseudomembranous stomatitis

Pseudomembranous stomatitis develops due to opportunistic infections by Candida. The pathology begins as small, white, spot-like lesions, expanding gradually into strips over a wider range of the oral mucosa. In the early stages, the white moss can be easily peeled off and the mucous membrane beneath forms sores and ulcers with the increasing level of inflammation. Any part of the oral mucosa can be affected, but the buccal mucosa, lower lip and tongue are the most common sites. When a lesion is extensive, the possibility of an underlying disease affecting immune status should be considered. Leukoplakia could occur same region as Pseudomembranous stomatitis. Leukoplakia is sometimes difficult to distinguish from precancerous lesions, and intractable cases should be referred to a specialist.

The oral cavity needs to be thoroughly cleaned, and regular use of iodine or a gargle including antifungal agents is warranted. In chronic hyperplastic candidiasis, topical applications are unlikely to achieve major results and long-term intravenous antifungals may be required.

(Makoto Noguchi)

117. Tooth decay and non-sugar sweeteners such as aspartame

The term ìsugarî often refers to sucrose, a disaccharide consisting of the monosaccharide sugars glucose and fructose. Sugar has been considered an important factor in tooth decay since ancient times. Sugar consumption is higher in Western countries than in Japan, but the incidence of dental caries is higher in Japan No direct association has been found between sugar consumption and tooth decay. In recent years, the method of sugar intake has been considered to affect tooth decay more than the actual quantity of sugar. Tooth decay occurs when three factors overlap for an extended period :a tooth surface; sufficient food; and cariogenic bacteria. If any one of these factors is lacking, tooth decay is much less likely to occur. Decalcification and decay of a tooth involves the presence of dental plaque. Some sugars, such as sucrose, can also be converted into viscous extracellular polysaccharides by oral bacteria, facilitating plaque formation. As a result, artificial sweeteners have been developed that oral bacteria are unable to metabolize.

1. Artificial sweeteners

1) Sorbitol

Sorbitol is a sugar alcohol that occurs naturally in fruits such as strawberries, apples and cherries. This substance has 60% of the sweetness of cane sugar, but is made by hydrogenation of glucose under high pressure and can be produced comparatively cheaply. The energy content is the same as sucrose, and for this reason sorbitol has also been used in patients with diabetes.

2) Xylitol

Xylitol is contained in many vegetables and fruits. This substance has the same degree of sweetness as sucrose and provides a refreshing feeling aftertaste. Uptake into cells does not require insulin, similar to sorbitol. In comparison with sucrose, xylitol cannot be used to produce dental plaque.

3) Coupling sugar

With the same sweetness as sucrose, coupling sugar that cannot be used by oral bacteria was developed in Japan. Almost 9% of coupling sugar is converted to glucose by salivary amylase. This substance has 60% of the sweetness of sucrose, but is less likely to be used to form insoluble dextran.

4) Palatinose

Palatinose has about 50% of the sweetness of sucrose, and is expensive.

5) Aspartame

Aspartame is 180 times sweeter than sucrose, and is commonly available as a sweetener in food outlets and in cool drinks.

6) Saccharine

Saccharin is 200-700 times sweeter than sucrose. Chemically stable, saccharine is widely used as a non-nutritive sweetener for dieting, but has an unpleasant aftertaste.

(Syohei Hatsuyama)

118. Accidents that can occur during oral care in frail elderly patients

In general, most frail elderly patients show declines in physical and mental functioning, accidents are likely to occur during oral care. Ensuring safe oral care for frail elderly individuals requires an understanding of the patients physical condition and possible contingencies for prevention of accidents, and preparation in advance is important. Contingencies can occur differently depending on the contents and implementation status of the frail elderly patient. Here, incidental events can occur during the provision of oral care.

