

[ORIGINAL ARTICLE]

The Complete Lateral Position Method Reduced the Mortality Rate among Elderly Patients with Severe Dysphagia

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Abstract:

Objective This study aimed to validate the efficacy of the complete lateral position method among elderly patients with severe dysphagia.

Methods We enrolled 103 patients >65 years old who were diagnosed with severe dysphagia via the fiberoptic endoscopic examination of swallowing and were treated with the complete lateral position method at Hida Municipal Hospital between February 1, 2015, and October 31, 2020. Patients treated with the complete lateral position method were included in the lateral position group, and patients treated with conventional methods were included in the control group. The mortality rates were then compared between the lateral position and control groups.

Results All patients had severe dysphagia. However, the complete lateral position method significantly decreased the mortality rate in the lateral position group compared with the control group (64.7% vs. 38.8%; $p < 0.01$). In the lateral position group, approximately 55.6% of patients who were discharged from the hospital were able to safely take food orally again in the sitting position. Furthermore, the complete lateral position method significantly shortened the fasting period and improved the prognosis in patients whose condition had progressed due to senility in the lateral position group compared with the control group (17.3 vs. 8.8 days, $p < 0.05$; 28.4 vs. 67.5 days, $p < 0.05$).

Conclusion The complete lateral position method facilitated safe oral ingestion among elderly patients with severe dysphagia. Furthermore, safe oral ingestion decreased the mortality rate and shortened the fasting period at the end of life. The method is easy to implement and does not require the use of special devices or techniques. It can therefore be a useful approach in the care of elderly patients with severe dysphagia.

Key words: aspiration pneumonia, complete lateral position method, dysphagia, mortality, oral ingestion

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Introduction

Increasing age is an important risk factor for aspiration pneumonia, as patients require admission to care facilities, and those with comorbidities are at an increased risk (1, 2). Approximately 55% of elderly patients had oropharyngeal dysphagia based on the water swallow test in one previous report (3), and the in-hospital mortality rate increases by 2.9% annually in patients with dysphagia (4).

Several interventions, such as positioning (5, 6), dietary changes (7), use of medications (8, 9), oral hygiene (10), and tube feeding, have been proposed to prevent aspiration, particularly in older adult patients and those with stroke. Although the management of swallowing disorder is challenging among elderly patients, the risk of aspiration may persist even with these therapeutic interventions. Percutaneous endoscopic gastrostomy and the use of nasogastric tubes are more effective at delivering nutrition supplements and oral medications in patients with dysphagia than oral intake.

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However, their use did not reduce the incidence of aspiration pneumonia (11-13).

Fukumura et al. showed that the complete lateral position method is used to facilitate swallowing to prevent aspiration (14). It was introduced in swallowing rehabilitation for patients with pseudobulbar palsy at a rehabilitation hospital, and it made a substantial contribution to improving the activities of daily living. Furthermore, in a small study, we demonstrated that the complete lateral position method enabled elderly patients to safely perform oral ingestion and achieve discharge from the hospital to their home or a nursing home (15). However, whether or not the complete lateral position method is useful for treating elderly patients with comorbidities has not been validated.

The current retrospective observational study therefore assessed the efficacy of the complete lateral position method among elderly patients with severe dysphagia.

Materials and Methods

Study design and participants

After admission, all patients suspected of having dysphagia based on medical interviews, the water swallow test, and the food test underwent the fiberoptic endoscopic examination of swallowing (FEES), which was performed by the nutrition support team (NST). In total, 654 patients underwent the FEES to detect laryngeal penetration, delays in triggering the pharyngeal swallow, and severe pharyngeal residue between May 1, 2013, and October 31, 2020. We included 103 patients ≥ 65 years old who were diagnosed with severe dysphagia (Food Intake LEVEL Scale (FILS) of 1-3) between February 1, 2015, and October 31, 2020 (16). Aspiration is challenging to prevent with conventional methods in these patients, so the complete lateral position method was used in some patients, who were included in the lateral position group.

