

Modified Coblator Posterior Cordotomy For The Management of Bilateral Vocal Fold Paralysis

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Abstract

Background: Bilateral vocal fold paralysis (BVFP) can cause severe airway narrowing, stridor, and the need for tracheostomy. Posterior cordotomy is used to widen the glottic airway, but treatment should also consider voice, swallowing, granulation, restenosis, and the need for revision.

Objective: To evaluate airway and functional outcomes after modified Coblator posterior cordotomy in patients with BVFP.

Methods: This single-arm clinical surgical series included 28 patients treated at Rizgary Teaching Hospital and Zheen International Hospital in Erbil, Kurdistan Region, Iraq, between January 2020 and February 2026. All patients underwent left-sided, arytenoid-preserving modified posterior cordotomy using a Coblator setting of 6/3. Breathing was assessed using the modified Medical Research Council (mMRC) dyspnea grade. Decannulation, stridor, airway success with and without revision, granulation, restenosis, voice change, aspiration, and second-look findings were recorded. Paired mMRC change was assessed using a two-sided exact sign test.

Results: The mean age was 44.9 ± 15.0 years and 71.4% of patients were female. All cases were post-thyroidectomy BVFP. Mean mMRC decreased from 3.14 ± 0.80 before surgery to 0.43 ± 0.50 after surgery; 27 patients (96.4%) improved and one was unchanged ($p < 0.001$). Stridor resolved in all 26 symptomatic patients. All six patients with a pre-existing tracheostomy were decannulated by 30 days. A successful recorded airway outcome without revision was achieved in 25/28 patients (89.3%). Three patients (10.7%) developed granulation and restenosis and required revision; all three later had a successful recorded airway outcome. Mild voice deterioration was recorded in 17 patients (60.7%). Two patients (7.1%) had transient aspiration, and no persistent aspiration occurred.

Conclusion: Modified Coblator posterior cordotomy was associated with marked breathing improvement, complete decannulation among tracheostomized patients, and a high final recorded airway success rate. Revision was needed in a small number of patients, while voice changes were mainly mild and persistent aspiration was not recorded.

Keywords: bilateral vocal fold paralysis; posterior cordotomy; coblation; decannulation; dyspnea; airway.

Introduction

Bilateral vocal fold paralysis (BVFP) is a condition in which both vocal folds lose normal movement. When both folds remain near the middle of the airway, the glottic opening becomes narrow and patients may develop shortness of breath, stridor, or severe airway obstruction. In some cases, tracheostomy is needed to secure the airway. Surgical injury, especially after thyroid and neck surgery, is a common cause of BVFP. A systematic review reported that 76.6% of cases were iatrogenic. The main goal of treatment is therefore to improve breathing while keeping voice and swallowing as good as possible. [1,2]

Management of BVFP can be difficult because a wider airway may reduce vocal fold closure during speech and may also affect swallowing. Treatment options include tracheostomy, posterior cordotomy, arytenoidectomy, laterofixation, reinnervation, and other airway-widening procedures. Tracheostomy gives a secure airway but may affect daily life and requires long-term care. Endoscopic procedures are therefore often used when recovery of vocal fold movement is unlikely. No single procedure has been shown to be best for every patient. [1,2]

Posterior cordotomy is one of the commonly used endoscopic operations for BVFP. Part of the posterior vocal fold is divided to create a larger airway. A systematic review and meta-analysis of 102 studies involving 2,802 patients found high decannulation rates after several glottic-widening operations, including posterior cordotomy. However, the studies used different techniques and outcome measures, and revision surgery remained an important issue. Voice change, aspiration, granulation, scar formation, and restenosis also need to be considered when judging the result of surgery. [1,3]

Coblation has been used as another method for performing posterior cordotomy or cordectomy. In China, Zhao and Li compared laser-assisted and coblation-assisted posterior cordotomy and found similar airway and decannulation outcomes, while the coblation procedure was shorter. In Egypt, Zamzam et al. compared conventional, laser, and coblation procedures and found that coblation had the shortest mean operative time and a low revision rate. These findings support coblation as a practical method for airway widening, although the choice of technique should still depend on the patient and surgical setting. [4,5]

