

## CASE REPORT

# Oral Intake in the Complete Lateral Position as a Compensatory Method for a Patient with Severe Dysphagia: A Case Report

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**Background:** We report a patient with severe dysphagia who was successfully treated using our newly developed swallowing rehabilitation method involving a complete lateral position. **Case:** This case involved a 74-year-old male patient with dysphagia caused by multiple morbidities, including sarcopenia after panperitonitis, Wallenberg syndrome, and Lewy body dementia. We attempted oral feeding in the complete lateral position and observed that the bolus was moving as intended and was swallowed without penetration or aspiration. The patient achieved oral feeding using the complete lateral position, and his physical and cognitive functions improved. He was discharged home and continued feeding orally without alternative means for more than 5 years. **Discussion:** In the flat (complete) lateral position, the bolus flows and pools as far as possible from the airway opening of the pharynx. Using this method, gravity aids in preventing penetration and aspiration. Therefore, eating in the complete lateral position has immediate effects that are reproducible and not dependent on the cognitive function or motor skills of the patient or the assistance skills of the caregivers.

**Key Words:** deglutition disorders; eating posture; feeding methods; Wallenberg syndrome

## INTRODUCTION

Dysphagia is a major factor that impacts malnutrition and is a non-negligible obstacle in the field of rehabilitation. There are various compensatory and rehabilitative treatments for dysphagia, such as strength training of the deglutition muscle and food texture alterations.<sup>1)</sup> Surgical treatments, such as percutaneous endoscopic gastrostomy and laryngotracheal separation, may be considered when patients are unresponsive to less invasive therapies.

While exploring the compensatory effects of eating postures of dysphagia patients, we found that side-lying is widely used as “the recovery position” for unresponsive patients to allow breathing and to prevent aspiration and airway obstruction.<sup>2)</sup> This inspired us to utilize a flat, side-lying position (complete lateral position) as a compensatory method

for providing oral intake to patients with severe dysphagia.<sup>3)</sup>

Here, we report the case of a frail and debilitated elderly male patient with severe dysphagia caused by several morbidities [sarcopenia after panperitonitis, Wallenberg syndrome, and Lewy body dementia (LBD)], who achieved oral feeding using the complete lateral position. The patient continued to receive sufficient oral nutrition for more than 5 years by utilizing the complete lateral position. The versatile and immediate effects of eating in the complete lateral position as a treatment for dysphagia are discussed.

## CASE

### Clinical Course in a Previous Hospital

A 74-year-old male patient presented to the emergency department because of the sudden onset of abdominal pain.

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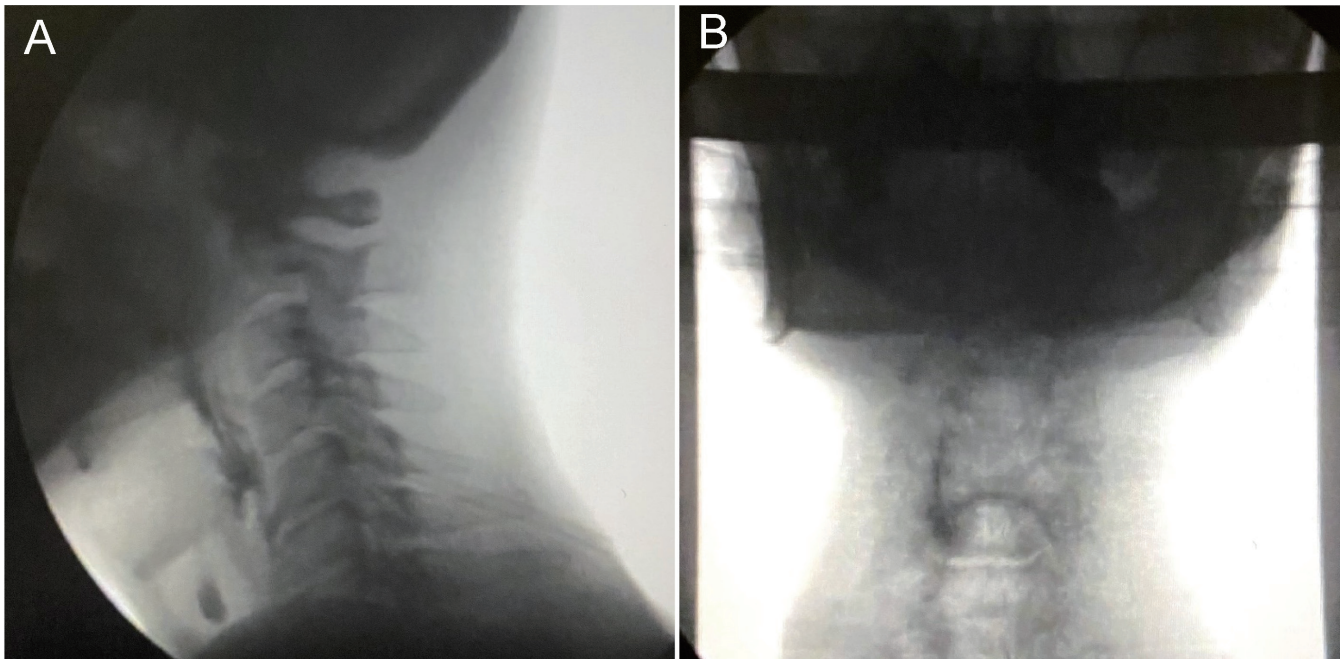
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**Fig. 1.** Videofluorographic swallowing study in the sitting position on day 51. (A) Sideview: the swallowing reflex shows overt aspiration, and a very small amount of bolus was sent to the esophagus. There was almost no air remaining in the hypopharyngeal space. (B) Front view: immediately after a swallowing reflex, small amounts of liquid passed the left side of the upper esophageal sphincter (UES), whereas almost no liquid passed the right side of the UES and remained in the piriform sinus.