1. Incidents before implementation of oral care

1) Obstracting or dislodging the catheter when moving or reclining the bed (Photo. 1)
2) Changing patients physical position, slide off the catheter or intravenous line during tube feeding or placement of a tracheostomy tube
3) Creation of orthostatic hypotension due to use of a steep backrest
4) Slips or falls when moving, such as from bed to wheelchair, or fracture or dislocation of the shoulder when providing assistance with movement
5) Collision with a wall or door frame when moving with a wheelchair; falls to the floor from the foot plate of the lower limbs, and drag the clothes of limbs (Photo. 2)
6) Collision with the wall or door frame when walking

Photo. 1 stuck intravenous line between the bed rail

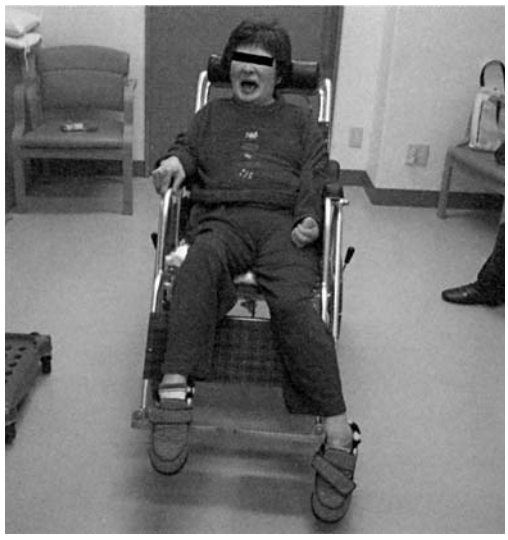


Photo. 2 Patients with left hemiplegia. The limb fell from footplate

2. Incidents during oral care

1) Incidents due to position during care
   ① Maintenance of a posture resulting in back pain due to prolonged sitting, pain in the buttocks, worsening of pressure ulcers
   ② Vomiting and gastroesophageal reflux due to increased abdominal pressure caused by posture
   ③ Contents of the mouth falling into the larynx in a horizontal position
   ④ Pharyngeal aspiration of saliva and influx of water during cleaning with the face upturned (Photo. 5a)

2) Incidents occurring in and around the oral cavity

① Laceration during insertion or removal of dentures, or during insertion and removal of cleaning equipment

② Loss of mobile teeth (Photo. 3)

③ Detachment of ill-fitting prostheses

④ Destruction of cleaning equipment

⑤ Injury of oral mucosal by cleaning equipment and denture clasps

⑥ Damage to the skin and oral mucosa due to incorrect use of chemicals

⑦ Temporomandibular joint dislocation with repeated wide opening of the mouth and inappropriate denture mounting (Photo. 4)

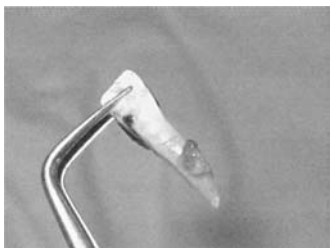
⑧ Dentures falling out during removal, resulting in damage

3) Aspiration, ingestion, vomiting, choking, injury during aspiration

① Inappropriate gargling causing aspiration by excessive use of cleaning fluid

② Aspiration of saliva and water due to keeping the mouth open for a long time (Photo. 5a), aspiration caused by neck overextension during oral care (Photo. 5b), the flow intrusion of saliva or moisture into the laryngeal pharynx during oral care

a: before falling down the mobile teeth



b: fallen teeth

c: after teeth falling

Photo. 3 Loss of mobile teeth

Photo. 4a:
Temporomandibular joint dislocation after large mouth opening

Photo. 4a
After reduction of the temporomandibular joint dislocation

Photo. 5a:
patient with over extend the neck who can getaspiration during oral care

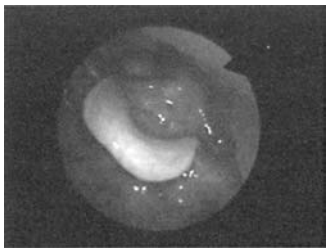


Photo. 5b:
During oral care, the flow of saliva or moisture intrusion into the laryngeal pharynx

