Original Investigation

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Long-Term Postoperative Swallowing Findings After Carbon Dioxide Laser Transverse Posterior Cordotomy in Bilateral Vocal Fold Paralysis: A Retrospective Cross-sectional FEES Study

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Abstract

Objective: To describe the frequency and pattern of long-term postoperative swallowing abnormalities detected by flexible endoscopic evaluation of swallowing (FEES) after carbon dioxide (CO_2) laser transverse posterior cordotomy for bilateral vocal fold paralysis (BVFP), and to relate these findings to patient-reported and functional swallowing measures.

Methods: This retrospective, single-center cross-sectional study included 17 adults with BVFP who had previously undergone CO_2 laser transverse posterior cordotomy and were evaluated at a single postoperative time point between January and June 2025. Swallowing safety and efficiency were assessed using FEES with boluses representing International Dysphagia Diet Standardisation Initiative levels 0 (thin liquid; dyed water), level 3 (moderately thick; dyed yogurt), and level 7 (regular; cracker). Airway invasion and pharyngeal residue were graded using the Penetration-Aspiration Scale and Yale Pharyngeal Residue Severity Rating Scale. Functional Oral Intake Scale (FOIS), Functional Outcome Swallowing Scale (FOSS), and Eating Assessment Tool-10 scores were also recorded.

Results: All participants were female (n=17; mean age 60.9±13.3 years) with a mean postoperative follow-up of 70.6±41.6 months. Penetration was common across consistencies; thin-liquid aspiration occurred in one patient. Vallecular and pyriform sinus residue was observed in a subset of patients. Most maintained full or near-full oral intake (FOIS 7, 76.5%) with mild functional limitation (FOSS 1-2, 94.1%).

Conclusion: This descriptive postoperative series contributes objective FEES-based long-term swallowing data after CO_2 laser transverse posterior cordotomy in BVFP. FEES frequently demonstrated penetration and pharyngeal residue despite generally preserved oral intake, but these findings should not be interpreted as a treatment effect because baseline swallowing data were unavailable.

Keywords: Vocal cord paralysis, lasers, deglutition disorders, endoscopy, laryngoscopy

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Introduction

Bilateral vocal fold paralysis (BVFP) is primarily managed as an airway disorder, and carbon dioxide (CO_2) laser transverse posterior cordotomy (TPC) is an established posterior glottic-widening procedure that improves airway patency while preserving acceptable voice quality (1-3). Accordingly, most studies on TPC have focused on respiratory outcomes, decannulation rates, revision surgery, and voice-related outcomes rather than on detailed instrumental findings of swallowing (4-7).

Swallowing deserves separate evaluation in this population because posterior glottic widening may affect laryngeal closure, and BVFP may coexist with impaired laryngopharyngeal sensation secondary to recurrent laryngeal or vagal nerve injury (8,9). Patient-reported symptoms and oral intake may remain satisfactory even when flexible endoscopic evaluation of swallowing (FEES) demonstrates penetration, aspiration, or pharyngeal residue, particularly when abnormalities are mild, compensated, or associated with reduced sensory response (9,10). Therefore, patients may appear functionally stable despite objective swallowing abnormalities.

Several studies have evaluated swallowing, quality of life, and overall outcomes after posterior cordotomy; however, swallowing assessment has generally relied on patient-reported measures, chart review, or functional scales rather than a standardized FEES-based protocol for assessing airway invasion and pharyngeal residue (4-7,10). To our knowledge, no previous study has specifically characterized long-term postoperative swallowing findings after CO_2 laser TPC in patients with BVFP using FEES together with the Penetration-Aspiration Scale (PAS) and Yale Pharyngeal Residue Severity Rating Scale (YPRSRS) across standardized International Dysphagia Diet Standardisation Initiative (IDDSI) consistencies. Accordingly, the present study was designed to address this gap.

Accordingly, the aim of this study was to characterize long-term postoperative swallowing findings in patients with BVFP following CO_2 laser TPC. Specifically, we sought to determine the frequency and pattern of penetration, aspiration, and vallecular or pyriform sinus residue and to relate these objective FEES findings to Eating Assessment Tool-10 (EAT-10), Functional Oral Intake Scale (FOIS), and Functional Outcome Swallowing Scale (FOSS) scores. These findings may help clinicians better understand the spectrum of FEES findings encountered in this postoperative population and provide a basis for future prospective perioperative studies.

Methods

This retrospective cross-sectional study evaluated postoperative swallowing at routine follow-up visits between January and June 2025 in patients who had previously undergone CO_2 laser TPC for BVFP at a tertiary academic center. The study protocol was approved by the Clinical Research Ethics Committee of Ondokuz Mayıs University (approval no: 2024/481, date: 14.11.2024). Written informed consent was obtained from all patients.