Sigmoid colon perforation and panperitonitis were diagnosed. The patient underwent emergency abdominal surgery, including colectomy, colostomy, and drainage surgery with postoperative irrigation.

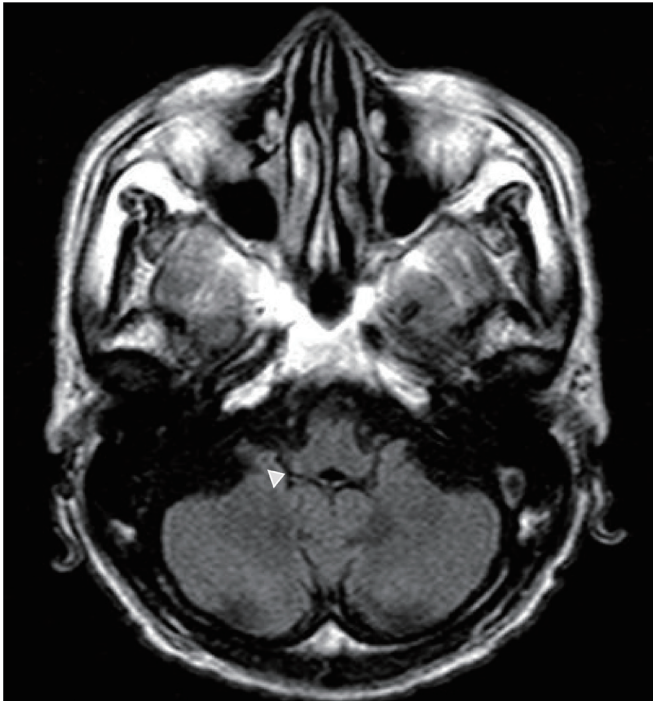
Although the patient was diagnosed with LBD 6 years before the surgery, he could independently perform activities of daily living (ADL), including bathing and dressing, until the acute abdominal symptoms occurred. He could walk 30 m outside without assistance and consumed the same diet as his family.

After surgery, he was transferred to an acute care unit and administered total parenteral nutrition. On day 51, he was transferred to a recovery rehabilitation care unit, where a nasogastric (NG) tube was fitted for enteral nutrition. On the day of transfer, a videofluorographic swallowing study (VF) was conducted in the sitting position. The VF showed problems with the upper esophageal sphincter (UES) opening on the right side. The side view of the VF showed overt aspiration, and a very small bolus was sent to the esophagus. Moreover, almost no air remained in the hypopharyngeal space (**Fig. 1A**). The front view of the VF showed significant laterality of UES passage (**Fig. 1B**). These findings meant that pharyngeal muscle function remained, at least moder-

ately, and the right side of the UES opening was severely impaired. The rehabilitation staff attempted to facilitate oral intake with head rotation to the right to send a bolus down to the less-affected left side.<sup>4)</sup> However, this manipulation was ineffective and caused aspiration. Therefore, his physicians determined that oral feeding was impractical for his nutritional management and tube feeding was continued. To prevent disuse, the patient ate small pureed meals under the supervision of speech–language–hearing therapists (STs).