The FEES was conducted by a physician, and its results were evaluated by the same physician (author). The FEES was repeatedly reconducted, depending on the patient's condition. Most patients had the FEES conducted two or more times during hospitalization at two-week intervals. We selected the meal form, eating position, and amount of thickened water to flush out food residue based on the FEES results.

Patients who underwent gastrostomy were excluded from the study. We examined data concerning patient characteristics, the primary diagnosis, nutritional status during NST intervention and discharge, and outcomes from the electronic medical records. In addition to the lateral position group, we also included 34 patients ≥ 65 years old who were admitted to our institution and diagnosed with severe dysphagia between May 1, 2013, and January 31, 2015 but were not treated with the complete lateral position method, instead adopting the sitting position, based on conventional methods. These patients were classified as the control group.

There were no marked differences in terms of oral care, swallowing rehabilitation, or nutrition therapy between the control and lateral position groups.

FILS

The FILS has decent reliability and validity as a practical tool for assessing the severity of dysphagia (16).

- Level 1: No swallowing training is performed except for oral care.
- Level 2: Swallowing training without using food is performed.
- Level 3: Swallowing training using a small quantity of food is performed.

Complete lateral position method

The complete lateral position method had two steps.

Step 1 involves eating in the lateral position on a flat surface independently of the lateral position (left- or right-side). If the patient can eat on his/her own, the right or left-side lateral position should be selected so that the dominant arm is on the upper side (Fig. 1a-c).

The steps for adopting a position in patients treated using the left-side lateral position are shown below:

1. Initially, the patients assumed a supine position.
2. The left arm was separated from the body.
3. The head was rotated to the left side.
4. The right arm was placed on the chest.
5. The right knee was bent.
6. The back and pelvis were pushed from the right- to the left-side lateral position.
7. The entire pelvis was supported and moved backward, and then a dog-leg shape was established.
8. The patients were instructed to place their chin down.
9. Cushions were placed on the back and between both legs to stabilize the body.

Step 2 involves drinking ≥ 10 -20 mL of thickened water at the end of a meal to rinse away any food residue in the pharynx. The clearance of the food residue was evaluated using the FEES. Each patient drank thickened water at the end of the FEES to evaluate the amount of thickened water required to clear the pharynx (Fig. 2a-c).

Outcome measure

The primary outcome was the in-hospital mortality rate. The secondary outcomes were the fasting period and prognosis of patients whose condition progressed due to senility.

Statistical analyses

The χ^2 test, Fisher's exact test, and the Mann-Whitney U test were used to compare categorical and continuous variables, respectively, between the lateral position and control groups. Wilcoxon's signed-rank test was used to compare changes in serum albumin (Alb) levels during NST intervention and discharge. All statistical analyses were performed using EZR (version 1.54) (17). p values of <0.05 were considered significant.