All patients had undergone unilateral CO_2 laser TPC according to the technique described by Dennis and Kashima (3). Under microlaryngoscopy, the posterior portion of one true vocal fold and approximately 3-4 mm of the adjacent false vocal fold were excised with the CO_2 laser. At follow-up, all patients had tracheostomy-independent respiration and exercise tolerance sufficient for daily activities.

The interval between cordotomy and FEES (mean postoperative follow-up duration) was 70.6±41.6 months.

Seventeen patients met the inclusion criteria: prior laser cordotomy for BVFP, absence of head and neck cancer, and ability to complete study procedures. Patients were excluded if they were <18 years old, pregnant, had undergone laryngeal surgery other than the index CO_2 laser TPC before the FEES assessment, had received head and neck radiotherapy, had structural abnormalities of the oropharynx or larynx, or had swallowing impairment related to neurological disease.

FEES was performed in the outpatient setting by a single examiner (first author) using a flexible video laryngoscope (3.7 mm; Karl Storz, Tuttlingen, Germany). No topical anesthetic was used. Boluses corresponding to IDDSI level 0 (thin liquid; blue-dyed water), IDDSI level 3 (moderately thick; blue-dyed yogurt), and IDDSI level 7 (regular; cracker) were administered (11). All examinations were digitally recorded for offline scoring.

Methylene blue was added in small amounts to the water and yogurt to enhance contrast with the mucosa during FEES (12,13). The procedure was performed by the same examiner in all patients to maintain procedural consistency. The recorded videos were subsequently reviewed independently by two otolaryngologists experienced in FEES.

Swallowing safety was graded using the 8-point PAS (14). Swallowing efficiency was graded using the YPRSRS for the vallecula and pyriform sinuses (15). Functional oral intake was assessed using the FOIS and the FOSS (16,17). Subjective dysphagia was assessed using the EAT-10, which was completed by the participants without investigator assistance or interpretation (18,19).

For interpretation, PAS scores of 1 indicate no airway invasion, scores of 2-5 indicate penetration (material entering the laryngeal vestibule above the vocal folds), and scores of 6-8 indicate aspiration (material passing below the vocal folds) (14). The YPRSRS grades residue severity separately for the vallecula and pyriform sinuses, ranging from 1 (none)

to 4 (severe) (20). An EAT-10 score of ≥3 was considered indicative of clinically meaningful dysphagia symptoms (19).

Statistical Analysis

Two otolaryngologists experienced in FEES independently scored the anonymized video recordings offline and were blinded to each other's ratings and to questionnaire results. Interrater agreement was evaluated using weighted kappa statistics. Discrepant scores were resolved by consensus for descriptive reporting (21).

Descriptive statistics are reported as mean±standard deviation and median (minimum-maximum), as appropriate. Given the lack of preoperative data and a control group, results are presented primarily descriptively. Although these analyses do not directly estimate the effect of cordotomy, exploratory one-sample comparisons were performed to provide secondary clinical context. Analyses were conducted using RStudio software (22). Statistical significance was set at $p<0.05$.

Results

All results represent a single-time-point postoperative descriptive assessment. Participant characteristics are summarized in Table 1. The cohort comprised 17 females with a mean age of 60.9±13.3 years and a mean body mass index of 29.7±4.2 kg/m². Mean postoperative follow-up time was 70.6±41.6 months. BVFP etiology was thyroidectomy in 16 patients (94.1%) and idiopathic in 1 patient (5.9%). All thyroidectomy-related cases had undergone total thyroidectomy; surgical indications were thyroid neoplasia, including papillary thyroid carcinoma in 14 patients and follicular thyroid carcinoma in 2 patients. Age ranged from 24 to 83 years, postoperative follow-up ranged from 12 to 132 months, and body mass index ranged from 20.9 to 38.2 kg/m² (Table 1). In the reviewed operative and pathological records, none of the thyroid carcinoma patients had documented cervical lymph node metastasis or had undergone therapeutic lateral neck dissection or prophylactic or therapeutic central neck dissection.

Patient-reported dysphagia was generally mild (EAT-10 mean 3.24±4.21; median 3), although 9 patients (52.9%) had an EAT-10 score ≥3. Most participants reported full oral intake without restriction (FOIS 7, 76.5%), and functional swallowing limitation was mild (FOSS 1-2, 94.1%) (Table 2; Figure 1).

Penetration (PAS 2-5) occurred in eight patients (47.1%) with thin liquid, seven patients (41.2%) with moderately thick consistency, and six patients (35.3%) with regular consistency. Thin-liquid aspiration (PAS 6-8) was observed in one patient (5.9%) (Supplementary Video), whereas no aspiration was observed with moderately thick or regular consistencies. Median PAS scores were 2 for thin liquid and 1 for both moderately thick and regular consistencies (Table 2).