③ Choking and aspiration due to epithelial sputum and food residues being pushed from the mouth into the pharynx by improper cleaning procedures
④ Ingestion or aspiration of a dislodged tooth or dental prosthesis, or damaged cleaning equipment
⑤ Damage of nasal and throat mucosa due to incorrect aspiration, bleeding or laryngeal spasm (procedure, tube diameter, inserted length, suction pressure)

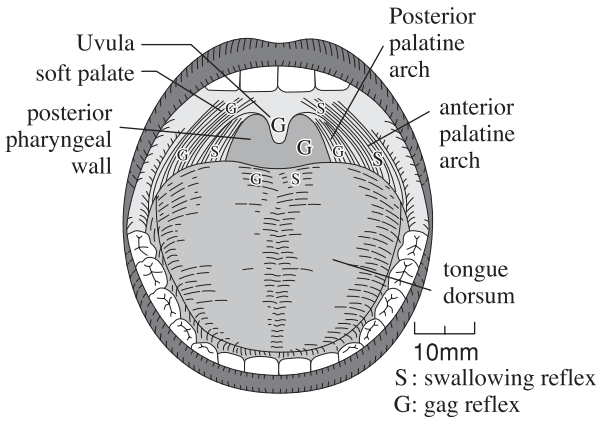


Fig. 1 Induced points of swallowing reflex and vomiting reflex

⑥ Choking or aspiration of vomit and vomiting and emetic reflex induced by stimulation of the pharyngeal region (Fig. 1)
⑦ Ingestion of mouthwash and denture cleaner

4) Infection in frail elderly individuals
5) Incidents affecting the individual providing care
① Back pain due to extended maintenance of a posture
② Bites to fingers
③ Infections caught from frail elderly patients

3. Incidents after implementation of oral care

1) Accidents before and during moving and transferring
2) Damage or infection from used cleaning equipment
3) Infection from linen contaminated with blood or expectorations during care

Precautions against the above incidents

1) Comprehensive understanding of frail elderly patients

Clarification in advance of swallowing function, surrounding environment, and circumstances of care may help in gaining an understanding of the systemic and oral status of elderly individuals (Photo. 7)

a: Listening to the sounds of breathing and swallowing sounds in neck

b: Monitor of the blood pulse and arterial oxygen saturation

c: Check position of the code and catheter around the bed of the frail elderly

Photo. 7 In advance, understand the current state of the Frail Elderly

2) Time at which care is performed

① In order to conduct safe, efficient care with the patient showing a good level of consciousness, a good time should be selected for oral care in frail elderly patients.

② At least 2 hours after tube feeding should be avoided to prevent gastroesophageal reflux

3) Environment in which care is performed

Prepare for intensive environment to have a care and create an environment in which frail elderly patients can relax (remove noise and distractions, use mirrors to see themselves)

4) Attitude adjustment

Ensure a safety-conscious attitude in the frail elderly patient (Photo. 8)

5) Maintenance of a suitable environment for caregivers

Conduct care in a safe, comfortable environment for caregivers (sufficient lighting, suitable bed height), have assistance if possible, observe the general condition and ambient conditions

6) Speak clearly and provide easy-to-understand explanations

When performing care, speak clearly and use easy-to-understand explanations (utilize a “tell, show, do” approach)

7) Appropriate procedures

Select methods that are appropriate to minimize burdens on the frail elderly and implement these procedures effectively (acceptable time and attention to the symptoms of hypersensitivity)

8) Instrument and drugs selection

Choose proper methods of cleaning equipment and gargling

9) Prevention of aspiration (particularly during mouth cleaning)

① If the patient shows declines in swallowing function, use a special cup for gargling and use a feeding cup to prevent the patient having to tilt the head upwards (Photo. 9)

② Adjust the temperature and amount of water used for cleaning and mouthwash (use of cold or hot water could increase stimulus intensity)

③ Do not extent the head or ask the patient to keep the mouth open for a long time

④ If the patient shows declines in swallowing function, take advantage of a low-flow moisturizing gel for the oral cavity

⑤ Apply suction if necessary

Photo. 8 Fowle’s position.
Using the cushions to fill the gap between the body and bed

Photo. 9 Prevention of aspiration during gargle.
Modification of the form of cups.