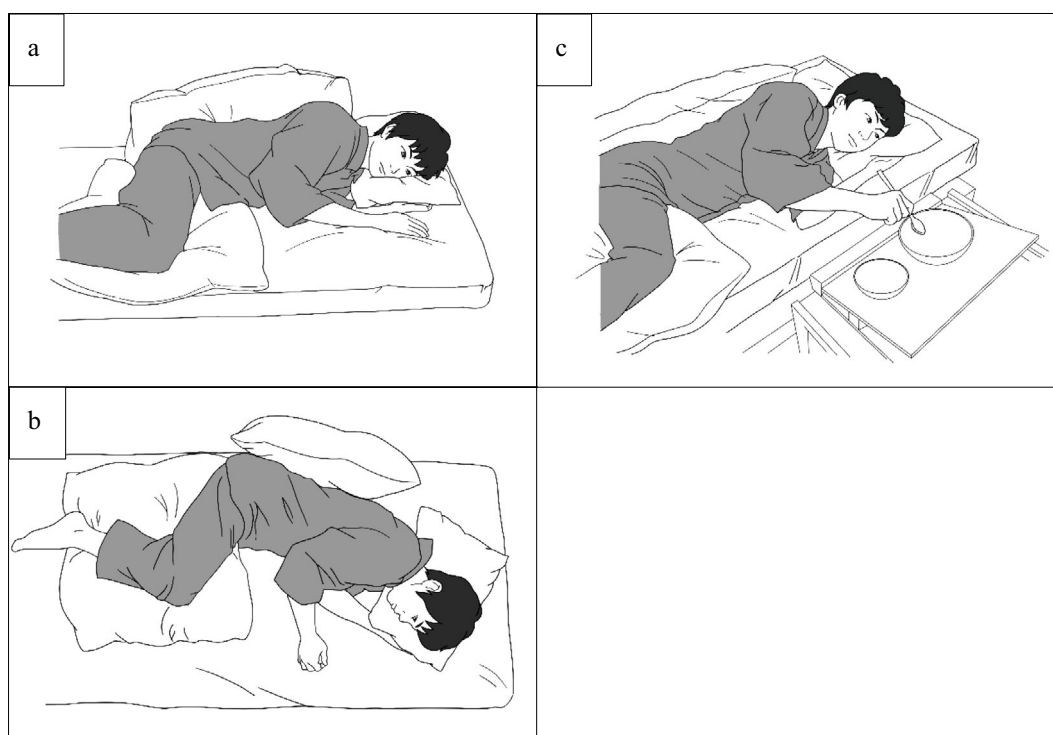


Figure 1. Position in the complete lateral position method. a: View from the side. b: View from above. The side of the neck that is directly underneath should be positioned. Hence, the lateral position must be assumed. The body must not press against the lower arm and thus must be placed in front. The shoulders and pelvis should be perpendicular to the bed surface. The upper leg should be placed in front of the lower leg to prevent the body from falling back. c: The dominant arm on the upper side should facilitate self-eating.

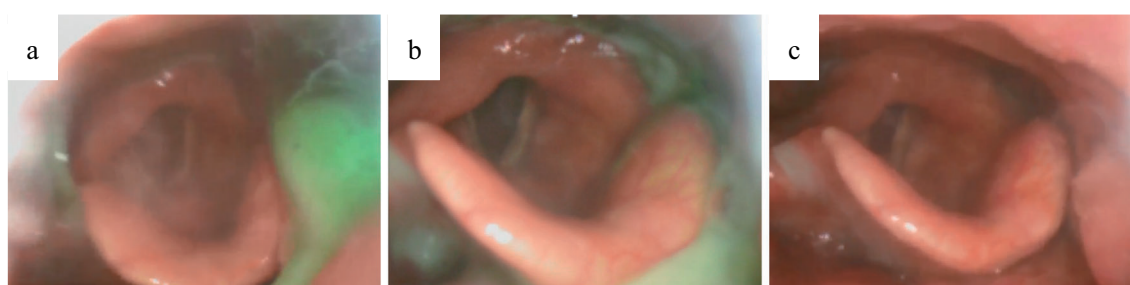


Figure 2. FEES showing the pharynx during a meal in the left-side lateral position. a: Food residues are stored in the left-side wall of the pharynx. b: The food residue remained in the pharynx at the end of the meal. c: The food residue in the pharynx was cleared by drinking thickened water.

Ethical considerations

This study was approved by the ethics committee of Hida Municipal Hospital and was conducted in accordance with the Declaration of Helsinki (approval number: 2018-1).

Results

Table 1 shows the characteristics of patients and their primary diagnosis during NST intervention. The average age of the participants was about 85 years old, and the Barthel Index score was extremely low. Furthermore, there were many

patients who were bedridden. The lateral position group had a higher proportion of men than did the control group. However, the results did not significantly differ.

All patients in the lateral position group underwent FEES. Fig. 2a-c shows that the food residue was stored in the side wall of the pharynx and was cleared by drinking thickened water at the end of the meal in the lateral position.

Fig. 3 shows the outcomes of the lateral position and control groups. The lateral position group had a significantly lower in-hospital mortality rate than the control group (64.7% vs. 38.8%; $p < 0.01$). About 55.6% of patients discharged with oral nutrition were able to safely take food in

Table 1. Characteristics of Patients with Severe Dysphagia.

