

# Influence of Flexible Endoscopic Evaluation of Swallowing (FEES) on Feeding Route Decisions in Hospitalized Patients with Dysphagia

*Influencia de la fibroendoscopia de la deglución (FEES) en la toma de decisiones sobre la vía de alimentación en pacientes con disfagia*

Navarrete, Rodolfo<sup>1,2</sup> ; Maiorano, Silvina<sup>1</sup>

Received: 11/202/2025

Accepted: 12/12/2025

## Correspondence

Rodolfo Navarrete. E-mail:  
rgnavarrete@hotmail.com

## ABSTRACT

**Introduction:** Dysphagia is common in hospitalized patients and is associated with complications. Flexible Endoscopic Evaluation of Swallowing is a safe, direct method for assessing swallowing.

**Objective:** To evaluate the impact of Flexible Endoscopic Evaluation of Swallowing on feeding route decisions in hospitalized patients with dysphagia.

**Materials and Methods:** Retrospective observational study in patients evaluated with Flexible Endoscopic Evaluation of Swallowing during hospitalization. Clinical variables and changes in feeding route were analyzed.

**Results:** In 33.7% of cases, Flexible Endoscopic Evaluation of Swallowing led to a change in feeding decision. Lack of laryngeal elevation and altered consciousness were significantly associated with non-oral feeding indication.

**Conclusion:** Flexible Endoscopic Evaluation of Swallowing has both diagnostic and therapeutic impact. Systematic use supports better clinical decision-making regarding feeding safety.

**Key words:** dysphagia; flexible endoscopic evaluation of swallowing; endoscopy; swallowing; feeding route

## RESUMEN

**Introducción:** La disfagia es frecuente en pacientes internados, asociada a complicaciones. La fibroendoscopia de la deglución permite evaluar de forma directa y segura la deglución.

**Objetivo:** Evaluar el impacto de la fibroendoscopia de la deglución sobre la conducta alimentaria en pacientes internados con disfagia.

**Material y Métodos:** Estudio retrospectivo observacional en pacientes evaluados con fibroendoscopia de la deglución durante la internación. Se analizaron variables clínicas y la modificación de la vía de alimentación.

**Resultados:** En el 33,7% de los pacientes, luego de realizada la fibroendoscopia de la deglución, cambió la vía de alimentación. La ausencia de elevación laríngea y el com-

promiso del nivel de conciencia se asociaron con indicación de no alimentar por vía oral.

**Conclusión:** La fibroendoscopia de la deglución tuvo impacto diagnóstico y terapéutico. Su uso sistemático optimiza decisiones clínicas relacionadas con la seguridad alimentaria.

**Palabras clave:** disfagia; fibroendoscopia de la deglución; endoscopia; alimentación; evaluación de la deglución

## INTRODUCTION

Dysphagia is a common condition in hospitalized patients with neurologic or traumatic diseases. It is associated with respiratory complications, malnutrition, dehydration, prolonged hospital stays, and increased mortality.<sup>1</sup> The use of subjective clinical strategies for its evaluation remains a common practice in many centers, despite their low sensitivity and specificity.

The flexible endoscopic evaluation of swallowing (FEES) introduced by Langmore in 1988, has proven to be an objective, safe, and highly useful tool for both acute and chronic settings.<sup>2</sup> This technique enables direct and detailed assessment of laryngopharyngeal structures, secretion management, and the passage of the food bolus, with immediate application of therapeutic strategies during the procedure. Assessing the sensitivity of the laryngeal structures through direct contact with the fiberscope is another benefit provided by this method.

In hospitalized patients with dysphagia –particularly those with tracheostomy, neurological impairment, or motor impairments– FEES has been shown to be superior to clinical evaluation. Systematic use of FEES has been associated with a significant reduction in diagnostic errors, respiratory complications, and unnecessary use of enteral nutrition.<sup>3, 4</sup>

The standardization of food stimuli through the IDDSI (International Dysphagia Diet Standardisation Initiative) enables precise categorization of consistencies and viscosities used during dysphagia evaluation. This facilitates result comparisons, interdisciplinary communication, and targeted therapeutic planning.<sup>5</sup>

Despite its potential benefits, there are few studies that quantify the real impact of FEES on clinical decision-making regarding the choice of

the feeding route, particularly in inpatient and rehabilitation settings. This study analyzes the influence of FEES on the feeding route choice in hospitalized patients diagnosed with dysphagia, also evaluating predictive factors associated with the decision to use enteral feeding.