Pharyngeal residue was present in both the vallecula and pyriform sinuses. Residue graded as YPRSRS ≥2 occurred in the vallecula in ten patients (58.8%) with thin liquid, seven patients (41.2%) with moderately thick consistency, and seven patients (41.2%) with regular consistency. Corresponding pyriform sinus residue occurred in ten (58.8%), seven (41.2%), and five (29.4%) patients, respectively.

Median residue scores were 2 for thin liquid in both the vallecula and pyriform sinuses and 1 for both moderately thick and regular consistencies (Table 2).

The main descriptive pattern was preserved functional oral intake despite frequent penetration and pharyngeal residue detected by FEES. When dichotomized, PAS >1 occurred in 52.9% of patients for thin liquid, 41.2% for moderately thick consistency, and 35.3% for regular consistency. YPRSRS >1 was most common with thin liquid (vallecula 58.8%, pyriform

Table 1. Patient demographics and clinical features

Characteristics		Mean (±SD)	Median (min-max)
Sex (F/M)		17/0	
Age (mean±SD)		60.9 (±13.3)	62 (24-83)
BMI (kg/m²) (mean±SD)		29.7 (±4.2)	30.3 (20.9-38.2)
Etiology of the BVFP	Thyroidectomy	16	
	Idiopathic	1	
Type of thyroidectomy	Total thyroidectomy	16	
Indication for thyroidectomy	Papillary carcinoma	14	
	Follicular carcinoma	2	
Lymph node metastasis		0	
Neck dissection		0	
Postoperative follow-up time (month)		70.6 (±41.6)	72 (12-132)

SD: Standard deviation, F: Female, M: Male, BMI: Body mass index, BVFP: Bilateral vocal fold paralysis, min: Minimum, max: Maximum

52.9%). Figure 1 summarizes the distributions of EAT-10, FOIS, and FOSS scores, whereas Figure 2 summarizes the highest PAS and YPRSRS scores. Representative FEES images illustrating penetration and post-swallow vallecular and pyriform sinus residue are presented in Figures 3-5.

Interrater agreement for FEES-based scales was substantial to almost perfect across consistencies, with weighted kappa values shown in Table 3.

Table 2. Swallowing evaluation outcomes

	Reference value	Mean±SD	Median (min-max)	Test statistics*	p
EAT-10	3	3.24±4.21	3 (0-18)	95	0.193
PAS regular	1	1.53±0.87	1 (1-3)	15.0	**0.024**
PAS moderately thick	1	1.76±1.03	1 (1-4)	28.0	**0.010**
PAS thin-liquid	1	2.18±1.43	2 (1-6)	45.0	**0.004**
YPRSRS-V regular	1	1.47±0.87	1 (1-4)	15.0	**0.027**
YPRSRS-V moderately thick	1	1.76±1.15	1 (1-4)	28.0	**0.010**
YPRSRS-V thin-liquid	1	1.82±0.95	2 (1-3)	45.0	**0.004**
YPRSRS-PS regular	1	1.41±0.71	1 (1-3)	15.0	**0.027**
YPRSRS-PS moderately thick	1	1.65±0.93	1 (1-3)	28.0	**0.010**
YPRSRS-PS thin-liquid	1	1.76±0.83	2 (1-3)	45.0	**0.004**
FOSS	0	1.35± 0.61	1 (1-3)	153	**<0.001**
FOIS	7	6.76±0.44	7 (6-7)	0	**0.036**

*:Wilcoxon signed rank test. The bold prints in the p column indicate that there is a significant difference when compared with the reference values in the literature. SD: Standard deviation, min: Minimum, max: Maximum, EAT-10: Eating Assessment Tool-10, PAS: Penetration-Aspiration Scale, YPRSRS-V: The Yale Pharyngeal Residue Severity Rating Scale for Vallecula, YPRSRS-PS: The Yale Pharyngeal Residue Severity Rating Scale for Pyriform Sinus, FOSS: Functional Outcome Swallowing Scale, FOIS: Functional Oral Intake Scale

