Body Positions and Functional Training to Reduce Aspiration in Patients with Dysphagia

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Hitoshi KAGAYA,*1 Yoko INAMOTO,*2 Sumiko OKADA,*3 Eiichi SAITOH*4

Abstract

Body positions that minimize aspiration include the reclining position, chin down, head rotation, side inclination, the recumbent position, and combinations of these. Patients with severe dysphagia often use a 30° reclining position. But in reality, the patient must be more than 60° higher than a supine position in order to eat without assistance. There are 3 types of "chin down" positions: head flexion, neck flexion, and compound flexion (head flexion + neck flexion). Patients whose pharynx are more paralyzed on either side can turn their head toward the paralyzed side to narrow the piriform fossa on the paralyzed side or use the force of gravity from a side-lying or recumbent position to guide a food bolus to the non-paralyzed side. Training methods include cervical range of motion exercises, thermal-tactile stimulation, supraglottic swallow, the Mendelsohn maneuver, head raising exercises, balloon training, respiratory physiotherapy, training for activities of daily living, and physical strength training. There is no one best body position or training method that is effective for all patients, so it is crucial that effectiveness be confirmed before use.

Key words Dysphagia, Aspiration, Body positions, Functional training

Introduction

Aspiration occurs when food or saliva enters the subglottis. There are 3 types of aspiration: aspiration before swallowing reflex is engaged (aspiration before swallowing), aspiration that occurs during swallowing reflex (aspiration during swallowing), and aspiration after swallowing reflex is completed (aspiration after swallowing). In many cases, these 3 types of aspiration are the result dysfunction in swallowing reflex initiation, failure of laryngeal closure, and dysfunction of the entrance of the esophagus (superior esophageal sphincter), respectively.[1] It is not easy to completely prevent aspiration in patients with dysphagia; however, there are cases where aspiration can be minimized thorough various efforts, such as changing the form of food boluses, adjusting body positions, and functional training. This paper will discuss the body positions and functional training that can minimize aspiration.

Aspiration Diagnosis

There is no one best body position or functional training method that will minimize aspiration for everyone. Accordingly, the presence or absence of aspiration must be diagnosed in order to determine whether a particular body position or functional training is effective for that patient. Currently, the videofluoroscopic examination (VF) and video endoscopic evaluation (VE) of swallowing are the most accurate ways of diagnosing the presence of aspiration. If VF and VE

*1 Department of Rehabilitation Medicine, School of Medicine, Fujita Health University, Aichi, Japan (hkagaya2@fujita-hu.ac.jp).
*2 Graduate School of Health Sciences, Fujita Health University, Aichi, Japan.
*3 Faculty of Rehabilitation, School of Health Sciences, Fujita Health University, Aichi, Japan.
*4 Department of Rehabilitation Medicine, School of Medicine, Fujita Health University, Aichi, Japan.
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can confirm that a certain position or training minimizes aspiration, we can conclude that it is an effective method. When using VF and VE, it is important to record whether the patient coughs (i.e., does the patient coughs right away, sometime after, or not at all) or whether the patient has a wet hoarseness (i.e., makes a gargling sound that weakens or is eliminated by coughing). Invariable coughing or hoarseness during aspiration indicates the presence of aspiration.