	Control group, n=34	Lateral position group, n=103	p value
Age (years)	84.8±8.8	85.0±8.3	n.s.
Sex (male:female)	17:17	67:36	n.s.
Barthel Index	4.4±6.3	7.9±11.3	n.s.
FILS (1/2/3)	3/9/22	9/17/77	n.s.
Bedridden, n (%)	24 (70.6)	62 (60.2)	n.s.
Serum Alb level (g/dL)	2.7±0.5	2.7±0.5	n.s.
Primary diagnosis, n (%)			n.s.
Aspiration pneumonia	10 (29.4)	44 (42.7)	
Cerebral infarction	5 (14.7)	11 (10.7)	
Dehydration	5 (14.7)	6 (5.9)	
Heart disease	2 (5.9)	9 (8.7)	
Fracture	0 (0)	3 (2.9)	
Others	12 (35.2)	30 (29.1)	

FILS: Food Intake LEVEL Scale. Bedridden: spending whole day in bed and need assistance in excretion, eating, and changing clothes. Sex, bedridden: χ^2 test. FILS, primary diagnosis: Fisher's exact test. Others: Mann-Whitney U test. n.s.: not significant

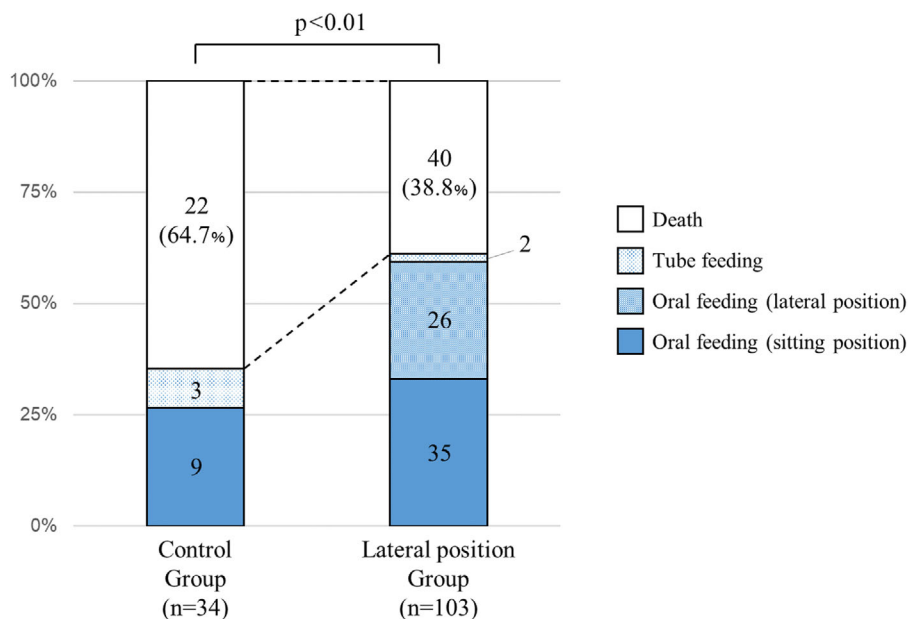


Figure 3. The mortality rate of the lateral position group decreased significantly compared with that of the control group.

the sitting position.

The nutritional status of patients discharged with oral feeding during NST intervention and discharge was then compared. The serum Alb levels at discharge were not increased compared with those during the NST intervention in the control group (2.9±0.3 vs. 2.7±0.3; not significant), whereas the serum Alb levels of the lateral position group were significantly increased (2.8±0.5 vs. 3.0±0.5; $p<0.01$) (Table 2).

Table 3 shows the prognosis and fasting period of patients who died due to senility and the causes of mortality. The lateral position and control groups had a high rate of mortality due to senility. The lateral position group had a signifi-

cantly shorter fasting period at the end of life than the control group (17.3±15.1 vs. 8.8±12.1 days; $p<0.05$). About 50% of patients in the lateral position group were able to ingest food orally without aspiration until a few days before death. Furthermore, the prognosis of the lateral position group was significantly better than that of the control group (28.4±20.6 vs. 67.5±53.0 days; $p<0.05$).