## MATERIALS AND METHODS

An observational, analytical, longitudinal, and prospective study was conducted in a cohort of 107 adult patients hospitalized in a rehabilitation center between January 2023 and April 2025. All patients had a clinical diagnosis of dysphagia and required instrumental evaluation using FEES.

### Procedure

FEES was performed by an interdisciplinary team comprising a pulmonologist and a speech-language pathologist specialized in swallowing disorders. Standardized scales, such as the Langmore secretion scale for documenting secretion pooling sites before food stimulus, helped predict aspiration risk. The Rosenbek Penetration-Aspiration Scale was also used to quantify penetration and aspiration events for each consistency and volume.

The study was carried out at the bedside, with patients in a seated or semi-seated position, depending on their tolerance.

The following general clinical variables were recorded:

- Tongue motility
- Soft palate elevation
- Velopharyngeal closure
- Vocal cord mobility
- Laryngeal elevation
- Laryngeal contractility
- Reflex cough

### Swallowing evaluation

Food stimuli of 5 mL and 10 mL were administered in consistencies defined by the IDDSI:

- **Level 0:** Thin liquids
- **Level 1:** Slightly thick liquids
- **Level 4:** Puree

### Objectives

The primary objective of this study was to evaluate the impact of FEES on clinical decision-making regarding the feeding route in patients with dysphagia. The primary outcome was defined as a change in nutritional indication

(initiation, suspension, or modification of oral intake) following the study.

As a secondary objective, the association between selected clinical variables and the decision to withhold oral feeding was analyzed using univariable and multivariable statistical analyses, with the aim of identifying potentially useful clinical predictors in the context of feeding route decision-making.

## RESULTS

### General characteristics of the cohort

A total of 107 consecutive patients with a clinical diagnosis of dysphagia were evaluated. The mean age was 66 years (standard deviation [SD]  $\pm$  15.6), with a range from 17 to 89 years. 72% were male ( $n = 77$ ). The most frequent reason for hospitalization was stroke (56%), followed by polyneuropathies (25%) and traumatic brain injury (TBI) (9%).

### General status and conditions at the time of the study

87% of patients had preserved alertness, while 13% showed some degree of impaired level of consciousness (9% disoriented, 4% drowsy). Regarding patient position during the study, 58% were evaluated in a seated position and 42% in a semi-seated position (45 degrees). Only 10% had a tracheostomy ( $n = 11$ ).

### Functional findings on FEES before swallowing evaluation

94% had vocal cord mobility; 98% had velopharyngeal closure; and 96% had soft palate elevation. However, 82% did not have adequate pharyngeal contractility. 45% lacked tongue motility, and 29% did not show laryngeal elevation—two key parameters for safe swallowing.

### Endoscopic evaluation of swallowing

Swallowing impairments were frequently observed during the administration of 5 mL and 10 mL volumes at IDDSI levels 0 (thin liquid), 1 (slightly thick liquid), and 4 (puree). At IDDSI levels 1 and 4, more than 90% of patients presented some type of swallowing disorder. Penetration or aspiration events were identified in 26.7% with thin liquids (IDDSI 0), 52.3% with nectar-thick liquids (IDDSI 1), and 59.3% with puree (IDDSI 4). The higher frequency of events observed with thicker consistencies (IDDSI 1 and 4) compared to thin liquids

(IDDSI 0) is explained by the study protocol, which prioritized starting with safer consistencies. If significant aspiration or penetration was observed, progression to thinner consistencies was discontinued to avoid risks, which may have led to an underestimation of events at IDDSI 0.

According to the Rosenbek Penetration-Aspiration Scale, the distribution of scores was as follows: a score of 2 (penetration that resolves spontaneously) was the most common for IDDSI levels 1 and 4. silent aspirations (score of 8) were recorded in a small percentage of patients, mostly in IDDSI level 4.

### Change in clinical management post-FEES

One every three patients ( $n = 33$ ; 31%) had their feeding route modified after the instrumental evaluation. Twenty-six patients (24%) initiated oral feeding after previously lacking an oral route, while 7 patients (6%) discontinued oral feeding due to risk findings ( $p = 0.002$ ).