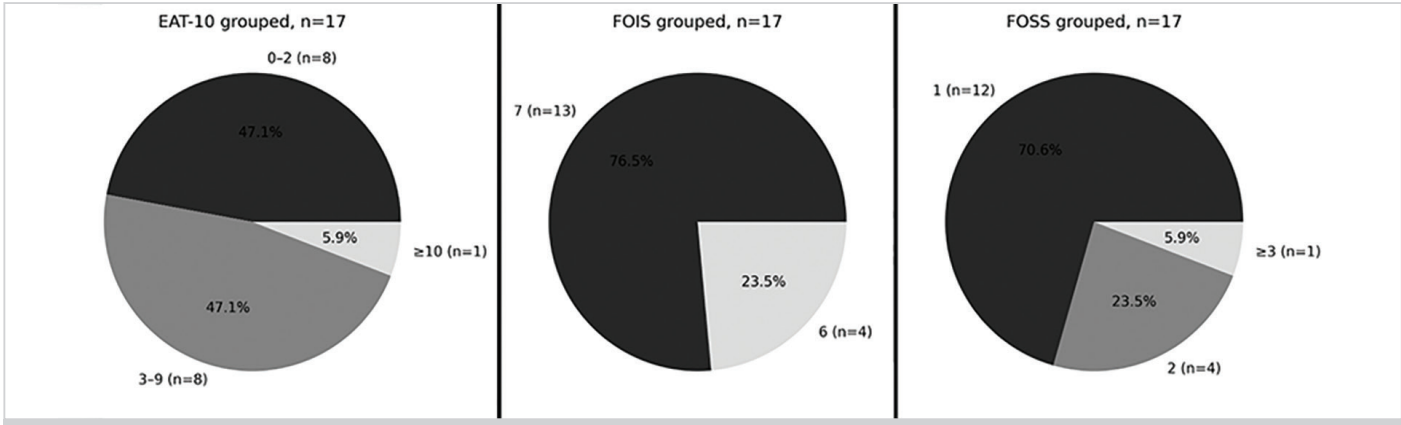

Figure 1. Distribution of EAT-10, FOIS, and FOSS grouped scores among the study cohort
EAT-10: Eating Assessment Tool-10, FOIS: Functional Oral Intake Scale, FOSS: Functional Outcome Swallowing Scale

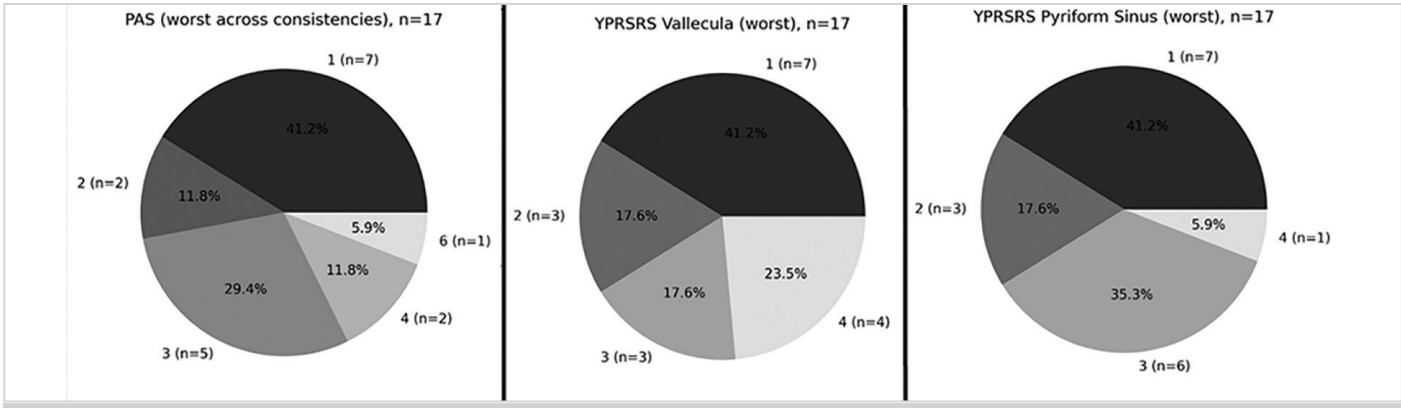

Figure 2. Distribution of worst PAS and YPRSRS scores across assessed consistencies
PAS: Penetration-Aspiration Scale, YPRSRS: Yale Pharyngeal Residue Severity Rating Scale

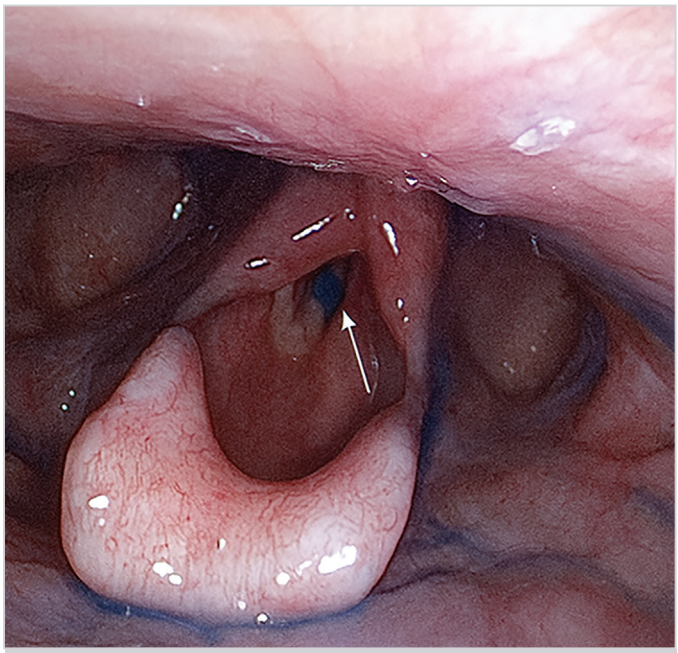

Figure 3. FEES image demonstrating penetration of blue-dyed IDDSI level 3 bolus into the laryngeal vestibule (arrow) after transverse posterior cordotomy
FEES: Flexible endoscopic evaluation of swallowing, IDDSI: International Dysphagia Diet Standardisation Initiative