Direct studies of coblation have also reported improvement in breathing. In Egypt, Ibrahim et al. compared radiofrequency and coblation posterior cordotomy in 40 patients. Both groups showed significant improvement in dyspnea, and aspiration did not significantly worsen. All tracheostomized patients were decannulated by three months. In India, Rajasekar et al. studied 27 patients treated with coblation-assisted Kashima surgery and reported significant improvement in dyspnea with generally good patient satisfaction with voice. [6,7]

Granulation, restenosis, and revision surgery remain important concerns after posterior cordotomy. In the United States, Benninger et al. reported improvement in shortness of breath and stridor after coblation cordotomy, but granulation and revision were still seen in some patients. In a later two-centre series of 94 patients, Benninger et al. reported decannulation in 21 of 25 patients who had a tracheostomy during their care, while 20 of 94 patients required a revision cordotomy. These findings show why initial airway success and final airway success should be reported separately. [8,9]

Modified procedures have been developed to improve airway opening while trying to preserve voice and swallowing. In China, Lin et al. reported that all 22 tracheostomized patients treated with a modified posterior cordotomy combined with plasma ablation subtotal arytenoidectomy were decannulated within six months, with no significant worsening of voice or swallowing. In Argentina, Ruggeri and Latourrette also reported good airway improvement and an 87.5% decannulation rate after posterior cordotomy with partial arytenoidectomy, although temporary aspiration occurred in two patients. [10,11]

Voice outcomes vary between studies. In India, Sethi et al. found that both laser posterior cordotomy and Coblator posterior cordectomy improved the airway, with no significant difference between preoperative and postoperative Voice Handicap Index scores. In Italy, Filauro et al. reported successful decannulation in all nine tracheostomized patients and no significant worsening of VHI-30 after posterior cordotomy with or without partial arytenoidectomy. These studies show that airway improvement should be assessed together with voice and swallowing outcomes. [12,13]

The present study evaluates a modified Coblator posterior cordotomy in patients with BVFP treated in Erbil. The procedure uses two parallel cephalo-anterior and posterior extensions with a microlaryngeal Coblator wand while preserving the arytenoid and avoiding exposure or resection of arytenoid bone. The study evaluates changes in dyspnea, stridor resolution, decannulation, recorded airway success with and without revision, granulation, restenosis, voice change, aspiration, and the planned second-look treatment pathway.

Methods

Study design and setting

This was a single-arm clinical surgical series of 28 patients with BVFP who underwent modified Coblator posterior cordotomy. Patients were treated at Rizgary Teaching Hospital and Zheen International Hospital in Erbil, Kurdistan Region, Iraq. The recorded operations were performed between January 2020 and February 2026. Clinical records were used to collect baseline characteristics, breathing symptoms, tracheostomy status, operative findings, second-look findings, postoperative complications, voice changes, aspiration symptoms, revision surgery, and follow-up outcomes.

Study population

The study included all 28 available patients who underwent the modified procedure. Eligible patients were adults with confirmed BVFP and significant airway compromise. Primary cases and patients with failed previous airway-widening surgery could be included if the present modified technique had not previously been performed. All recorded patients in this series had post-thyroidectomy BVFP. Exclusion criteria were active laryngeal malignancy, cricoarytenoid fixation, severe posterior glottic stenosis requiring another reconstruction, advanced chronic lung disease causing major respiratory limitation, morbid obesity with respiratory compromise, inability to undergo general anesthesia, or inability to complete planned follow-up.

Surgical procedure and second-look pathway

All patients underwent modified posterior cordotomy under general anesthesia. The operation was performed on the left side with a microlaryngeal Coblator wand at a recorded setting of 6/3. The technique used posterior cordotomy with two parallel cephalo-anterior and posterior extensions. The arytenoid was preserved, and arytenoid bone was not exposed or removed. The aim was to enlarge the posterior glottic airway while limiting unnecessary tissue removal.