### Clinical variables associated with the decision to withhold oral feeding

In the subgroup of patients in whom oral feeding was not initiated or was suspended (regardless of prior oral intake), specific clinical patterns were identified. The two main significant predictors of the decision to withhold oral feeding were: absence of laryngeal elevation observed during the endoscopic study, strongly associated with contraindication to oral feeding ( $p = 0.001$ ), and altered level of consciousness, including disoriented or drowsy patients, also significantly correlated said contraindication (Figure 1, Table 1).

These findings remained significant in the multivariable analysis, reinforcing their value as independent predictors of contraindication to oral feeding in this clinical context (Table 2).

Change in voice tone was common, but not significantly associated with the clinical decision ( $p = 0.56$ ), underscoring the need for objective instrumental assessments.

### Complications

A low complication rate was recorded (0.9%); the most frequent was nasal discomfort, followed by nausea. Only one patient was unable to tolerate the procedure.

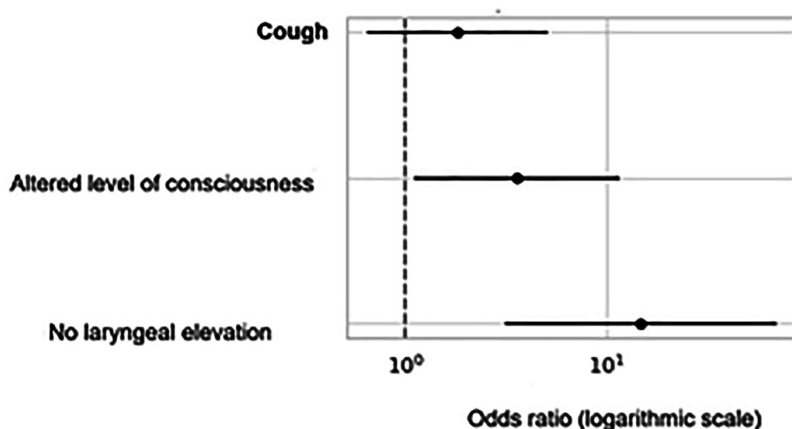


Figure 1. Multivariable analysis: predictors of contraindication to oral feeding

TABLE 1. Univariable analysis for withholding oral feeding after FEES

Variable	Test	P-value	Significance	n
Sex	Fisher	0.624	Non-significant	33
Level of consciousness	Fisher	0.710	Non-significant	33
Position	Fisher	0.674	Non-significant	33
Tracheostomy	Fisher	0.555	Non-significant	33
Change in voice tone	Fisher	0.556	Non-significant	33
NGT (nasogastric tube)	Fisher	0.018	Significant	33
Tongue motility	Fisher	0.494	Non-significant	33
Soft palate elevation	Fisher	0.788	Non-significant	33
Contractility	Fisher	0.788	Non-significant	33
Laryngeal elevation	Fisher	0.044	Significant	33
Cough	Fisher	0.023	Significant	33

TABLE 2. Multivariable analysis for withholding oral feeding after FEES

Variable	p-value	OR (exp (B))
Laryngeal elevation	0.001	14.85
Cough	0.101	3.743
Level of consciousness	0.033	3.590

## DISCUSSION

The present study shows that the systematic use of FEES with standardized food consistencies such as those described by the IDDSI, has a significant impact on clinical decision-making regarding the feeding route in hospitalized pa-

tients with dysphagia. In our cohort, one every three patients experienced a change in their feeding route after the procedure, reinforcing its role as a diagnostic but also a therapeutic evaluation tool.

These findings are consistent with previous studies. Dziejewas et al evaluated FEES in critically ill patients with tracheostomy, applying a standardized swallowing assessment protocol that included neuromuscular and sensory functions. The study showed that FEES not only safely identifies swallowing disorders but also allows for structured, early guidance toward oral feeding progression in these vulnerable patients.<sup>3</sup> The standardization of assessment using tools such as FEESST (flexible endoscopic evaluation of swal-

lowing with sensory testing) or FEES+ facilitates more objective feeding decisions in the context of prolonged hospitalization.