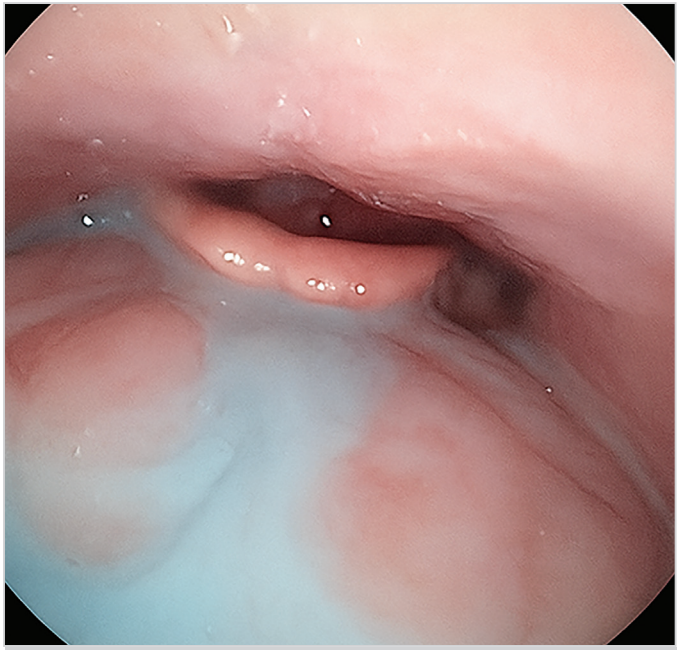

Figure 4. FEES image demonstrating post-swallow pharyngeal residue (blue-dyed bolus) in the vallecula
FEES: Flexible endoscopic evaluation of swallowing

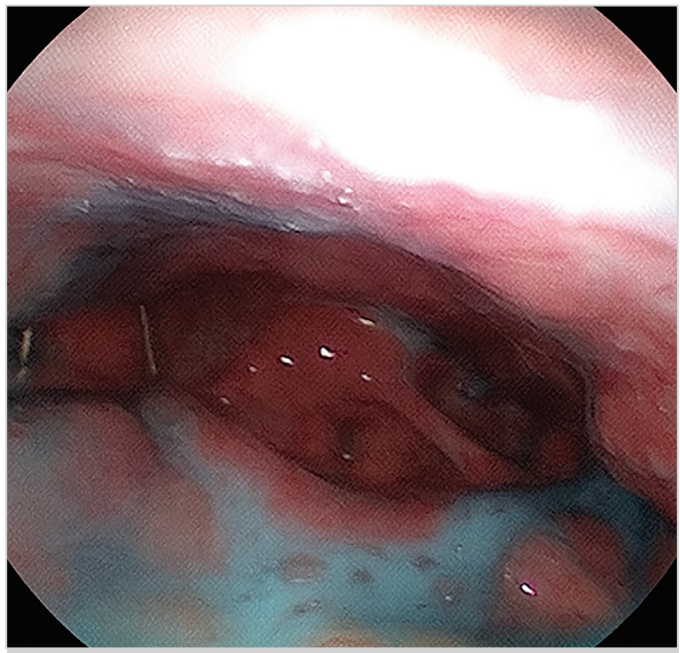

Figure 5. FEES image demonstrating post-swallow pharyngeal residue (blue-dyed bolus) in the hypopharynx/pyriform sinus region
FEES: Flexible endoscopic evaluation of swallowing

Table 3. Interrater reliability results

Parameter	Weighted Kappa
PAS regular	0.92
PAS moderately thick	0.83
PAS thin-liquid	0.86
YPRSRS-V regular	0.91
YPRSRS-V moderately thick	0.85
YPRSRS-V thin-liquid	0.79
YPRSRS-PS regular	0.89
YPRSRS-PS moderately thick	0.85
YPRSRS-PS thin-liquid	0.86

PAS: Penetration-Aspiration Scale, YPRSRS-V: The Yale Pharyngeal Residue Severity Rating Scale for Vallecula, YPRSRS-PS: The Yale Pharyngeal Residue Severity Rating Scale for Pyriform Sinus

Discussion

This study describes long-term postoperative swallowing findings after CO_2 laser TPC in BVFP using objective FEES-based measures. Most patients maintained full or near-full oral intake and had only mild functional limitation, but penetration and pharyngeal residue were frequent on FEES. This discordance suggests that patient-reported and functional measures alone may not fully capture postoperative swallowing findings. Because preoperative FEES data and a control group were unavailable, these observations should be interpreted as a descriptive postoperative profile rather than as evidence that cordotomy caused the swallowing abnormalities.