A planned second-look direct laryngoscopy was performed after surgery, with the recorded interval ranging from 7 to 10 days. The operative area was assessed for fibrin, granulation tissue, and healing. Debridement was performed as recorded. The postoperative pathway also included topical mitomycin-C at a concentration of 0.3 mg/mL for four

minutes. The planned second-look procedure was considered part of the treatment pathway and was not counted as later revision surgery.

Assessment of respiratory symptoms

Breathing difficulty was assessed before and after surgery using the modified Medical Research Council (mMRC) dyspnea scale. The scale ranges from grade 0 to grade 4, with a higher grade showing greater limitation from breathlessness. The MRC dyspnea scale is a simple clinical method for grading the effect of breathlessness on daily activity. [14]

Table 1. Modified Medical Research Council (mMRC) dyspnea grades

Grade	Description
0	Breathlessness only with heavy or strenuous exercise.
1	Breathlessness when hurrying on level ground or walking up a small hill.
2	Walks more slowly than people of the same age because of breathlessness, or needs to stop while walking at own pace.
3	Stops for breath after about 100 metres or after a few minutes on level ground.
4	Too breathless to leave the house, or breathless while dressing or undressing.

For each patient, the preoperative and postoperative grades were compared. Improvement was defined as a lower postoperative grade, unchanged as the same grade, and worsening as a higher postoperative grade.

Airway, decannulation, voice, and swallowing outcomes

Decannulation was assessed only among patients who had a tracheostomy before surgery. The number successfully decannulated and the time from surgery to decannulation were recorded. The need for a new postoperative tracheostomy was also recorded. Airway outcome was described as recorded success without revision, success after revision, or recorded failure. Stridor resolution was assessed among patients who had stridor before surgery. Granulation, restenosis, and revision surgery were recorded during follow-up.

Voice and aspiration outcomes were taken from the available clinical records. Postoperative voice was classified as no change, mild deterioration, or moderate/severe deterioration. Aspiration was classified as none, transient, or persistent. Structured VHI-10 and EAT-10 questionnaires were not available and were therefore not reconstructed.

Statistical analysis

Categorical variables were presented as numbers and percentages. Selected proportions were reported with exact 95% binomial confidence intervals. Continuous variables were summarized using mean and standard deviation, or median and range when appropriate. Preoperative and postoperative mMRC grades were paired ordinal measurements. A two-sided exact sign test was used to assess the direction of paired change, with ties excluded from the test. A p-value below 0.05 was considered statistically significant. Missing values were analyzed using available data only and were not imputed.

Results

The mean age of the 28 patients was 44.9 ± 15.0 years, and 20 patients (71.4%) were female. All patients had post-thyroidectomy BVFP. Preoperative stridor was present in 26 patients (92.9%), six patients (21.4%) had a pre-existing tracheostomy, and three (10.7%) had undergone previous airway-widening surgery. Among those three patients, one had a previous posterior left cordotomy, one had arytenoid lateralization by stitch, and one had undergone cordotomy. Preoperative aspiration symptoms were recorded in two patients (7.1%). The mean duration of paralysis was 32.2 ± 45.5 months.

Table 2. Baseline demographic and clinical characteristics (N = 28)

Characteristic	Result
Mean age, years	44.9 ± 15.0 ; range 20–70
Female sex	20/28 (71.4%)
Male sex	8/28 (28.6%)
Etiology of BVFP	Post-thyroidectomy 28/28 (100%)
Mean duration of paralysis	32.2 ± 45.5 months
Pre-existing tracheostomy	6/28 (21.4%)
Previous airway surgery	3/28 (10.7%)
Preoperative stridor	26/28 (92.9%)

Characteristic	Result
Preoperative aspiration symptoms	2/28 (7.1%)
Preoperative voice status	Normal 27/28 (96.4%); tracheostomy/no voice 1/28 (3.6%)

All 28 patients underwent left-sided cordotomy using the same Coblator setting of 6/3. The arytenoid was preserved in all cases, and the procedure was completed as planned in every patient. No intraoperative complications were recorded. All patients underwent a second-look examination, required debridement, and had granulation tissue or fibrin recorded at second look. Mitomycin-C was used at 0.3 mg/mL for four minutes.

