

# Endoscopic Posterior Cordotomy with Microdissection Radiofrequency Electrodes for Bilateral Vocal Cord Paralysis

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## Abstract

The purpose of this study is to evaluate the results of endoscopic posterior cordotomy using microdissection electrodes in patients with bilateral vocal cord paralysis. Eleven patients underwent endoscopic posterior cordotomy using a radiofrequency Arrowtip monopolar needle. Preoperative-postoperative exercise tolerance, airway, and voice evaluation were performed in all patients. Two patients required a secondary revision operation due to granulation and crust formation and respiratory problems. No other complications were encountered. Two patients with tracheotomy cannulas were decannulated on the third postoperative day. All patients had an adequate functional airway and good exercise tolerance compared with poor preoperative exercise tolerance. There was no significant difference between preoperative and postoperative Voice Handicap Index values ( $P > .05$ ). The data indicated the safety, easy use, and efficiency of the microdissection radiofrequency electrodes in patients with bilateral vocal fold paralysis. This technique provides a reliable alternative to laser procedures.

## Keywords

vocal cord paralysis, posterior cordotomy, radiosurgery, larynx

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**B**ilateral vocal cord paralysis is a potentially life-threatening condition, occurring most commonly as a result of surgical interventions.<sup>1</sup> In most cases, surgery is considered if there is no recovery of vocal fold motion within 6 months of diagnosis.<sup>2</sup> Besides many modified techniques with a laser for the treatment of bilateral vocal cord paralysis, Basterra et al<sup>3</sup> presented the use of microdissection electrodes for endoscopic management of vocal cord pathologies. In this

study, we aimed to evaluate the results of endoscopic posterior cordotomy using microdissection electrodes in patients with bilateral vocal cord paralysis.

## Materials and Methods

Eleven patients (10 females, 1 male) with bilateral vocal cord paralysis who were treated with microdissection electrodes between May 2009 and November 2012 were retrospectively analyzed. Institutional review board approval from the ethics committee of Umraniye Education and Research Hospital and informed consent were obtained from the patients.

Patients with previous surgeries for vocal fold paralysis were excluded. Their ages ranged between 13 and 65 years. Patient demographics, etiology of the paralysis, and follow-up data were analyzed. All operations were performed after 6 months from the onset of paralysis to rule out etiologies causing transient paralysis. Preoperative and postoperative exercise tolerance was questioned for the subjective evaluation of respiration. Each patient was asked to estimate the number of flights of stairs they could climb without experiencing symptomatic limitation. Preoperative and postoperative exercise tolerance was rated as poor (1 flight of stairs), good (2 flights of stairs), and very good (3 flights of stairs).<sup>4</sup> Preoperative and postoperative Voice Handicap Index (VHI) scores were evaluated. Functional evaluations for respiration and voice quality were performed just 1 day before the patient was hospitalized for surgery. The postoperative test