These findings should be viewed in the context of the existing TPC literature. Previous studies have mainly evaluated airway patency, decannulation or revision rates,

aerodynamic parameters, voice outcomes, or quality of life (4-7). Swallowing-specific evidence remains limited. Conklin et al. (10) examined perceived dysphagia after unilateral cordotomy and reported limited patient-reported change. In contrast, the present study adds an instrumental perspective by applying PAS and YPRSRS scoring to FEES recordings, showing that objective penetration and residue can coexist with preserved oral intake. This supports the selective use of instrumental swallowing assessment in postoperative BVFP patients, especially when symptoms or risk factors are present.

The possible pathomechanism of penetration in these patients is multifactorial. A persistent posterior glottic gap may reduce complete glottic closure during swallowing, while underlying recurrent laryngeal or vagal nerve injury may also impair laryngopharyngeal sensation and the cough response. Thin liquids may enter the laryngeal vestibule more easily because of rapid bolus flow, whereas residue may reflect reduced pharyngeal clearance, impaired pharyngolaryngeal coordination, age-related muscle weakness, or ineffective clearing swallows. Residue in the vallecula or pyriform sinuses may subsequently spill into the laryngeal vestibule after swallowing and contribute to penetration (8,23).

Patients with EAT-10 scores ≥3 or more pronounced penetration may represent a heterogeneous subgroup rather than a single mechanism. Possible contributors include individual differences in laryngopharyngeal sensation, age-related swallowing reserve, reflux or other comorbid factors, bolus flow characteristics, and compensatory swallowing behavior. Because of the small sample size, the present study could not identify predictors of higher EAT-10 scores or penetration; therefore, these findings should be interpreted descriptively.

Although this study cannot determine which surgical factors reduce postoperative penetration, the findings reinforce the importance of preserving airway-protective structures while achieving adequate airway widening. In practice, cordotomy should be limited to the minimum posterior glottic enlargement necessary for breathing, with careful avoidance of unnecessary anterior extension, excessive contralateral vocal fold injury, or excessive supraglottic or arytenoid tissue removal. A precise unilateral and, when appropriate, staged approach may help balance airway gain with preservation of glottic closure during swallowing, consistent with the principle of limited posterior glottic enlargement described for TPC (3).

In the present dataset, airway invasion was observed most often with thin liquids, whereas aspiration was rare and occurred only with thin liquids. This pattern is compatible with the known effect of bolus viscosity on swallowing safety and efficiency. Moderately thick boluses may slow bolus flow and reduce aspiration risk, but increased viscosity can also increase pharyngeal coating and residue when clearance is impaired (23). Thus, diet recommendations should be individualized according to instrumental findings rather than automatically recommending thickened liquids for all patients.

Management of patients with penetration should also be individualized. In patients with preserved oral intake, no recurrent pulmonary events, and penetration without aspiration, immediate major diet restriction may not be necessary. Instead, counseling on small sips, slower intake, avoidance of large-volume thin liquids, repeated swallows, throat clearing, and referral to a speech-language pathologist for compensatory strategies may be appropriate. Diet modification or thickening should be reserved for selected patients after instrumental assessment, especially because thickened boluses may increase residue (23).

FEES with sensory testing (FEESST) may have a role in future studies because it can assess laryngopharyngeal sensation and the laryngeal adductor reflex in addition to bolus flow. This may help distinguish penetration or aspiration related primarily to structural glottic insufficiency from abnormalities related to impaired sensation and silent airway invasion. Tabaee et al. (9) demonstrated that reduced laryngopharyngeal sensation in vocal fold immobility was associated with penetration and aspiration, supporting the relevance of sensory assessment in this population.

From a clinical perspective, these observations may support selective postoperative swallowing screening in BVFP patients after cordotomy, especially in those with cough during liquid intake, recurrent chest infections, weight loss, advanced age, or comorbidities that may affect sensation and airway-protective reflexes. Because dysphagia in this age group can also reflect age-related sarcopenia, polypharmacy, reflux, or neurologic disease, endoscopic abnormalities should be interpreted in their clinical context rather than attributed to cordotomy alone (24-27).

The strengths of this study include long postoperative follow-up, the use of validated FEES-based scales (PAS and YPRSRS), standardized IDDSI consistencies, integration of functional (FOIS, FOSS) and symptom-based (EAT-10) measures, and blinded independent rating with substantial-to-almost-perfect interrater agreement. These features provide a more objective and clinically interpretable description of postoperative swallowing than symptom reports alone.