Similarly, Terzi et al analyzed the clinical utility of FEES in patients admitted to a respiratory care unit and found that more than 40% of the abnormalities detected by endoscopy were not clinically suspected. Instrumental evaluation allowed for reclassification of feeding management in a significant proportion of cases, highlighting the risk of underestimating or overestimating dysphagia when assessed only clinically.<sup>6</sup>

In our cohort, a high frequency of swallowing disorders was also observed with thicker consistencies (IDDSI 1 and 4), along with elevated penetration/aspiration levels according to the Rosenbek scale, underscoring the pathophysiological complexity of dysphagia in hospitalized patients. Among clinical predictors, absence of laryngeal elevation and altered level of consciousness were significantly associated with the decision to withhold oral feeding. These findings are consistent with studies proposing the inclusion of these variables as objective clinical screening criteria prior to FEES.<sup>3, 4</sup>

Notably, commonly used clinical signs such as the “wet voice” were not significantly associated with decision-making regarding the feeding route. This is consistent with findings reported by Suiter and Leder, who analyzed the specificity of this clinical sign and concluded that, in the absence of an instrumental evaluation, its predictive value is low and may lead to unnecessarily restrictive decisions.<sup>7</sup> This finding reinforces the need to prioritize objective, instrument-based tools over an isolated clinical examination.

Our study presents several relevant methodological strengths. The prospective design, with systematic implementation of FEES under real clinical conditions, allowed for a robust evaluation of hospitalized patients with diverse profiles. The application of international standards such as those established by the IDDSI, significantly enhanced the reproducibility of the findings and their comparability with other studies. In addition, the use of a rigorous multivariable analysis allowed the identification of clinically relevant predictors associated with feeding route decisions.

However, certain limitations should also be considered. This was a single-center study, which may limit the generalizability of results to other healthcare settings. Furthermore, no longitudinal follow-up of patients was conducted, making it impossible to assess the impact of FEES-based clinical decisions on nutritional recovery, incidence of aspiration pneumonia, or medium- and long-term morbidity and mortality. Additionally, no direct comparison was made between FEES and other instrumental methods such as videofluoroscopy, limiting the comparative analysis of diagnostic sensitivity and specificity. Finally, the small number of patients with tracheostomy made it difficult to draw solid conclusions for this specific subgroup.

## CONCLUSION

The systematic use of FEES, with IDDSI standardization significantly impacts clinical decision-making on feeding routes in dysphagic patients. Standardized food stimuli enabled the categorization of consistencies during instrumental evaluation, enhancing case comparability and result quality.

Variables such as absence of laryngeal elevation and impaired level of consciousness were reliable predictors to withhold oral feeding. In contrast, the “wet voice” sign showed no association with feeding management changes, indicating it should not be used alone as a clinical criterion. These findings support the routine use of FEES in hospital settings as a safe, objective, and cost-effective tool.

## Conflict of interest

The authors have no conflicts of interest to declare.

## REFERENCES

1. González-Fernández M, Ottenstein L, Atanelov L, Christian AB. Dysphagia after stroke: an overview. *Curr Phys Med Rehabil Rep*. 2013;1(3):187–196. <https://doi.org/10.1007/s40141-013-0021-5>.
2. Langmore SE, Schatz K, Olsen N. Fiberoptic endoscopic examination of swallowing safety: a new procedure. *Dysphagia*. 1988;2(4):216–219. <https://doi.org/10.1007/BF02414429>.
3. Dziejewas R, Warnecke T, Olenberg S, Teismann I, Zimmermann J, Kramer C, et al. Towards a basic endoscopic evaluation of swallowing in acute stroke-devel-

- opment and evaluation of a simple dysphagia score. *Stroke*. 2008;39(8):2341-2345. <https://doi.org/10.1161/STROKEAHA.107.510800>.
4. Warnecke T, Ritter MA, Kroog A, Oelenberg S, Teismann IK, Zimmermann J, et al. Fiberoptic endoscopic dysphagia severity scale predicts outcome after acute stroke. *Cerebrovasc Dis*. 2009;28(3):283-289. <https://doi.org/10.1159/000235915>
  5. Terzi N, Normand H, Daudet S, Pierre D, Roblot P, Mercat A. Swallowing disorders in patients with prolonged mechanical ventilation. *Am J Respir Crit Care Med*. 2010;181(10):1049-1055. <https://doi.org/10.1164/rccm.200906-0892OC>.
  6. International Dysphagia Diet Standardisation Initiative (IDDSI). Complete IDDSI framework. [Internet]. 2019 [cited 2025 Aug 31]. Available from: <https://iddsi.org/Framework>.
  7. Suiter DM, Leder SB. Clinical utility of the 3-ounce water swallow test. *Dysphagia*. 2008;23(3):244-250. <https://doi.org/10.1007/s00455-007-9127>.