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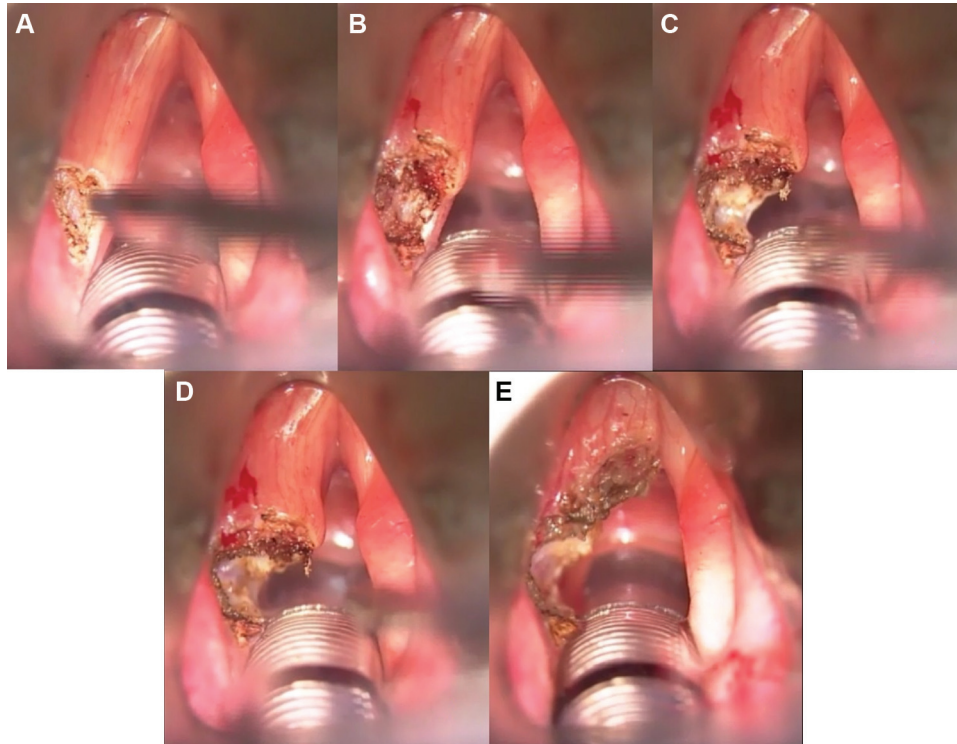
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**Figure 1.** After identifying the vocal process using a suction tip, a simple transverse section from the free border of the membranous cord, anterior to the vocal process, was made using radiofrequency Arrowtip monopolar needle. Care was taken to avoid injury and expose the vocal process (A-C). A transverse section was extended to the lateral thyroid cartilage that creates a wedge opening of the glottis (D). Redundant mucosa was minimally resected, and a ~6-mm transverse opening was obtained at the posterior larynx (E).

was performed in the eighth week after the procedure in order to wait for complete wound healing.

### Technique

Procedures were performed under general anesthesia with a conventional suspension laryngoscopy position and Kleinsasser medium-size operating laryngoscope (Karl Storz GmbH, Tuttlingen, Germany). A CURIS Radiofrequency Generator (Sutter Medizintechnik, Freiburg, Germany) was used during operations. The generator was set in a “CUT1” monopolar cutting mode with 15- to 25-Watt power, depending on the tissue response to the electrode. The procedure was performed with a 21-cm-long radiofrequency Arrowtip tungsten monopolar needle using a straight and/or 90° (right-left) angled tip (Sutter Medizintechnik, Freiburg, Germany). The proximal end of the electrode was inserted into an ordinary electric scalpel handpiece. A nonmetallic 6.0-mm Sheridan Spiral-Flex tube (Hudson Respiratory Care, Temecula, California) anesthetic tube was used during the procedure. Steps of the surgery are delineated in detail in **Figure 1**.

Statistical analysis was conducted with Microsoft Excel (Microsoft Corp, Redmond, Washington). The treatment effect on VHI was analyzed using a paired *t* test.

### Results

The analyzed data are presented in **Table 1**. The etiology of vocal fold paralysis was total thyroidectomy in 9 patients,

Guillain-Barré syndrome in 1 patient, and idiopathic in 1 patient. The duration of paralysis ranged from 6 to 120 months. Nine patients were operated on without need for tracheotomy. Two tracheotomized patients were decannulated on the third postoperative day. Hospital stay due to operation ranged from 2 to 3 days.

All patients had an adequate functional airway and good exercise tolerance postoperatively. Three patients had very good exercise tolerance, and 8 patients had a good exercise tolerance test postoperatively (**Figure 2**). The difference between preoperative and postoperative VHI score was not significant ( $P > .05$ ). Two patients required a secondary debridement operation due to granulation and crust formation and respiratory problems. The duration of follow-up ranged from 6 to 15 months.

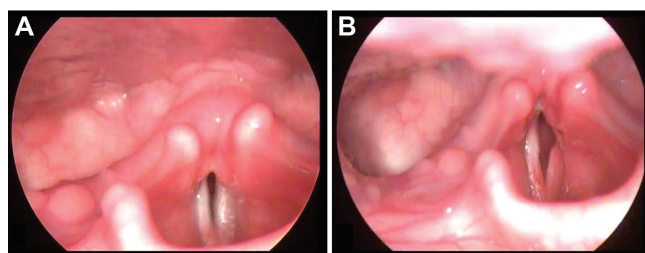
### Discussion

Many external and endoscopic surgical procedures have been proposed for the treatment of bilateral vocal cord paralysis.<sup>1</sup> Each procedure has some advantages or disadvantages compared with each other. Endoscopic laser transverse cordotomy or posterior cordectomy achieves sufficient air passage, providing a relatively good voice quality.<sup>1</sup> Nevertheless, laser interventions require special instruments and an experienced surgical team. Radiofrequency Arrowtip electrodes have the advantage of tactile feedback and do not require safety precautions compared with laser. Posterior