During his previous hospitalization, the patient repeatedly underwent VF and videoendoscopy (VE) to evaluate swallowing function. The attending physician identified his swallowing function as Food Intake Level Scale<sup>5)</sup> (FILS) level 3 (swallowing training using a small quantity of food was performed, i.e., oral food intake was impractical) and recommended the placement of a percutaneous endoscopic gastrostomy tube.

The patient's family was not convinced he should cease oral intake; therefore, they presented to our hospital for a second opinion. After reviewing the referral documents from his previous physician, we considered that eating in the complete lateral position (our newly developed swallowing rehabilitation method for dysphagia)<sup>3)</sup> may be an effective



**Fig. 2.** FLAIR MRI of the brain on day 142 (the day of admission to the authors' hospital) showed a small high-signal area outside the right medulla oblongata (white triangle).

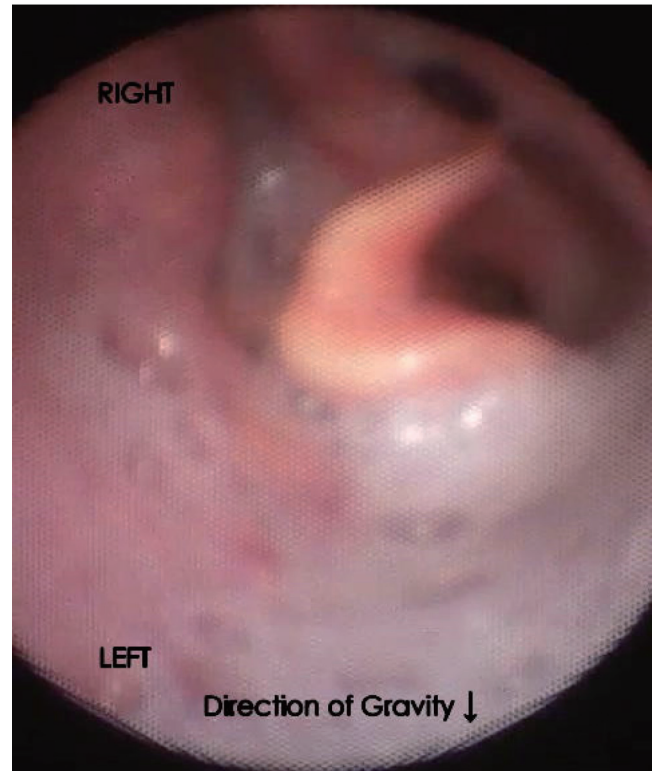
solution for his condition. We accepted the patient's transfer, and he was admitted to our recovery rehabilitation unit on day 142.

### Hospital Course in Our Unit

At the time of admission to our unit, the patient's consciousness level was Glasgow Coma Scale score E4V4M6. Muscle rigidity caused by LBD was also observed. He was not ambulatory, could not independently perform ADLs, and returned a Functional Independence Measurement (FIM) score of 22 (motor items, 13; cognitive items, 9).

Fluid-attenuated inversion recovery magnetic resonance imaging (FLAIR MRI) of the brain was performed on admission and showed a small high-signal area outside the right medulla oblongata (**Fig. 2**). Therefore, we diagnosed his condition as right Wallenberg syndrome; his previous physicians did not consider this diagnosis. We assumed the previous doctors had considered that the dysphagia was caused by LBD and sarcopenia after panperitonitis. Reduced brain blood flow during panperitonitis may have triggered a stroke.

The patient could tolerate sitting upright for only 10 min because of easy fatigability. Although his condition was clas-