10) Prevention of accidental ingestion
   ① If a dental prosthesis or tooth appears likely to be dislodged, fix the object in position with dental floss or silk thread and consult with a dentist
   ② When wearing gloves, be careful of wet cleaning equipment and dentures, as these could easily slip and drop into the oral cavity
   ③ If an object (prosthesis, tooth, etc.) drops into the mouth, keep the mouth open and get the patient to turn their head to the side or downwards, then remove the object carefully by hand (take care, as the object is likely to be slippery)
   ④ Do not put drinks in the reach which are easily mistaken for denture cleaner by frail elderly
11) Prevention of temporomandibular joint dislocation
   ① Avoid keeping the mouth open wide for an extended time, and allow the patient to occasionally close the mouth for a rest
   ② Do not place excessive force on the mandible
   ③ Ensure that dentures are installed using an appropriate method to avoid habitual dislocation of the temporomandibular joint
12) Prevention of infections
   ① confirmation of the presenct infection (Methicillin resistant staphylococcus aureus hepatitis C virus Hepatitis B virus , human immunodeficiency virus, scabies, syphilis, norovirus)
   ② Use gloves and a mask. If necessary, use eye-protectors and a gown
   ③ Ensure hands are washed before care, and clean and sterilize equipment
   ④ Dispose of medical waste using appropriate methods
13) Preventing biting
   ① Wear gloves
   ② Use a mouth speculum
   ③ Select appropriate procedures
14) Confirm physical contact with the family (gardian and nursing personnel before and after performing care)
15) Improve the knowledge and skills of caregivers

Safely, comfort for the oral care, caregivers should improve their knowledge and skills. Preparation should be performed in advance to cooperate and collaborate with medical institutions to address any accidents that occur.

(Takeshi Awaya)

119. Inspections when required to perform oral care for patients with bleeding disorders

Various diseases show a tendency for bleeding in the mouth, but due to a variety of factors. It is more important discrimination and non-fatal disease than systemic diseases and topical issues in the mouth (mostly periodontology). In addition, patients with systemic bleeding tendencies often fear that oral care will cause bleeding, and therefore often neglect oral care. This is likely to result in degradation of oral hygiene, and thus inducing a vicious cycle of further easy bleeding. When performing oral care for patients with bleeding tendencies, an understanding of the patient's underlying condition and the meanings of results from test they have already undergone is necessary.

1. Cause of bleeding disorders

1) Hematological diseases

Causes of bleeding disorders can be classified into three categories:

① Vessel wall abnormalities: purpura simplex, senile purpura, allergic purpura

② Platelet abnormalities: acute aplastic anemia, leukemia, myelodysplastic syndrome, anemia, idiopathic thrombocytopenic purpura, SLE(systemic lupus erythematosus), disseminated intravascular coagulation, thrombasthenia, uremia, myeloma, idiopathic thrombocytopenia

③ Abnormal clotting: hemophilia, von Willebrand disease, vitamin K deficiency, disseminated intravascular coagulation, hepatitis, cirrhosis

2) Side effects of drugs

Poor blood clotting function and platelet aggregation due to long-term use of anticoagulants (warfarin, heparin) and antiplatelet agents to prevent blood clots and stroke. (PT (prothrombin time), 20-30%; INR((International Normalized Ratio), 2.0-3.5)

① Cardiac disease

② Disorders of cerebral circulation

③ Dialysis

3) Local factors in the mouth

① Tumors of the oral cavity

② Xerostomia (Sjögren's syndrome)

③ Drug-induced gingival hyperplasia (calcium antagonists, anti-epilepsy drugs, immunosuppressive agents)

4) Others

Bone marrow suppression caused by side effects of pharmacotherapies, which can lead to bleeding tendencies and decreases in platelets and other blood components.

