

Preventing Aspiration Pneumonia by Oral Health Care

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Abstract

In recent years, the need for oral care in preventing aspiration pneumonia has been recognized across the academic disciplines. Pursuing both oral cleaning and improvements in food ingestion is necessary to achieve the objective. At a minimum, cleaning should include mechanical cleaning of the tongue and palatal mucus and removal of pathogenic bacteria causing aspiration pneumonia (typically oral anaerobic bacteria). As for the improvement of eating function, the patient should be first trained in breathing and swallowing saliva so that he/she gradually regains swallowing function. Even if the patient has a gastric fistula, successful oral ingestion of several mouthfuls not only prevents aspiration pneumonia, but can also raise the quality of the social life by enhancing the patient and the family's motivation for everyday living.

Regardless of the patient's clinical condition, the oral cavity becomes moist and healthy in color as soon as it is cared for—and its care is reflected in the entire body. I believe that the oral cavity deserves greater recognition, and hope less people will have to suffer from ingestion problems and aspiration pneumonia through proper oral care in the future.

Key words Aspiration pneumonia, Eating function training, Oral care, Oral intake, Oral moisture retention in the oral cavity

Introduction

Pneumonia is the fourth most common cause of death among Japanese, and is the leading cause among the elderly in need of long-term care. Moreover, 30% of those who die of pneumonia are diagnosed with aspiration pneumonia.¹ Thanks to intervention studies and research, it is now recognized across the academic disciplines that regular oral care by a professional can prevent aspiration pneumonia and reduce the onset of fever.² However, even oral microorganisms that are not ordinary pathogenic tend to develop into infectious diseases as a result of opportunistic infections. Culture tests of bacteria obtained from patients who contracted aspiration pneumonia using the percutaneous pneumocentesis revealed that oral resident bacteria were most common.³

Moreover, oral care not only prevents pneumonia, but has also been reported to have a positive impact on activities in daily life and cognitive functions.⁴ Currently, the concept of oral care is broadly interpreted as *oral health care*, including not only oral cleaning but also eating function training. This paper will examine the characteristics of the oral cavities of elderly people in need of long-term care who developed aspiration pneumonia and the concept and techniques for oral care.

Characteristics of Oral Cavity Which Causes Onset of Aspiration Pneumonia

The oral cavities of patients who contract aspiration pneumonia have characteristic mucous membranes, soft tissue, teeth, and oral func-

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Fig. 1 Mucous membranes residue, remaining like an oblate



Fig. 2 Coated tongue

tion. The key points to observe to prevent aspiration pneumonia or improve the prognosis are described below.

Residue in oral mucous epithelium and oral dryness

When oral functions are almost completely suppressed due to depressed consciousness or tube feeding such as intravenous drips and gastric fistula, the secretion of mucosal resting saliva begins to dominate, mixing with the residue in the oral epithelium to form a sticky paste that adheres to the oral cavity membranes and teeth. Since the self-cleaning function of the oral cavity is not working, the oral mucous membrane is not regenerated and replaced. Instead, the mucous remains on the palate like an oblate as shown in **Fig. 1**, and the tongue becomes coated (**Fig. 2**). The bacterial flora of such palate or tongue contains different bacteria that do not normally appear in the healthy mouth, raising the risk of upper respiratory tract infections and thus aspiration pneumonia.

The main causative microorganism of aspiration pneumonia is thought to be gram-negative anaerobic bacteria, which live in secreta (phlegm), epithelial residue, crusts, and saliva. A silent aspiration of these microorganisms (called microaspiration) in the process of normal respiration causes pneumonia.

Morphological damage to oral hard tissue (teeth)

Inadequate oral cleaning can result in multiple and simultaneous cases of dental caries at the



Fig. 3 Remaining roots after losing the crown portion

tooth cervix. If oral hygiene continues to be neglected, the crown can rot away with only residual roots left as shown in **Fig. 3**. Food residue tends to adhere to the residual root of the decayed teeth, creating bacterial plaque, and forming bacterial flora that cannot be removed by mere gargling. If the condition reaches the point that bad breath pervades the entire room, it is evident that decaying matter is remaining in the mouth, meaning there is a grave risk of aspiration pneumonia.