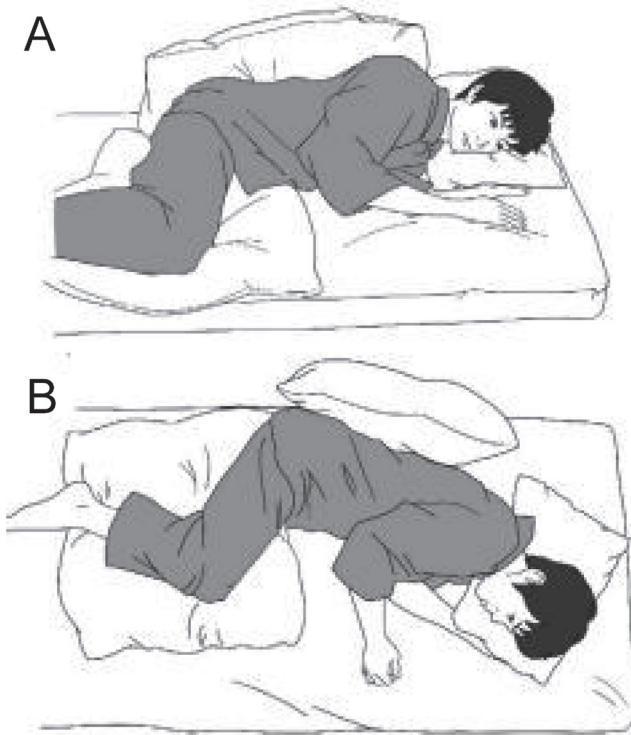


**Fig. 3.** Videoendoscopic evaluation of swallowing on day 142 in the complete lateral position on the left side showing right-side bulbar palsy and weak right vocal cord abduction movement (incomplete unilateral laryngeal paralysis). The image shows a V-shaped epiglottis and hypopharynx filled with foamy saliva.

sified as Brunnstrom stage V, differentiating bilateral hemiparesis from ataxia was difficult because of muscle weakness (3/5) in the manual muscle strength test. The patient did not complain of dizziness or vertigo. We were unable to perform a detailed evaluation of his sensory impairment because of dementia.

The patient's body weight immediately before surgery was 52.0 kg, and his height was 165.0 cm. Postoperatively, his body weight was 44.6 kg, and his body mass index (BMI) was 16.4 kg/m<sup>2</sup>, indicating a weight loss of 14%. Laboratory tests showed a serum albumin level of 3.0 g/dL.

VE findings on the day of admission were weak right vocal cord abduction movement (incomplete unilateral laryngeal paralysis), V-shape epiglottis, and hypopharynx filled with foamy saliva (**Fig. 3**). These findings indicated impaired opening on the right side of the UES, which had been detected at the previous hospital. The curtain sign was unclear. His swallowing function in a sitting position was FILS level



**Fig. 4.** The complete lateral position. (A) Side view; (B) view from above. Adapted from Kudo et al.<sup>6)</sup>

3, which was the same grade as that reported by the previous doctors.

To alter the bolus movement from the affected right side to the unaffected left side of the UES, we encouraged oral intake of puree and honey-thickened liquid while he was in the complete lateral position on his left side (see **Fig. 4**).<sup>6)</sup> We endoscopically observed a bolus that moved as intended along the left side of the pharyngeal wall and was swallowed without penetration or aspiration. His swallowing function in the complete lateral position was FILS level 6 (three easy-to-swallow meals primarily provide the patient's nutrition, complemented by alternative nutrition).

We removed the patient's NG tube and commenced parenteral nutrition because we thought he could eat in the complete lateral position without aspiration and because the tube was impeding the epiglottis movement and pharyngeal constriction. On day 2 in our unit, we began offering him a pureed diet three times per day under the supervision of STs. **Figure 5** shows the amount and route (parenteral, enteral, and oral) of nutritional intake during the patient's hospital stay in our unit.

Because the patient's oral intake was increased without difficulty, his parenteral intake was gradually reduced. On day

35 in our unit, parenteral nutrition was stopped because he received the required nutrition orally in the complete lateral position on his left side. Although we temporarily stopped his oral intake and resumed parenteral nutrition twice because of suspected respiratory infection and gastroenteritis, he achieved stable oral intake without enteral or parenteral nutrition.

Speech therapy with indirect and physical therapy including resistance training and movement exercises, such as Shaker exercise,<sup>7)</sup> were also initiated daily during hospitalization. Although we intended to dilate the affected right side of the patient's UES by balloon catheter treatment,<sup>8)</sup> the patient strongly refused this treatment. Moreover, it was difficult for the patient to utilize head rotation immediately after swallowing<sup>9)</sup> because of cognitive impairment. We also attempted treatment with an interferential current electrical stimulation device<sup>10)</sup> for 2 weeks, but no significant change in his swallowing function was noted. At about this time, the patient started performing basic ADLs and strengthening exercises under the supervision of physical therapists and occupational therapists. To minimize saliva aspiration, the patient lay on his side (the recovery position) while resting in bed.<sup>11)</sup>

Although the patient's oral intake increased without difficulty, several evaluations of his swallowing function in a sitting position showed significant foamy saliva and bolus residue in his pharynx. We could not allow him to eat in a position other than the left complete lateral position.