- Radiation therapy
- Interferons and anticancer drugs

2. Test items for bleeding tendency

When examining a patient with bleeding tendencies, past medical history, family history, and drug history are important. An understanding of this background information will provide some insights into the causes of bleeding tendency that is informative for the future tests. First perform screening for blood and hematopoietic disorders (general blood tests, urine test), then examine and ascertain the cause for the

bleeding tendency, and finally perform tests to confirm the diagnosis. Since the most common cause is thrombocytopenia, the first test should be to determine whether platelet functions and coagulation factors are normal. Understanding the pathogenesis will allow determination of suitable responses to bleeding. However, diagnosis of hemorrhagic disease requires hematological expertise, and cooperation with specialists is necessary.

MEMO 1 Test items for bleeding tendency

1. Vasculature (1-5 minutes)
   ① Bleeding time (Rumpel Leede: less than 4 – negative)
   ② Capillary resistance test
2. Platelet system
   ① Bleeding time (1-5 minutes)
   ② Platelet count (150,000-350,000/μl)
   ③ Adhesive platelet function (Salzman: 25-60%; Hellem: 60-95%)
   ④ Platelet aggregation
3. Coagulation
   ① Prothrombin time (PT/ prothrombin time) (10-13 seconds)
   ② PT-INR (prothrombin time- International Normalized Ratio) (0.8-1.20)
   ⑤ Activated partial prothrombin time (APTT) (24.0-40.0 seconds)

3. Oral care for patients with bleeding disorders

Basically, most oral care should be performed in the same manner as for regular patients for preventing infection and bleeding. Successful cleaning of the mouth and dentures and good oral environment requires regular care by a dentist. In addition to oral care, assessment of the general condition and laboratory data from the patient is important. Oral care should be implemented in an appropriate manner in conjunction with a physician, if necessary.

1) Actual oral care

① Do not damage the oral mucosa. In other words, avoid direct mucosal contact with the equipment used, as much as possible. To carefully remove accumulations of viscous sputum, use oxydol and hyaluronic acid to soften the residue

② If available, use a small, soft-bristled toothbrush that has been soaked in mouthwash. Brush from the gum toward the surface of the tooth. In addition, use a gel containing enzymes similar to saliva for keeping your mouth clean

③ If a suitable toothbrush is unavailable, use an appropriately sized mouthwash-soaked swab, then wipe the entire mouth. If possible, try to use dental floss gently

④ Use an appropriate mouthwash for the oral environment. Mouthwash should be warmed to body temperature

⑤ After performing oral care, check that the mouth has been properly cleaned and identify whether any bleeding is present

2) During oral care, pay close attention to the following matters:

(1) Hematological diseases

① Leukemia

Patients with leukemia may bleed easily. If the white blood cell count has been decreased due to treatment, mouthwash containing antibiotics can be used to prevent infection.

② Thrombocytopenic purpura

If the platelet count is more than 5,000,000/mm^3, regular oral care can be performed. If bleeding has already been recognized, wipe the mouth clean using a cotton swab until the bleeding stops, then start brushing using a soft brush.

③ Hemophilia

Patients with hemophilia may not bleed easily, but bleeding is likely to prove difficult to stop. Tooth brushing is possible, but treatment with clotting factors may be needed if bleeding occurs.

④ Liver disease

Easy bleeding at progressive stages, use a soft toothbrush. In the case of viral hepatitis, instrument sterilization and infection control is important.