Impaired oral function

When using a cerebral stroke as an example, more than 50% of patients in the acute phase have aspiration, but only 7% still experience aspiration during the recovery phase. But because their oral cavity organs such as the lips, tongue, cheek, and soft palate remain paralyzed even during the recovery phase, 30% of chronic patients experi-



Fig. 4 Moisturizing agents



Fig. 5 Cleaning the tongue and palate

ence impaired mastication.

As the patient recover from acute phase and move on to chronic phase, impairment of eating functions shifts from the pharyngeal phase to oral phase.⁵ Even if the patient succeeds in ingesting food orally, poor mastication prevents the formation of alimentary bolus, and food adheres to the surface of the teeth in its original shape. This kind of functional impairment of the oral phase is one cause of poor oral hygiene and consequently induces silent aspiration or miswallowing.

Approaches and Techniques for Oral Care

Aspiration pneumonia can be broadly divided into 2 groups: one caused by *micro-aspiration* (the aspiration of microorganisms into the trachea) and *macro-aspiration* (the aspiration of food). Micro-aspiration can be prevented by cleaning of the oral cavity. Macro-aspiration can be addressed by improving eating and swallowing functions. When pursuing both oral hygiene management and eating function restoration, the original objective of preventing aspiration pneumonia can be achieved.

Oral hygiene management

Moisture retention

The first step is to retain moisture in the oral cavity. There are 3 types of moisturizing agents: gels, creams, and liquids (Fig. 4). One may use a piece of gauze or cotton wrapped around the

finger as a cleaning tool, but it is better to use an ordinary sponge brush or special brush specifically designed for the mucous membranes in order to more scrupulously and reliably enhance the effects of moisture retention and cleaning. After spreading a moisturizing agent to a brush, apply it to the upper and lower lips, left and right buccal mucous membranes, palate, and tongue, to care for the mucous membranes.

Moisturizing agents in gel form include a polymer (poly glyceryl methacrylate), which achieves a swelling effect by absorbing moisture and softening the mucous membranes.

Moisturizing creams include substances that promote a natural healing for oral inflammation with a combination of milk protein extracts containing antimicrobial ingredients and immunoglobulin. In particular, using a toothbrush to remove epithelial residue (shown in Fig. 1) or crusts can have an adverse result of bleeding. However, applying a moisturizing agent to the dry lining in advance softens the epithelium within a few minutes, making removal easier.

Some liquid moisturizing agents contain hyaluronic acid. Once the oral cleaning is finished, spraying the liquid moisturizer and then applying a moisturizing gel can extend the moisturizing effect for a longer period.

Areas that must be cleaned

In the oral cavity of a tube-fed patient, microorganisms are most often stuck to 2 areas: the tongue and palate. This means that even just mechanically cleaning the tongue and palate can help to prevent aspiration pneumonia (Fig. 5).

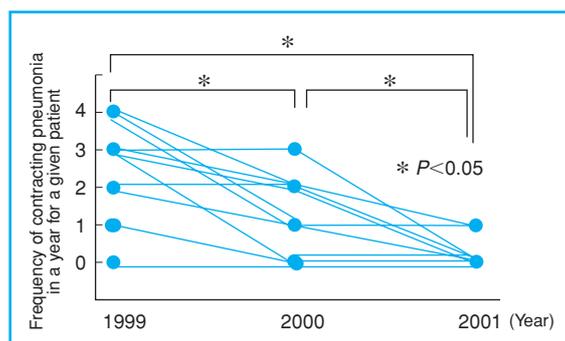


Fig. 6 Frequency of pneumonia in a 3-year period in the group that received both professional oral cleaning and swallowing training (11 patients)

Regarding eating function training

Key points for eating function

Mechanical stimulation from oral cleaning can stimulate the secretion of saliva and activate the swallowing and coughing reflexes. Thus, oral cleaning can be a very important anti-infection measure. When cleaning the mouth, attention should be paid to the way in which the patient disposes of saliva. In other words, if the visual observation confirms the closing of the lips and elevating of the larynx when the patient is swallowing saliva, no residual sound is noted in the pharyngeal region with a stethoscope, and the patient can expectorate when choking, then, the patient can proceed to aggressive swallowing training. Tests that utilize mechanical devices, such as videofluorography (VF) or video endoscopy (VE), should also be used for diagnosis as necessary.