Discussion

The current study had two important clinical findings. First, the complete lateral position method significantly decreased the mortality rate among elderly patients with severe

Table 2. The Eating Position and Serum Alb Levels at Discharge of Patients with Oral Nutrition.

	NST intervention	Discharge	p value
Control group (n=9)			
Eating position (sitting/lateral)		9/0	
Serum Alb level (g/dL)	2.9±0.3	2.7±0.3	n.s.
Lateral position group (n=61)			
Eating position (sitting/lateral)		35/26	
Serum Alb level (g/dL)	2.8±0.5	3.0±0.5	<0.01

Wilcoxon signed-rank test. n.s.: not significant

Table 3. Fasting Period and Prognosis of Patients who Died Due to Senility.

	Control group, n=22	Lateral position group, n=40	p value
Cause of death, n (%)			
Senility	10 (45.5)	26 (65.0)	n.s.
Aspiration pneumonia	3 (13.6)	5 (12.5)	
Cerebral infarction	2 (9.1)	3 (7.5)	
Heart disease	1 (4.5)	0 (0)	
Others	6 (27.2)	6 (15.0)	
Fasting period of senility, n (%)			
Days	n=10	n=24 [†]	
0-3	2 (20.0)	11 (45.8)	
4-7	1 (10.0)	6 (25.0)	
8-30	5 (50.0)	4 (16.7)	
31≤	2 (20.0)	3 (12.5)	
Mean	17.3±15.1	8.8±12.1	p<0.05
Prognosis of senility, (days)			
Mean	28.4±20.6	67.5±53.0	p<0.05

The cause of death: Fisher's exact test. Others: Mann-Whitney U test. n.s.: not significant

[†]Excluding two patients who received tube feeding.

dysphagia. Second, the complete lateral position method significantly shortened the fasting period and improved the prognosis of patients whose condition progressed due to senility.

The complete lateral position method significantly decreased the mortality rate. If elderly patients develop aspiration pneumonia, sarcopenia can easily progress due to inappropriate dietary discontinuation or bed rest, which may deteriorate the patient's medical condition and prognosis (18). Although this study excluded patients who were discharged with feeding tubes and total parenteral nutrition, the serum Alb levels of the lateral position group increased, and the mortality rate improved. This finding may be due to the use of the complete lateral position method, which can facilitate safe ingestion at an early stage. In turn, this has strengthened nutrition therapy and rehabilitation. The mortality rate due to aspiration pneumonia did not change; therefore, a safe oral intake may indeed have contributed to the improvement of the nutritional status and the pathological condition of the primary disease, and as a result the mortality rate decreased. Furthermore, more than half of elderly patients with severe dysphagia can be treated and discharged to their

homes or nursing facilities with oral nutrition.

The prognosis highly depends on the primary disease. To clarify the contribution of the complete lateral position method at the end of life, we limited the cause of death to senility and performed the relevant evaluation. The complete lateral position method significantly shortened the fasting period and improved the prognosis of patients whose condition progressed due to senility. Dysphagia is a disturbing symptom that commonly occurs in patients with serious life-limiting illness. Furthermore, it can result in death. The complete lateral position method was comfortable and thus could be continually used, even in critically ill patients. By facilitating safe oral intake using the complete lateral position method, the fasting period was significantly extended in the lateral position group compared with the control group. Furthermore, the prognosis of patients was prolonged even at the end of life.