(2)Use of antithrombotic drugs

Regular oral care is possible, it is not necessary to stop the drug, but reference to general condition and test results. (bleeding time, PT-INR)

4. Bleeding due to oral care

Wipe clean with sterile gauze or aspirate blood, examine the bleeding point then give the pressure with sterile gauze to stop bleeding. The effective use gauze soaked in 5000 times epinephrine-fold, which is absorbed through the oral mucosa, so be careful of the effects on the cardiovascular system. If pressure is difficult to stop bleeding, consult a doctor or dentist as soon as possible. It will need a professional hemostasis.

(Yutaka Imai)

120. Eating disorders

1. What are eating disorders?

Eating can be considered “enjoying delicious food in a friendly atmosphere with pleasant conversation”, and eating disorders indicates a problem with some part of this process.

Eating disorders must be learnd in nutrition education, school, industry, lunch and administration are and be used on a daily basis. There is no opportunity to learn about eating disorder in dental education and medical care or education will not be as well. When they see a patient, meaning of the words differ in the relationship between job. And the meanings of words are delicately different, therefore it is difficult to plan enough mutual understanding.

In this chapter, feeding refers to the process of ingesting nutrients as a means of supporting life, whereas “eating” refers to enjoying a meal and the associated processes. Cause of eating disorders can include toothache, malfunction of false teeth, cardiac stress, and dysphagia. The multidisciplinary team (doctor, dentist, nurse, administrative dietitian, etc.) concerned with planning treatment for the patient must therefore cooperate to prevent disorders arising and improve any impediments to eating.

2. Factors causing eating disorders

Physical factors can involve the oral cavity and jaws. Typical causes include:

1) Factors associated with the intraoral environment: toothache, significantly mobile tooth, the incompatibility denture and or broken, dry mouth, etc.
2) Factors associated with function in the maxillofacial region facial paralysis, involuntary, trismus etc.
3) Physical factors ····· diseases and sequelae such as stroke and Parkinson’s disease, dementia etc .
4) Mental factors ····· depression, discord in family relationships, various stress such as the misfortune etc.
5) Eating environment ··· lonely, cold and dark atmosphere, noise, smell etc.
6) Status eating ····· training for speech, mealtime, amount eating etc.
7) Menu etc ····· chilled meals, hate food, looks bad cooking etc.

On the other hand, the work of an administrative dietitian and the kitchen person concerned influences a body as nourishment with a meal greatly to accept you. It is not possible to be enough with a splendid cooking ingredient, a first-class cook. The maintenance of the system which the type of job concerned performs cooperation and information exchange thickly, and can support an obstacle immediately is expected.

In addition, improvement of the eating disorder wants to expect what is planned because it seems that NST is active at more hospitals so that I grasp a cause to wake up the eating disorder with care perception Juarez, and eating is performed smoothly by the information because I carry out assessment monitoring when an administrative dietitian devises a nourishment care plan from 2005.

3 For improvement of the eating disorder

I improve the obstacles such as pains in the oral cavity and artificial tooth problems, and anyone tends to be able to wrestle anywhere even from where even in when such as one flower arrangement, a warm meal, plain words. It becomes the route to the countermeasure to improve an obstacle to plan cooperation without medical personnel, a person concerned with nourishment forgetting gentleness.

(Toshio Suzuki, Satoshi Suzuki)