Adjustments to Body Positions

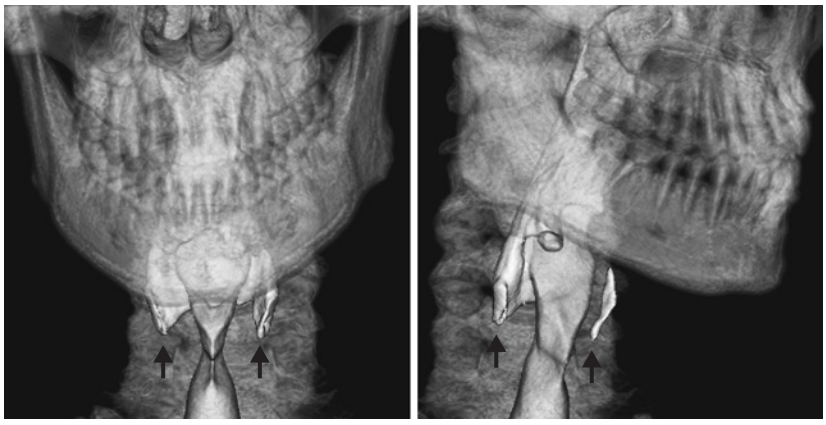
There are several body positions that can be utilized to reduce aspiration.

Reclining position

When reinforcing a reclining position (almost supine), the front of the oral cavity is raised and the back is lowered. Since the force of gravity makes it easier to bring a food bolus from the oral cavity to the throat, this method is often used with patients who have difficulties sending a food bolus into the pharynx. At the same time, in the reclining position the respiratory tract is raised and the esophagus is lowered, so that the bolus easily slides down the posterior wall of the pharynx and can easily enter the esophagus, which minimizes aspiration. A reclining position in which the head is raised 30° is often used with patients with severe dysphagia. The reclining position makes it easy for the neck to extend, so a pillow must be used to inflect the neck (**Fig. 1**).

Nevertheless, the efficacy of the seated position when eating should not be overlooked. Adopting a seated position makes it easier to leave the bed for meals, and also enables the patient to eat out. To eat without any assistance, the patient must be more than 60° higher than a supine position; any less and the patient would require assistance for eating. In many cases, reinforcing a reclining position lowers the level of consciousness and the patient may close his/her eyes. In such cases, putting patients into an almost seated position can often improves the patient's mental alertness and make aspiration less likely. Moreover, remaining in a seated position for 2 hours after eating is said to prevent gastroesophageal reflux and the onset of fever presumably caused by aspiration.[2]

Fig. 1 Reclining position (at 30°)
Use a pillow or other object to rotate the head in a reclining position.



Front Rotation to the left

Fig. 2 Three-dimentional images using a 320-detector-row multi-slice CT scanner
Rotating the head to the left expands the piriform fossa on the right and narrows it on the left. (➔ piriform fossa)

Chin down (or chin tuck)

There are 3 types of "chin down" (also known as "chin tuck") positions: head flexion, neck flexion, and compound flexion (head flexion + neck flexion).[3] Here, efforts are made to avoid confusion over which position is being referred to. The head flexion involves the upper cervical spine (O-C1, C1-C2), while the neck flexion involves the middle and lower cervical spine (C4-C5, C5-C6). The head flexion is effective when food residue is stuck in the epiglottic vallecula, while the neck flexion is effective when there is great tension in the neck or the initiation of swallowing reflex is poor.[4] However, the effectiveness of these positions should be first verified using VF and VE.

Head rotation

When turning the head, the piriform fossa narrows on the side that was turned and expands on the opposite side (**Fig. 2**), which makes it easier for a food bolus to travel down the non-rotated side. This technique can be used when the pharynx is paralyzed to a different extent on the right or left due to conditions like bulbar paralysis, in order to guide a food bolus to the healthy side or less paralyzed side.

Side-lying or recumbent position

Tilting the body to the non-paralyzed side (side-lying) makes it easier for the force of gravity to bring a food bolus downward and pass through the non-paralyzed side. In addition, a recumbent position in which the non-paralyzed side is downward allows a bolus to pass through the non-paralyzed side. In general, patients with relatively minor symptoms use a side-lying position, while patients with serious symptoms use a recumbent position.

Fig. 3 Turning the head to the left and lying on the right side, with chin down

Turning the head toward the left, lying on the right side, and bringing the chin down helps to move a food bolus to the piriform fossa on the right (= non-paralyzed side).