Table 3. Intraoperative and second-look procedural characteristics

Variable	Result
Left-sided cordotomy	28/28 (100.0%)
Coblator setting 6/3	28/28 (100.0%)
Arytenoid preserved	28/28 (100.0%)
Procedure completed as planned	28/28 (100.0%)
Intraoperative complications	0/28 (0.0%)
Second-look examination performed	28/28 (100.0%)
Second-look interval	7–10 days
Debridement required	28/28 (100.0%)
Granulation/fibrin at second look	28/28 (100.0%)
Mitomycin-C used	28/28 (100.0%)
Mitomycin-C concentration	0.3 mg/mL
Mitomycin-C exposure time	4 minutes

Before surgery, most patients had severe dyspnea: 18 patients (64.3%) were in mMRC grade 3 and eight (28.6%) were in grade 4. After surgery, 16 patients (57.1%) were in grade 0 and 12 (42.9%) were in grade 1, with no patient remaining in grades 2–4. Mean mMRC decreased from 3.14 ± 0.80 to 0.43 ± 0.50 . Twenty-seven patients (96.4%) improved, one (3.6%) was unchanged, and none worsened. The paired improvement was statistically significant ($p < 0.001$).

Table 4. Changes in mMRC dyspnea grade before and after surgery

Outcome	Preoperative	Postoperative / change	P-value
mMRC grade 0	1 (3.6%)	16 (57.1%)	
mMRC grade 1	0	12 (42.9%)	
mMRC grade 2	1 (3.6%)	0	
mMRC grade 3	18 (64.3%)	0	
mMRC grade 4	8 (28.6%)	0	
Mean $\pm$ SD mMRC	3.14 ± 0.80	0.43 ± 0.50	
Mean reduction	—	2.71 ± 0.81 grades	
mMRC change	—	Improved 27 (96.4%); unchanged 1 (3.6%); worsened 0	<0.001

P-value from a two-sided exact sign test for paired direction of mMRC change; ties were excluded.

Six patients (21.4%) had a tracheostomy before surgery. All six were successfully decannulated. One patient was decannulated by 14 days and all six were decannulated by 30 days. No patient required a new postoperative tracheostomy.

Table 5. Decannulation outcomes among patients with pre-existing tracheostomy

Outcome	No. (%)	Exact 95% CI
Patients with pre-existing tracheostomy	6/28 (21.4%)	8.3–41.0
Successfully decannulated	6/6 (100.0%)	54.1–100
Decannulated by 14 days	1/6 (16.7%)	0.4–64.1
Decannulated by 30 days	6/6 (100.0%)	54.1–100
New postoperative tracheostomy required	0/28 (0.0%)	0–12.3

Decannulation proportions use the six patients with a pre-existing tracheostomy as the denominator.

A recorded successful airway outcome without revision was achieved in 25 patients (89.3%). Three patients (10.7%) required revision surgery, and all three had a successful recorded airway outcome after revision. The final recorded airway outcome was therefore successful in all 28 patients.

Table 6. Recorded airway outcomes with and without revision

Airway outcome	No. (%)	Exact 95% CI
Successful recorded airway outcome without revision	25/28 (89.3%)	71.8–97.7
Revision surgery required	3/28 (10.7%)	2.3–28.2
Successful recorded airway outcome after revision	3/3 (100.0%)	—
Final recorded successful airway outcome	28/28 (100.0%)	87.7–100
Recorded failure	0/28 (0.0%)	0–12.3

Stridor resolved in all 26 patients who had preoperative stridor. Granulation developed in three patients (10.7%), and the same three patients developed restenosis and required revision surgery. No patient required a new tracheostomy after surgery.