Study Limitations

Limitations include the retrospective cross-sectional design, small sample size, and all-female cohort, which limit generalizability. Most importantly, preoperative instrumental swallowing assessment and a control group were unavailable; therefore, the present data cannot determine whether FEES

abnormalities were pre-existing, related to BVFP itself, caused by cordotomy, or influenced by age and comorbid conditions. The bolus protocol was limited to representative IDDSI consistencies. Future prospective studies with baseline and postoperative FEES or FEESST are needed to clarify trajectories, mechanisms, and risk factors.

Conclusion

In this descriptive long-term postoperative series, patients with BVFP who underwent CO_2 laser TPC generally maintained functional oral intake, although FEES frequently demonstrated penetration and pharyngeal residue, with rare thin-liquid aspiration. The main contribution of this study is to provide an objective FEES-based description of postoperative swallowing patterns in a population previously characterized mainly by airway, voice, and subjective swallowing outcomes. Because preoperative swallowing data and a control group were unavailable, these findings should not be directly interpreted as an effect of cordotomy surgery. Prospective studies using preoperative and postoperative FEES or FEESST are needed.

Ethics

Ethics Committee Approval: The study protocol was approved by the Clinical Research Ethics Committee of Ondokuz Mayıs University (approval no: 2024/481, date: 14.11.2024).

Informed Consent: Written informed consent was obtained from all patients.

Footnotes

Authorship Contributions

Surgical and Medical Practices: E.D., O.Ç., M.A., M.B.Ö., Ö.Ç., E.T., Ö.K., S.Ç.K., Concept: E.D., O.Ç., M.A., M.B.Ö., Ö.Ç., E.T., Ö.K., S.Ç.K., Design: E.D., O.Ç., M.A., M.B.Ö., Ö.Ç., E.T., Ö.K., S.Ç.K., Data Collection and/or Processing: E.D., O.Ç., M.A., M.B.Ö., Ö.Ç., E.T., Ö.K., S.Ç.K., Analysis or Interpretation: E.D., O.Ç., M.A., M.B.Ö., Ö.Ç., E.T., Ö.K., S.Ç.K., Literature Search: E.D., O.Ç., M.A., M.B.Ö., Ö.Ç., E.T., Ö.K., S.Ç.K., Writing: E.D., O.Ç., M.A., M.B.Ö., Ö.Ç., E.T., Ö.K., S.Ç.K.

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Main Points

- This study describes long-term postoperative flexible endoscopic evaluation of swallowing (FEES) findings after carbon dioxide laser transverse posterior cordotomy in patients with bilateral vocal fold paralysis.
- FEES frequently demonstrated penetration and pharyngeal residue, although most patients maintained full or near-full oral intake.
- The study adds objective Penetration-Aspiration Scale- and Yale Pharyngeal Residue Severity Rating Scale-based swallowing data to a literature that has mainly emphasized airway, voice, and patient-reported outcomes.
- Because preoperative FEES data and a control group were unavailable, prospective perioperative FEES or FEES with sensory testing studies are needed.

Supplementary Video: Representative flexible endoscopic evaluation of swallowing examination demonstrating penetration and pharyngeal residue after posterior transverse laser cordotomy for bilateral vocal fold paralysis

Video 1 Link: https://youtu.be/sZPNBCFMI7I

References

1. Hillel AD, Benninger M, Blitzer A, Crumley R, Flint P, Kashima HK, et al. Evaluation and management of bilateral vocal cord immobility. Otolaryngol Head Neck Surg. 1999; 121: 760-5. [Crossref]
2. Ibrahim AA, Hamdan AM, Elnaggar AA. Endoscopic assisted microscopic posterior cordotomy for bilateral abductor vocal fold paralysis using radiofrequency versus coblation. Eur Arch Otorhinolaryngol. 2024; 281: 835-41. [Crossref]
3. Dennis DP, Kashima H. Carbon dioxide laser posterior cordectomy for treatment of bilateral vocal cord paralysis. Ann Otol Rhinol Laryngol. 1989; 98(12 Pt 1): 930-4. [Crossref]
4. Dursun G, Gökcan MK. Aerodynamic, acoustic and functional results of posterior transverse laser cordotomy for bilateral abductor vocal fold paralysis. J Laryngol Otol. 2006; 120: 282-8. [Crossref]
5. Çelenk F, Tümüklü K, Karataş ZA, Durucu C, Baysal E, Kanlıkama M. The effect of unilateral posterior transverse cordotomy on quality of life of patients with bilateral vocal fold paralysis. Turk Arch Otorhinolaryngol. 2013; 51: 83-6. [Crossref]
6. Qazi S, Mau T, Tibbetts KM. Impact of patient factors and management strategies on outcomes after transverse posterior cordotomy. Laryngoscope. 2021; 131: 1066-70. [Crossref]