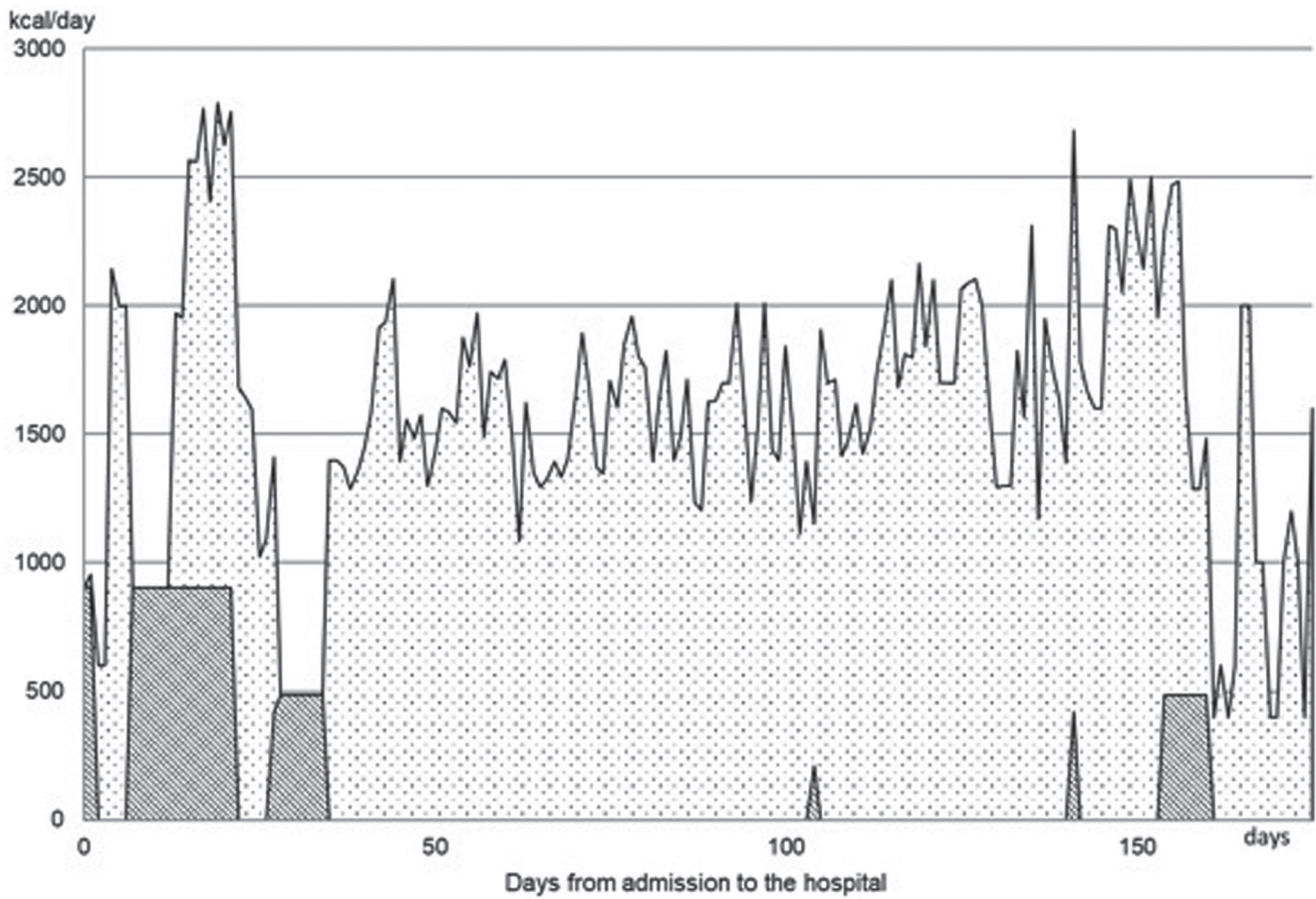
We provided the patient's family with instructions on how to feed him safely, how to create the appropriate food texture, and how to place him in a stable, complete lateral position. His ability to perform ADLs improved slowly, and he was discharged home after 176 days in our unit (day 317).

### Condition on Discharge

At the time of discharge, the patient's body weight was 45.4 kg (BMI, 18.6 kg/m<sup>2</sup>), and his FIM score was 41 (motor items, 22; cognitive items, 19). Despite his muscle rigidity and fluctuating level of lucidity, he could walk 15 m with assistance when lucid. While in the left complete lateral position, he was able to eat pureed food orally.