Table 7. Stridor resolution and postoperative airway complications

Outcome	No. (%)	Exact 95% CI
Stridor resolved among patients with preoperative stridor	26/26 (100.0%)	86.8–100
Granulation during follow-up	3/28 (10.7%)	2.3–28.2
Restenosis	3/28 (10.7%)	2.3–28.2
Revision surgery required	3/28 (10.7%)	2.3–28.2
New postoperative tracheostomy required	0/28 (0.0%)	0–12.3

Before surgery, aspiration symptoms were present in two patients (7.1%). After surgery, 26 patients (92.9%) had no aspiration and two (7.1%) had transient aspiration. No persistent aspiration was recorded. Voice was unchanged in 11 patients (39.3%) and mildly worse in 17 (60.7%). No moderate or severe voice deterioration was recorded.

Table 8. Qualitative voice changes and aspiration symptoms

Outcome	No. (%)
Preoperative aspiration: present	2/28 (7.1%)
Preoperative aspiration: absent	26/28 (92.9%)
Postoperative aspiration: none	26/28 (92.9%)
Postoperative aspiration: transient	2/28 (7.1%)
Postoperative aspiration: persistent	0/28 (0.0%)
Postoperative voice: no change	11/28 (39.3%)
Postoperative voice: mild deterioration	17/28 (60.7%)
Postoperative voice: moderate/severe deterioration	0/28 (0.0%)

Discussion

The main finding of this study was the marked improvement in breathing after modified Coblator posterior cordotomy. Mean mMRC fell from 3.14 to 0.43, 27 of 28 patients improved, and stridor resolved in all 26 patients who had it before surgery. This is in agreement with a study from Egypt by Ibrahim et al. in 2024, where both radiofrequency and coblation posterior cordotomy significantly improved dyspnea. It is also similar to a study from India by Rajasekar et al. in 2022, where the dyspnea index improved significantly after coblation-assisted Kashima surgery. In the United States, Benninger et al. in 2018 also reported improvement in shortness of breath and stridor after coblation cordotomy. [6-8]

The breathing results also agree with studies using other posterior glottic-widening techniques. In Argentina, Ruggeri and Latourrette in 2022 reported relief of inspiratory dyspnea in all 11 non-tracheostomized patients after posterior cordotomy with partial arytenoidectomy. In the United States, West et al. in 2026 found a significant improvement in Dyspnea Index after transverse cordotomy with medial arytenoidectomy. In Yemen, Muthanna and Al-Ozaib in 2024 also reported significant improvement in breathing after posterior cordotomy or partial arytenoidectomy. These findings support the principle that enlarging the posterior glottic airway can give major respiratory benefit. [11,15,16]

All six patients with a pre-existing tracheostomy in the present study were decannulated by 30 days. This 100% rate is similar to a study from China by Lin et al. in 2023, where all 22 tracheostomized patients were decannulated within six months, and to the Egyptian study by Ibrahim et al., where all tracheostomized patients were decannulated by three

months. In Italy, Filauro et al. reported successful decannulation in all nine tracheostomized patients, although the time to decannulation was longer. Other studies reported slightly lower rates: Mo et al. in China reported 89.7%, Ruggeri and Latourrette in Argentina reported 87.5%, and West et al. in the United States reported 76%. A meta-analysis by Titulaer et al. found a pooled decannulation rate of about 96% after posterior cordotomy. The result in our study is therefore within the high range reported in the literature, but it should be interpreted carefully because only six patients entered the decannulation analysis. [3,6,10,11,13,15,17]

A successful recorded airway outcome without revision was achieved in 89.3% of patients. Three patients (10.7%) developed granulation and restenosis and needed revision, after which all three had a successful recorded airway outcome. Revision rates differ widely between studies. In Egypt, Zamzam et al. in 2025 reported revision in 1 of 21 coblation patients (4.8%). In the United States, Benninger et al. in 2018 reported revision in 47% of the main coblation cohort, while their later two-centre series reported revision in 20 of 94 patients (22%). In India, Sethi et al. reported repeat surgery in three of 23 patients, including one Coblator case. In India, Phaniendra et al. also reported two revision cordotomies after diode-laser surgery. Differences may be related to the amount of tissue removed, the cause of paralysis, surgical technique, follow-up time, and the definition of revision. [5,8,9,12,18]