7. Asik MB, Karasimav O, Birkent H, Merati AL, Gerek M, Yildiz Y. Impact of unilateral carbon dioxide laser posterior transverse cordotomy on vocal and aerodynamic parameters in bilateral vocal fold paralysis. J Laryngol Otol. 2016; 130: 373-9. [Crossref]
8. Logemann JA, Kahrilas PJ, Cheng J, Pauloski BR, Gibbons PJ, Rademaker AW, et al. Closure mechanisms of laryngeal vestibule during swallow. Am J Physiol. 1992; 262: G338-44. [Crossref]
9. Tabaee A, Murry T, Zschommler A, Desloge RB. Flexible endoscopic evaluation of swallowing with sensory testing in patients with unilateral vocal fold immobility: incidence and pathophysiology of aspiration. Laryngoscope. 2005; 115: 565-9. [Crossref]
10. Conklin M, Clary MS, Cuadrado EM, Jetté ME. Effect of unilateral cordotomy on perception of dysphagia. Ann Otol Rhinol Laryngol. 2020; 129: 536-41. [Crossref]
11. Cichero JA, Lam P, Steele CM, Hanson B, Chen J, Dantas RO, et al. Development of international terminology and definitions for texture-modified foods and thickened fluids used in dysphagia management: the IDDSI framework. Dysphagia. 2017; 32: 293-314. [Crossref]
12. Leder SB, Acton LM, Lisitano HL, Murray JT. Fiberoptic endoscopic evaluation of swallowing (FEES) with and without blue-dyed food. Dysphagia. 2005; 20: 157-62. [Crossref]
13. Tariq B, Simon SR, Pilz W, Maxim A, Kremer B, Baijens LWJ. Evaluating the safety of oral methylene blue during swallowing assessment: a systematic review. Eur Arch Otorhinolaryngol. 2021; 278: 3155-69. [Crossref]
14. Rosenbek JC, Robbins JA, Roecker EB, Coyle JL, Wood JL. A penetration-aspiration scale. Dysphagia. 1996; 11: 93-8. [Crossref]
15. Neubauer PD, Rademaker AW, Leder SB. The Yale pharyngeal residue severity rating scale: an anatomically defined and image-based tool. Dysphagia. 2015; 30: 521-8. [Crossref]
16. Salassa JR. A functional outcome swallowing scale for staging oropharyngeal dysphagia. Dig Dis. 1999; 17: 230-4. [Crossref]
17. Crary MA, Mann GD, Groher ME. Initial psychometric assessment of a functional oral intake scale for dysphagia in stroke patients. Arch Phys Med Rehabil. 2005; 86: 1516-20. [Crossref]
18. Belafsky PC, Mouadeb DA, Rees CJ, Pryor JC, Postma GN, Allen J, et al. Validity and reliability of the eating assessment tool (EAT-10). Ann Otol Rhinol Laryngol. 2008; 117: 919-24. [Crossref]
19. Demir N, Serel Arslan S, İnal Ö, Karaduman AA. Reliability and validity of the Turkish eating assessment tool (T-EAT-10). Dysphagia. 2016; 31: 644-9. [Crossref]
20. Atar Y, Atar S, Ilgin C, Anarat MEA, Uygan U, Uyar Y. Validity and reliability of the Turkish translation of the yale pharyngeal residue severity rating scale. Dysphagia. 2022; 37: 655-63. [Crossref]
21. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977; 33: 159-74. [Crossref]
22. R Core Team. R: a language and environment for statistical computing. Vienna (AT): R Foundation for Statistical Computing; 2024. [Crossref]
23. Newman R, Vilardell N, Clavé P, Speyer R. Effect of bolus viscosity on the safety and efficacy of swallowing and the kinematics of the swallow response in patients with oropharyngeal dysphagia: white paper by the European Society for Swallowing Disorders (ESSD). Dysphagia. 2016; 31: 232-49. [Crossref]
24. Chen KC, Jeng Y, Wu WT, Wang TG, Han DS, Özçakar L, et al. Sarcopenic dysphagia: a narrative review from diagnosis to intervention. Nutrients. 2021; 13: 4043. [Crossref]
25. Togashi S, Ohinata H, Noguchi T, Wakabayashi H, Nakamichi M, Shimizu A, et al. Polypharmacy, potentially inappropriate medications, and dysphagia in older inpatients: a multi-center cohort study. Ann Geriatr Med Res. 2024; 28: 86-94. [Crossref]
26. Campagnolo AM, Priston J, Thoen RH, Medeiros T, Assunção AR. Laryngopharyngeal reflux: diagnosis, treatment, and latest research. Int Arch Otorhinolaryngol. 2014; 18: 184-91. [Crossref]
27. Cook IJ. Oropharyngeal dysphagia. Gastroenterol Clin North Am. 2009; 38: 411-31. [Crossref]