Authors List

Ryouhei Adachi
Kimio Aoyagi
Akizumi Araki
Akira Arasaki
Souichiro Asanami
Nobuko Atsumi
Takeshi Awaya
Tomomi Azuma
Masako Fujisawa
Kakuhiro Fukai
Mitsuo Fukuda
Masayuki Fukuda
Osamu Fukuta
Keika Gen
Taizo Hamada
Kumiko Hara
Naoko Hara
Syohei Hatsuyama
Masami Hattori
Shinichi Hattori
Jun-ichiro Hayashi
Toshihiro Hirai
Hiroyoshi Hiratsuka
Harumi Horibe
Kazumi Hukudome
Mitsuyoshi Iino
Yutaka Imai
Koji Inagaki
Keiko Inoue
Masaki Ito
Mikiko Ito
Masataka Itoda
Setsuko Itoh
Eiko Izui
Yasuaki Kakinoki
Yoichiro Kameyama
Haruhiko Kashiwazaki
Tomoki Kato
Akitoshi Katsumata
Tsumako Kawasaki
Atsuhiro Kinoshita
Masako Kishima
Hiromitsu Kishimoto
Noriyuki Kitai
Mika Kobayashi
Satoko Komine
Takahide Komori
Sumito Konishi
Hisashi Koshino
Tamami Koyama
Hibiki Kumotsu
Kenji Kurashina
Hiroshi Kurita
Mikio Kusama
Seishi Magoshi
Takane Maruyama
Ichro Masui
Mitsuyoshi Matsuda
Manabu Miki
Youji Miyamoto
Masaru Miyata
Tatsuya Mizuno
Hideki Mizutani
Hideo Mori
Junko Morikawa
Shigeki Morisaki
Ichijiro Morisaki
Nobuo Motegi
Yukitaka Murakami
Hiroshi Murakami
Kenichiro Murakami
Masumi Muramatsu
Hiroshi Murata
Shuichiro Nagaosa
Haruo Nakagaki
Kenji Nakamori
Seiji Nakamura
Takahide Nakayama
Yoshiko Namba
Nagato Natsume
Akihide Negishi
Eisaku Nishida
Toshihide Noguchi
Makoto Noguchi
Hatsumi Nojima
Tetsuo Ohnishi
Norikazu Ohno
Miyuki Outani
Shogo Ozawa
Shinsuke Sadamori
Hideto Saijo
Mayu Saito
Hideo Sakaguchi
Kensuke Sakai
Hideaki Sakashita
Sumiyo Sakuma
Taeko Sasaki
Tsuyoshi Sato
Akira Senda
Toshiyuki Shibata
Michio Shikimori
Yoshiaki Shimizu
Taizo Sugimoto
Hajime Sunakawa
Kanzo Suzuki
Satoshi Suzuki
Toshio Suzuki
Chihoko Tabata
Ritsuo Takagi
Tsuyoshi Takato
Junko Takemoto
Yuuki Takeuchi
Yoshinobu Tanaka
Kayo Teraoka
Tomoko Tezuka
Yuko Tomomatsu
Sinpei Toumatsu
Syuhei Toumatsu
Yoshitaka Toyama
Rieko Toyoshima
Masako Tsukagoshi
Koichiro Ueda
Yoshiya Ueyama
Masahiro Urade
Ikuo Wada
Hideyuki Wada
Shizuko Yamada
Kazuko Yamada
Kazuyo Yamada
Morimasa Yamada
Katsumi Yamanaka
Shigetaka Yanagisawa
Toshikazu Yasui
Tetsuya Yoda
Noriaki Yohkoh
Takamasa Yokoi
Hidemi Yoshimasu
Fuminobu Yoshimura
Nobuo Yoshinari

List of Translators

Chief Translator TOKO HAYAKAWA Ph. D.
Associate Professor of Aichi-Gakuin University

Kumiko Fujiwara
Keika Gen
Naoko Hara
Hideto Imura
Chisako Inoue
Michie Ito
Mutsuyo Iwata
Yoshiya Ueyama
Haruhiko Kashiwazaki
Tomoki Kato
Hiyori Makino
Tomoko Mori
Akihide Negishi
Harue Ohoka
Itsuko Shimoda
Miki Sorihashi
Satoshi Suzuki
Miru Takami
Yuuki Takeuchi
Atsuko Tanabe
Hiroshi Tatsumi
Yuko Tomomatsu
Yoshitaka Toyama
Masako Tsukagoshi
Katsumi Yamanaka
Nobuo Yoshinari