**Table 1.** Findings in patients with bilateral vocal cord paralysis who underwent endoscopic posterior cordotomy.

Patient No.	Age, y	Sex	Hospital Stay, d	Follow-up Period, mo	Etiology	Duration of Paralysis, mo	Preoperative Tracheotomy	Preoperative		Postoperative		Postoperative Complications
								Exercise Tolerance	Exercise Tolerance	Preoperative VHI	Postoperative VHI	
1	54	F	2	12	Idiopathic	120	No	Poor	Good	22	23	None
2	31	F	2	7	Thyroidectomy	72	No	Poor	Very good	22	24	None
3	63	F	3	11	Thyroidectomy	6	No	Poor	Good	26	27	Granulation
4	51	F	3	13	Thyroidectomy	12	No	Poor	Very good	26	26	None
5	43	F	2	8	Thyroidectomy	228	No	Poor	Good	24	28	None
6	65	F	3	13	Thyroidectomy	6	No	Poor	Good	22	24	None
7	13	M	2	6	Guillain-Barré syndrome	120	Yes	Poor	Good	40	40	None
8	55	F	2	10	Thyroidectomy	7	No	Poor	Good	24	25	None
9	30	F	2	7	Thyroidectomy	6	No	Poor	Good	28	29	Granulation
10	61	F	3	15	Thyroidectomy	6	Yes	Poor	Good	21	23	None
11	54	F	2	6	Thyroidectomy	6	No	Poor	Very good	26	26	None

Abbreviation: VHI, Voice Handicap Index.



**Figure 2.** Preoperative endoscopic view of the larynx of a 13-year-old boy with Guillain-Barré syndrome (A). Postoperative laryngoscopic view of the same patient 4 weeks after surgery (B).

cordotomy using microelectrodes is a safe and simple procedure, having a shorter overall surgical time, improved hemostasis, and easier handling than laser.<sup>3</sup> Furthermore, the risk of airway fire is a life-threatening issue for laser surgery. However, airway fire has not been reported so far for procedures done with microdissection electrodes.<sup>3</sup> The senior author (Ç.O.) has performed more than 50 airway procedures in the past years and not encountered such a complication. Possible reasons for this include the fact that the needle used is ultrafine and the energy used during the procedure is not high enough to cause a spark in the lower airways. The cost-effectiveness of this instrument gains importance in underdeveloped countries. The tips are reusable, and the radiofrequency generator can be used as a bipolar or a monopolar cautery.

We performed unilateral posterior cordotomy using the Arrowtip monopolar needle. The anterior two-thirds of the vocal cord were left intact for voice production. We achieved similar results with laser-assisted endoscopic interventions. All patients had improved airway function and exercise tolerance. Two patients required secondary operation due to granulation and crust formation. Two patients with tracheotomy cannulas were decannulated

postoperatively. Patient-reported voice disturbance was not statistically significant ( $P > .05$ ).

According to the results of Bernstein et al<sup>5</sup> using monopolar diathermy, the procedure resulted in improved airway function and capacity for physical activity and the voice remained unchanged or only slightly worse.<sup>5</sup> Unfortunately, we measured exercise capacity, not respiratory function, in our patients. All our patients confirmed better exercise tolerance and acceptable voice after the surgery. None of our patients required prolonged tracheostomy.

An ideal treatment of bilateral vocal cord paralysis is still under debate despite new techniques. Microdissection with radiofrequency appears to be a promising alternative to laser with similar outcomes.

### Author Contributions

**Cagatay Oysu**, conception and design, acquisition of data, analysis and interpretation of data, revising manuscript for intellectual content; **Sema Zer Toros**, writing of the manuscript; **Çiğdem Tepe-Karaca**, acquisition of data, analysis and interpretation of data, writing of the manuscript; **Serap Şahin**, acquisition of data; **Asli Sahin-Yilmaz**, language editing, data collector.

### Disclosures

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