Comfort feeding only (CFO), a new guideline, specifies the steps that must be taken to ensure patient comfort via an individualized feeding care plan and is proposed in palliative care (19). To ensure safe and effective oral feeding as long as possible, the goal of managing dysphagia in patients with

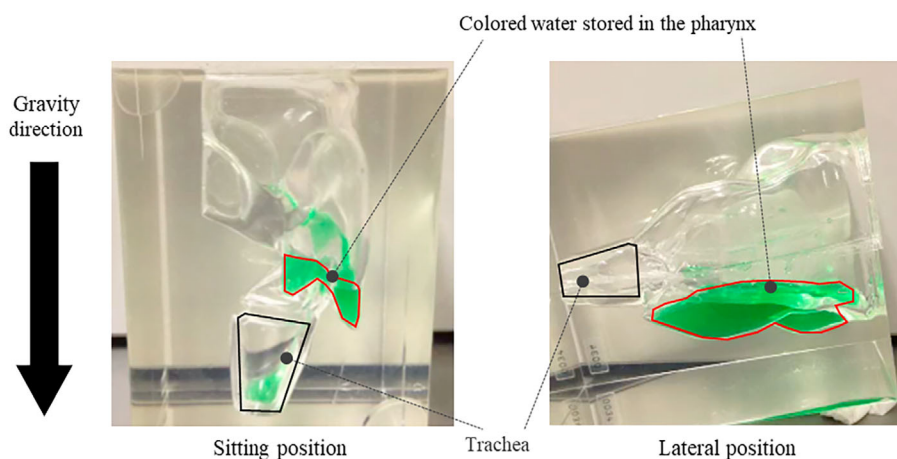


Figure 4. The transparent model of the pharynx and larynx. The colored water was stored in the pyriform sinuses in the sitting position. In contrast, the colored water was stored in the side wall of the pharynx in the lateral position. The volume of colored water increased, and the larynx and trachea were located perpendicular to the gravity direction in the lateral position (quoted from Ref 15 and slightly modified).

life-limiting illness is facilitative, not rehabilitative. The complete lateral position method can facilitate safe oral feeding for patients with severe dysphagia based on the CFO approach.

Fukumura et al. showed that the complete lateral position method creates a large bolus storage space on the side wall of the pharynx, thereby reducing the risk of aspiration (14). Fig. 4 depicts a simulated bolus (colored water) injected into a transparent model of the pharynx and larynx (LM-104, Koken, Tokyo, Japan). In total, 4.6 mL of colored water can be stored in the pyriform sinus in the sitting position and 14.2 mL in the side wall of the pharynx in the lateral position, an increase of about 3-fold. Fig. 2a shows the residues stored in the left-side wall of the pharynx and away from the circumference of the larynx in the left-side lateral position. Therefore, aspiration caused by pharyngeal residues can occur when the residual volume exceeds 4.6 mL in the sitting position, and up to 14.2-mL residues can be stored in the pharynx without aspiration in the lateral position. The aspiration caused by delays in triggering pharyngeal swallowing and aspiration attributed to residues in the pyriform sinuses can occur when food enters the larynx and trachea due to gravity. Fig. 4 shows that the larynx was positioned perpendicular to the gravity direction in the lateral position, making it easy to eliminate gravitational effects on pharyngeal residues. Fig. 2b, c show that drinking thickened water at the end of a meal can rinse out pharynx residues and reduce the risk of aspiration pneumonia caused by food residues.

The current study had several limitations. The swallowing function was evaluated via the FEES. However, the FEES has no established evaluation items that can be used as the gold standard. Therefore, a functional evaluation of swallowing via the FEES cannot account for the subjectivity of the practitioner. In the future, new evaluation criteria that can

separate the subjectivity of the practitioner should be used. Although there were no changes in terms of oral care, swallowing rehabilitation, or nutrition therapy in the control and lateral position groups, the possibility that the difference in mortality was influenced by historical progress in medical care and background multiple diseases cannot be excluded. Furthermore, this was a retrospective observational study, not a randomized controlled trial. Thus, to validate the efficacy of the complete lateral position method, new criteria for swallowing dysfunction must be established, and a comparative trial via prospective studies should be conducted.

In summary, the complete lateral position method significantly decreased the mortality rate among elderly patients with severe dysphagia. Furthermore, it significantly shortened the fasting period and improved the prognosis of patients whose condition progressed due to senility. The number of elderly patients with dysphagia will increase in the future. This method may thus be a breakthrough approach, able to be widely used in the care of elderly patients with severe dysphagia.

The authors state that they have no Conflict of Interest (COI).

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