Combination of body positions

A combination of 4 positions described above is commonly used. Patients with unilateral paralysis are often instructed to guide a food bolus to the non-paralyzed side, by turning the head toward the paralyzed side in the side-lying position leaning toward the non-paralyzed side with chin down[5] (**Fig. 3**). However, due caution is required since a combination of a reclining position and a head rotation could actually guide a food bolus to the paralyzed side.[6]

Functional Training

There are many methods of functional training. Here, the most typical methods are described.

Exercises to improve cervical range of motion

The patients with severe dysphasia tend to have seriously restricted range of motion in the cervical spine and cannot chin down or rotate the head enough. It is therefore essential to examine the cervical range of motion in the patients with dysphasia. If the patient does have limitations, exercises to improve the cervical range of motion should be provided. Such exercises are also effective to ease cervical hypertension.

Thermal tactile stimulation

When the initiation of swallowing reflex is poor, the swallowing reflex can be elicited by stimulating the anterior palatine arch or the posterior wall of the pharynx with a cotton swab soaked in cold water or frozen or using an indirect laryngoscope chilled in cold water or lemon juice.

Supraglottic swallow

This training method is often used for aspiration during swallowing. The patient draws in a deep breath and holds it, swallows a food bolus, and immediately clears his/her throat. Holding one's breath closes the glottis and prevents aspiration, and coughing after swallowing removes any food that has entered the respiratory tract.

Mendelsohn maneuver

The patient raises his/her larynx to the highest position by swallowing air, and then holds this position for several seconds. Prolonged elevation of the larynx is intended to enlarge the entrance of the esophagus.

Shaker exercise

This exercise is used to enlarge the entrance of the esophagus and strengthen the suprahyoid muscles.[7] The patient holds his/her head up for 1 minute while lying supine, followed by a 1 minute rest, and repeats this sequence 3 times. Then the patient raises the head 30 times. This set of exercises is repeated 3 times a day for 6 weeks.

Balloon training

This exercise is effective for patients experiencing difficulty in passing food through the entrance of the esophagus. A transoral or transnasal catheter is inserted beyond the entrance of the esophagus. A balloon is inflated, expanding the esophagus, and then withdrawn. In another method, a catheter is inserted to the entrance of the esophagus to expand the region by inflating a balloon intermittently.

Respiratory physiotherapy

In the patients with dysphagia, the secretion function of respiratory discharge is often reduced. Such patients are subject to respiratory physiotherapy in many cases. A sputum discharge maneuver is the most commonly used method of respiratory physiotherapy. Huffing (exhaling very quickly and with strength while the glottis is open), forced expiratory maneuver (huffing once or twice after breathing in), and coughing are effective in removing secretions trapped in the relatively central respiratory tract. A technique whereby pressure is applied to the chest when the patient expires, called "squeezing," is often used to move sputum accumulated in the peripheral lung region.

Training for activities of daily living and physical strength training

Patients with dysphagia often have a combination of paralysis and disuse syndrome, and the instability of eating positions and tiredness while eating tends to lead to aspiration. For this reason, it is essential that these patients receive training for activities of daily living and physical strength training.

Conclusions

Aspiration pneumonia is the most serious problem for patients with dysphagia. Preventing aspiration pneumonia requires both the effort to minimize aspiration and the techniques to avoid pneumonia onset even if the patient experiences aspiration. To accomplish this, body positions are adjusted, the form of food is modified, and training, drug therapy, and oral care are provided.

Body positions that minimize aspiration include reclining position, chin down, head rotation, and side-lying/recumbent position. Functional training to improve eating ability is also used to minimize aspiration, such as exercises to improve cervical range of motion, thermal-tactile stimulation, supraglottic swallow, the Mendelsohn maneuver, the Shaker exercise, balloon training, respiratory physiotherapy, training for activities of daily living, and physical strength training. There is no body position or training method that is equally effective for every patient, so it is crucial to verify the effectiveness for each patient before use.

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