Granulation and restenosis occurred in 10.7% of the present patients and were responsible for all revision procedures. This rate was lower than the 27% granulation rate reported by Benninger et al. in the United States in 2018. In the Egyptian study by Ibrahim et al., postoperative edema and granulation occurred in both groups, with numerically fewer events in the coblation group, although the difference was not significant. Lechien et al. also identified edema, granuloma, fibrosis, and scarring as known problems after surgery for BVFP. These findings show that a good final airway result does not remove the need to monitor healing and restenosis. [1,6,8]

Voice change was common but mild in this study. Seventeen patients (60.7%) had mild deterioration, while no patient had moderate or severe deterioration. This is consistent with the known airway-voice balance after glottic-widening surgery. In Egypt, Zamzam et al. found postoperative worsening in voice measures in all treatment groups, including coblation. In China, Mo et al. reported reduced voice quality in 89.2% of patients at one month, followed by improvement by three months. Lechien et al. also reported a tendency toward worse voice after posterior transverse cordotomy. On the other hand, studies from India by Rajasekar et al. and Sethi et al., from Italy by Filauro et al., and from the United States by West et al. reported acceptable voice outcomes or no significant worsening on formal voice scores. The difference may partly reflect the surgical technique and the method used to measure voice. In our study, voice was recorded qualitatively and no structured VHI score was available. [1,5,7,12,13,15,17]

Swallowing results were also acceptable. Two patients (7.1%) had transient aspiration and no patient had persistent aspiration. This agrees with the Egyptian study by Ibrahim et al., where aspiration did not significantly worsen after surgery. In India, Phaniendra et al. reported mild aspiration in one patient that resolved after three weeks. In Argentina, Ruggeri and Latourrette reported aspiration in two patients requiring temporary nasogastric feeding, while Mo et al. in China reported a temporary decrease in swallowing function in 13.5% of patients. Lin et al. in China found no significant worsening of swallowing, and Filauro et al. in Italy reported improved EAT-10 scores. Overall, temporary swallowing problems can occur, but persistent aspiration was uncommon in these reports. [6,10,11,13,17,18]

All patients in the present study underwent a planned second-look examination with debridement, and topical mitomycin-C was used at 0.3 mg/mL for four minutes. This pathway allowed early inspection of the surgical site. Ruggeri and Latourrette described topical mitomycin and other measures as possible ways to reduce scar formation after posterior cordotomy, but they did not show that these measures reduced revision. The studies reviewed here did not directly test the same routine second-look and mitomycin-C pathway against a control group. For this reason, the low restenosis rate in the present study cannot be attributed to mitomycin-C or second-look debridement alone. [11]

This study has several limitations. The sample was small, especially the six patients included in the decannulation analysis. There was no control group, and all cases were post-thyroidectomy BVFP, so the results may not apply to all causes of bilateral vocal fold immobility. Voice and swallowing were recorded in simple clinical categories because VHI-10 and EAT-10 were not available. Published studies also differ in technique, follow-up time, and outcome definitions. Both Titulaer et al. and Lechien et al. noted major differences between studies and limited comparative evidence. Even with these limits, the results are generally in agreement with previous work and support further study of this modified Coblator technique using larger samples and standardized functional measures. [1,3]

Conclusion

Modified Coblator posterior cordotomy was associated with marked improvement in breathing and complete decannulation among the six tracheostomized patients. The final recorded airway outcome was successful in all patients after revision when needed. Voice changes were mainly mild, and no persistent aspiration was recorded.

Recommendations

Modified Coblator posterior cordotomy can be considered a useful airway-widening option for selected patients with BVFP. Larger comparative studies with longer follow-up and standardized measures of voice, swallowing, and airway function are recommended.

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