### Condition after Discharge

The patient was followed up as an outpatient by a dysphagia rehabilitation physician. VE evaluation performed in a complete lateral position 2 years after the onset of pancreatitis showed improved vocal cord closure, opening of the UES on the right side, and significantly decreased bolus residue



**Fig. 5.** The amount and route (parenteral, enteral, and oral) of nutritional intake during hospitalization. Dotted area, oral nutrition; shaded area, parenteral and enteral nutrition.

in the hypopharynx. However, 3 months later, during VE in an upright sitting position, the patient aspirated thickened water. Therefore, we recommended that he continue oral intake in the complete lateral position. His ability to perform ADLs continued to improve, and he could walk 30 m with assistance and use the toilet with assistance. Two years after discharge, his weight returned to 54 kg: his preoperative weight.

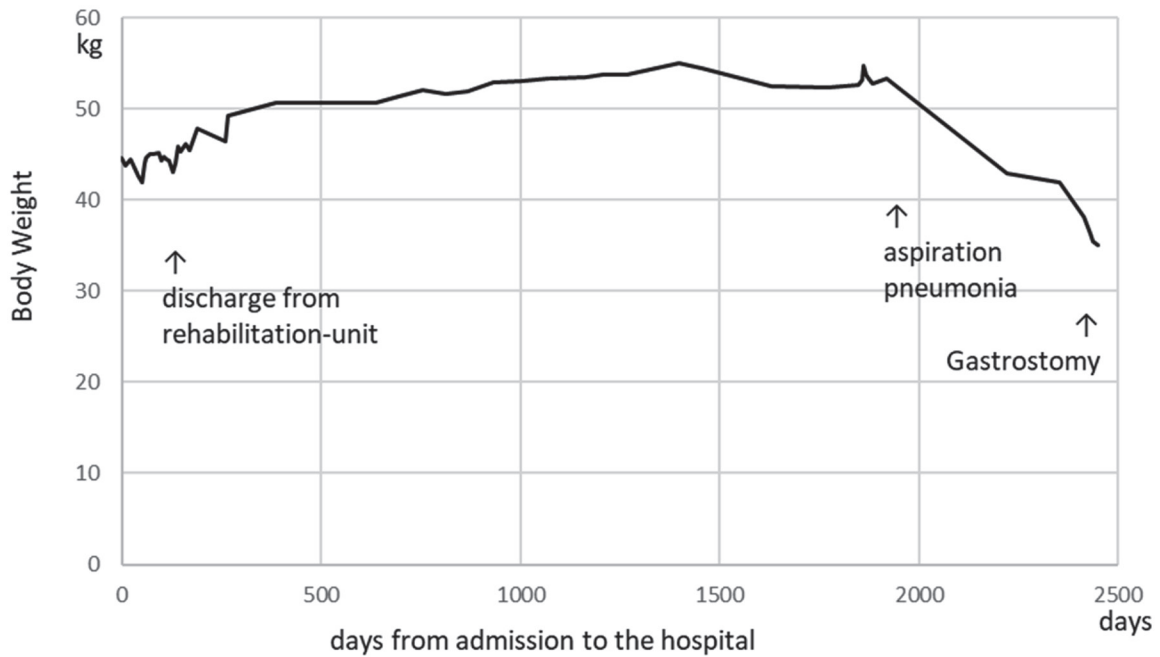
Five years and nine months after discharge from our unit, the patient suddenly developed aspiration pneumonia. After this episode, he lost much weight (**Fig. 6**) and his general condition declined. Therefore, the patient and his family decided that gastrostomy was appropriate. He is now bed-ridden and tube-fed but still lives with his family under the supervision of a home care physician.