As long as the patient is unable to control his/her breathing, mastication and deglutition movements will be difficult. So, first the swallowing training should start with the practice in abdominal breathing on the bed. Next, the patient can start training in swallowing saliva by licking candies to stimulate saliva secretion and induce saliva swallowing.

“A spoon of life”

In this section, I will discuss a comparative case study I conducted with my colleagues.⁶ At an intensive care home for the elderly, we provided oral care to patients with dementia once a week since 1999. Of these patients, a dental professional provided weekly oral cleaning to 10 dysphagia patients with feeding tube who needed assistance

for all of their daily life activities. The outbreak frequency of pneumonia among these 10 patients was tracked over a period of 3 years. After 3 years, there was an overall decline in the frequency of pneumonia, but since there were several patients who experienced pneumonia repeatedly, the difference was not statistically significant in these 3-year period data.

However, at another facility, we provided functional training of dysphagia in addition to oral cleaning to 11 patients with similar physical conditions. The functional training was the ingestion of less than 40 ml of gelatin jelly once a week. Endoscopic diagnosis, visual examination, auscultation, and palpation were used to check for aspiration, and the patient only orally ingested the jelly when the dentist visited. Two of the 11 patients died of heart failure during the 3-year period. But as illustrated in **Fig. 6**, the remaining 9 patients showed a decrease in the frequency of pneumonia or no change, which was statistically significant.

In addition to daily oral cleaning by care givers, by providing weekly professional oral cleaning and the ingestion of a spoonful of jelly once a week, this study succeeded in reducing the frequency of pneumonia.⁶ Even though it was only a mouthful, this ingestion of jelly was “a spoon of life.” In the latter facility, more than 15 patients a year died of pneumonia prior to 1999, but the pneumonia mortality has decreased to less than 6 since 2001. These figures confirmed the importance of using eating function in patient care, even to ingest just a spoonful of gelatin jelly, in addition to proper cleaning.

Conclusion

The oral problems among elderly patients in need of long-term care become progressively worse as the period of systemic illness prolongs, to the point of disintegration of the crown, stagnation of food residue, adhesion of epithelial residue, and loss of artificial teeth. Before reaching such dismal conditions, at some point in the transition—from the acute to recovery phase or from the recovery to maintenance phase, there must have been a turning point somewhere.

In recent years, the need for oral care in preventing aspiration pneumonia has been recognized across the academic disciplines. In order to successfully prevent aspiration pneumonia, a

patient must: 1) improve his/her ability to ingest food items, and 2) receive sufficient oral care including proper cleaning. To this end, oral cleaning should at least include mechanical cleaning of the tongue and palate to remove pathogenic bacteria (e.g., anaerobic bacteria) that can lead to aspiration pneumonia. As for improving eating function, the patient should first be trained in breathing and swallowing saliva in order to gradually regain swallowing function. Ingestion of several mouthfuls can successfully prevent aspiration pneumonia, even if the patient is being tube fed. The act of eating, even as little as a spoonful, can also raise motivation for life for both the patient and the family and can enhance

the quality of their social life.

The oral cavity is an organ that responds promptly to proper care, regardless of the clinical condition. It becomes moist and healthy in color as soon as it is cared for, and the improved oral cavity can also influence the entire body. “Eating” is such a simple, everyday activity for healthy people, and so is oral care. But for those who have problem with eating function, “it is only oral care, but it is part of the care.” I would like to see greater recognition of oral care, so that less patients and people in recuperation will have to suffer from ingestion problems and aspiration pneumonia.

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