### Ethical Considerations

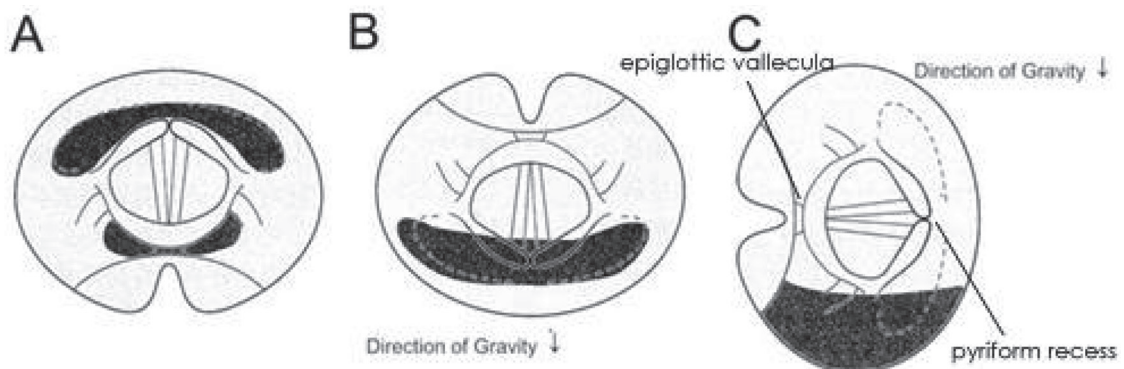
We obtained written consent from the patient and his family for his treatment and publication of this report.

## DISCUSSION

We previously investigated the effects of eating in the complete lateral position in patients with severe dysphagia and found that eating in this position effectively prevented aspiration and improved oral intake.<sup>3)</sup> In the complete lateral position, gravity prevents penetration and aspiration. Before the swallowing reflex occurs, the bolus temporarily pools in the pharynx. During ingestion, the temporary retaining space of a bolus in the pharynx depends on the person's position (**Fig. 7**). In the sitting position, the bolus pools in the epiglottic vallecula and/or pyriform recess (**Fig. 7A**). However, in the supine position, the bolus pools in the space floored by the retropharyngeal wall (**Fig. 7B**), and it pools in the space floored by the side wall of the pharynx when in the complete lateral position (**Fig. 7C**). Furthermore, the bolus is pulled by gravity and flows to the lower part of the pharynx. In the flat (0° reclining), complete lateral position, the bolus flows to the side wall of the oral and laryngeal pharynx.



**Fig. 6.** Weight changes of the patient during and after hospitalization.



**Fig. 7.** Effects of posture and the temporary retaining space on the bolus in the pharynx during ingestion. (A) In the upright sitting position, the bolus pools in the epiglottic vallecula and/or pyriform recess. (B) In the supine position, the bolus pools in the space floored by the retropharyngeal wall. (C) In the complete lateral position, the bolus pools in the space floored by the side wall of the pharynx. Adapted from Fukumura et al.<sup>3)</sup>

Then, the bolus pools at the maximum distance from the airway opening of the pharynx because the vocal folds open in the mid-sagittal direction. Because gravity is ubiquitous and works quickly, oral intake in the complete lateral position is a versatile compensatory method for patients with pharyngeal dysphagia. Gravity pulls the bolus and liquid to a safe space in the pharynx, preventing aspiration. Moreover, the complete lateral position can be an ergonomically stable posture with appropriate cushions and pillows. Therefore,

eating in the lateral position has immediate effects that are reproducible and do not depend on the cognitive function or motor skills of the patient or the skills of caregivers.

Our ability to follow up this patient as an outpatient for more than 5 years shows the reproducibility of the method (useful for dementia patients and non-professional family caregivers) and the long-term effects of complete lateral position. Of course, the dedicated support of the patient's family, such as having him use an appropriate posture for eating,

preparing food according to our recommendation, and cleaning his oral cavity, enabled him to rely on oral feeding for years.

To confirm the benefits of eating in the complete lateral position for patients with severe dysphagia, we conducted a non-randomized controlled trial to determine the effectiveness of complete lateral eating for patients in a convalescent care ward; we reported our findings (in Japanese) in 2012.<sup>3)</sup> During that study, we compared patients who underwent swallowing rehabilitation and performed eating in the complete lateral position with patients who did not, and changes in the overall physical and mental functions were evaluated. Patients in the complete lateral group were more likely to achieve significantly better swallowing function and greater gains in FIM score.<sup>3)</sup>

The patient reported herein suffered from severe dysphagia that was attributed to disuse and the effects of multiple morbidities, including Wallenberg syndrome, sarcopenia after pancreatitis, and underlying LBD. A vicious cycle of sarcopenia occurred in this patient: the inflammatory response of pancreatitis and dysphagia caused malnutrition (he lost 14% of his weight in 14 weeks), exacerbated sarcopenia, and weakened deglutition muscles.<sup>12)</sup> To reverse this deterioration, his previous doctors proposed gastrostomy as a nutrition method. We utilized the complete lateral position as a compensatory method, and it was successful for more than 5 years. We assume that LBD and aging were the main causes of the patient's recent decline in general status; the development of an aspiration pneumonia triggered the return of his vicious cycle of deterioration.

There is little evidence regarding the effect of posture on swallowing and eating. Most related studies refer only to head rotation and chin tuck in the sitting position.<sup>1)</sup> Some studies have reported the effect of side-lying on swallowing,<sup>13,14)</sup> but few of them report the mechanisms (how it works and for what reason) or the target patients (the dysphagia patients that experience the most benefit).

Fujishima<sup>9)</sup> reported that side-lying on the unaffected side was effective for patients with cricopharyngeal dysphagia and termed it "one-side swallowing." One-side swallowing also utilizes gravity and ensures the bolus flows only to the healthy side of the pharynx. Our proposed method of complete lateral swallowing is like Fujishima's one-side swallowing because it utilizes gravity. However, the main concept of the complete lateral position method is providing a relatively safe and capacious pooling space on the side wall of the pharynx that serves as a buffer against aspiration. We used a silicone oropharyngeal model based on three-dimensional

MRI data of a healthy adult man to measure the maximum volume without laryngeal penetration. The volume of the bolus-retaining pool in the complete lateral position was three times larger than that in the sitting position.<sup>3)</sup>

Kozu et al.<sup>11)</sup> used a video endoscope to observe the laryngopharynx of a patient with severe dysphagia in different lying positions and reported that lying in a lateral position was effective for saliva drainage and useful as a treatment method for respiratory rehabilitation. Concepts of saliva pooling while lying in a supine or lateral position are explained in **Fig. 7B and 7C**. In a supine position, saliva easily overflows the arytenoid, resulting in aspiration. If chronic aspiration is controlled, patients might regain laryngopharyngeal sensation and improve their swallowing function.

The complete lateral position is inappropriate for patients with dysphagia who have a reverse pressure gradient incoordination between pharyngeal contraction and UES opening during swallowing. In addition to the use of the complete lateral position, patients with severe UES opening impairment require additional therapy, such as balloon training or cricopharyngeal myotomy. The complete lateral position prevents aspiration by increasing the pharyngeal pooling volume, and it can only be safely applied under conditions where the liquid or bolus drain will away from the pharynx to the esophagus. Kunieda et al.<sup>15)</sup> used high-resolution manometry to illustrate a case of severe impairment of the UES opening. The phenomenon of weak pharyngeal contraction and UES opening dysfunction, as described by Kunieda, is occasionally observed in patients with Wallenberg syndrome. In the present case, VF and VE showed sufficient pharyngeal contraction, and the bolus flowed from the hypopharynx to the esophagus in the complete lateral position. The safety of swallowing in this position should be checked with VE or VF before utilizing the complete lateral position. The indications and contraindications of the complete lateral position should be discussed in future studies.

Although the patient in this case could not eat in a sitting position, we have encountered dozens of patients treated with the complete lateral position whose swallowing function improved such that they could eat in a sitting position within several months. We assume that reduced aspiration led to improvements in laryngopharyngeal sensation and was instrumental in their recovery.

This is the first English language case report of a patient with severe dysphagia treated with the complete lateral position method. This case report describes the effects of complete lateral swallowing on the long-term prognosis of a patient with severe dysphagia. Although we describe only one dys-

phagia patient treated with the complete lateral position, we have utilized complete lateral eating for dysphagia patients for a decade. Moreover, since we introduced the complete lateral position as a compensatory method for dysphagia in 2012, several studies have shown the effects of the complete lateral position for various dysphagia cases. Kudo et al.<sup>6)</sup> investigated the effects of the complete lateral swallowing method for bedridden elderly patients with severe dysphagia and concluded that patients treated with the complete lateral position had significantly lower mortality than the control group. Moreover, patients in the lateral swallowing group were more likely to resume oral intake at the time of hospital discharge.<sup>6)</sup> Nagao et al.<sup>16)</sup> conducted a retrospective case-control study using multivariate analysis to evaluate the efficacy of the complete lateral position for non-stroke patients with severe dysphagia and concluded that utilization of the complete lateral position was an independent factor associated with facilitating the swallowing function.

### CONCLUSION

Using the complete lateral position, which utilizes gravity and the anatomical structure of the laryngopharynx, can be an effective, versatile, non-invasive, and reproducible method to compensate for dysphagia.

### ACKNOWLEDGMENTS

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### CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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