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## Minimizing revision rates with the “Π” technique for bilateral vocal fold immobility: A new technique combining carbon dioxide and diode laser

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**ABSTRACT:** *Background.* For more than 25 years, posterior laser transverse cordotomy has been generally considered the ideal endoscopic minimally invasive procedure of choice for bilateral vocal fold immobility. The main drawback of this procedure, when compared to more aggressive “glottic aperture improvement” operations, is the high revision rates, caused by granulations, adhesion, and scar, for example.

*Methods.* We describe a technique using a combination of conventional and flexible lasers. Our technique seems to minimize the revision rates.

*Conclusion.* This new technique combining CO<sub>2</sub> and diode laser is a safe alternative for treating bilateral vocal fold palsies. © 2015 Wiley Periodicals, Inc. *Head Neck* 00: 000–000, 2015

**KEY WORDS:** vocal fold immobility, vocal fold palsy, bilateral, post-thyroidectomy, tracheostomy, laser, diode

### INTRODUCTION

For more than 25 years, posterior laser transverse cordotomy (PTLC), or Kashima's technique, has been generally considered the ideal endoscopic, minimally invasive procedure of choice for bilateral vocal fold immobility (BVFI).<sup>1</sup> The primary concern in BVFI, irrespective of its cause, is airway preservation, whereas secondary concerns are voice and swallowing. Many procedures and variations of techniques, including posterior vocal fold and arytenoid surgery, have been described.<sup>2</sup> Although for voice surgeons who deal with glottal incompetence on a daily basis, there is a delicate balance between creating a safe airway and therefore decannulating the tracheostomized patients and at the same time minimizing the postoperative dysphonia and possible aspiration.<sup>2</sup>

The main drawback of PTLC, when compared to more aggressive “glottic aperture improvement” operations, is the high revision rates caused by granulations, adhesion, scar, etc. These rates range from 19% to 66% in several published series.<sup>3,4</sup> The more aggressive and lateral the cordotomy, the less need for revision surgery but with a significant sacrifice on voice and occasionally swallowing. Some surgeons will even advocate bilateral PTLC to minimize restenosis.<sup>5</sup> Tracheostomy, although life-saving, is considered a disability and negatively affects the quality of

life in all patients irrespective of age or reason for tracheostomy.<sup>6</sup> Subsequently, most patients, when appropriately counseled, will be grateful for their better breathing and quality of life and not unhappy with their characteristically postoperative breathy voice. The search is still ongoing to establish a technique that will deal with all 3 glottic functions in BVFI, airway, voice, and swallowing. We describe a new technique that minimizes recurrence rates by combining straight beam and flexible laser techniques.

### Technique

There are 2 parts to our technique. The first part is a standard posterior transverse cordotomy. Laser precautions are implemented and the patient is intubated with a 5.0 or 5.5 laser-safe endotracheal tube positioned in the posterior commissure to allow the best visualization of the posterior larynx. A standard CO<sub>2</sub> laser incision is made using the micromanipulator at 4 to 6 W super-pulse with a small spot size. The incision starts from just anterior to the vocal process and extends laterally 3 to 4 mm into the false vocal fold. The resulting shape is a C-shape or a lateral greek “Π” (Figures 1 and 2). Second, after this part of the procedure is completed, we inspect the area with a 0° or 30° rigid endoscope. Laser char is removed by rubbing a saline-soaked neuropatty. We then use a 980 nm diode laser flexible fiber that goes through a laryngeal handpiece. The end of the bare fiber should be at least 3 to 5 mm longer than the end of the hand piece tip. Our settings are at 6 to 8 W continuous mode. A standard microlaryngoscopy

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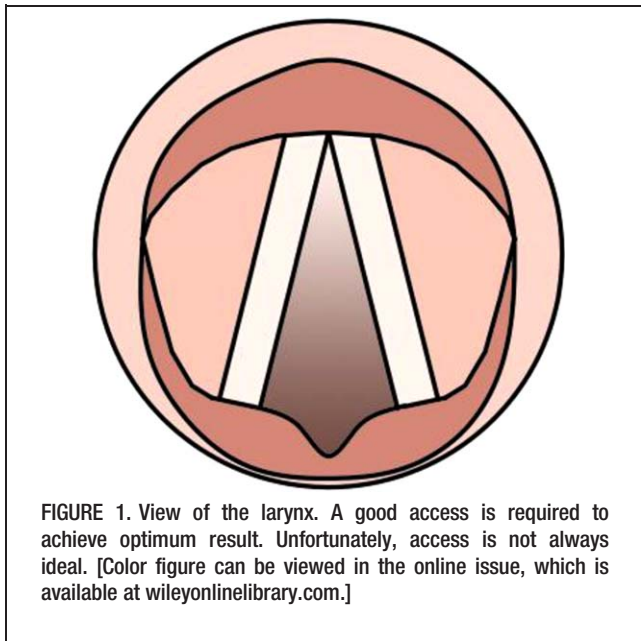


FIGURE 1. View of the larynx. A good access is required to achieve optimum result. Unfortunately, access is not always ideal. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

suspension system can be used, although we tend to prefer a video endoscopic approach using a Kantor–Verci laryngoscope, as we feel this enhances our viewing field. We direct the tip of the fiber into the deep (ie, distant or inferior) part of the “Π” or the “C” that we have created at the first part of the procedure. Multiple piercings of this area are done by inserting 5 mm of the fiber into the deep part of the original incision literally watching the tip of the laryngeal handpiece “near-touching” the larynx (Figure 3). The area feels like it has been “deflated” as the tissue is being vaporized after no more than 4 to 5 seconds and the fiber is withdrawn. Multiple piercings are done until we ensure the final “Π” result is flush with the lateral subglottic wall (Figure 4). At the end of procedure, we always apply topical mitomycin C (0.4 mg/mL for 4 minutes).

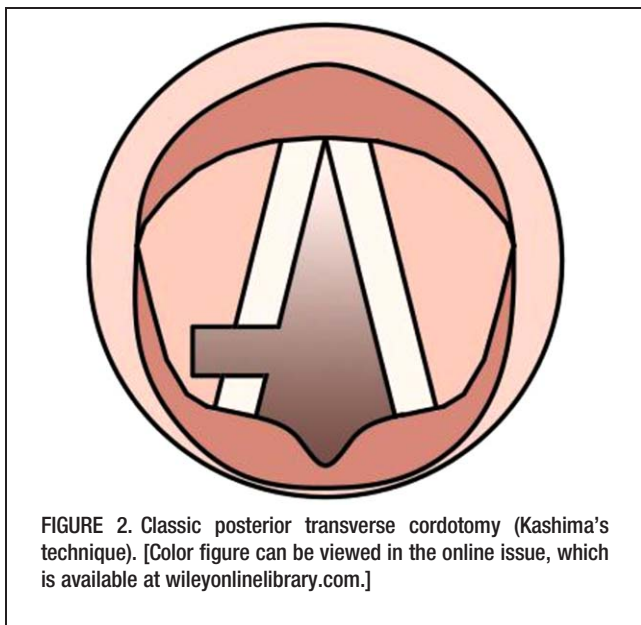


FIGURE 2. Classic posterior transverse cordotomy (Kashima's technique). [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

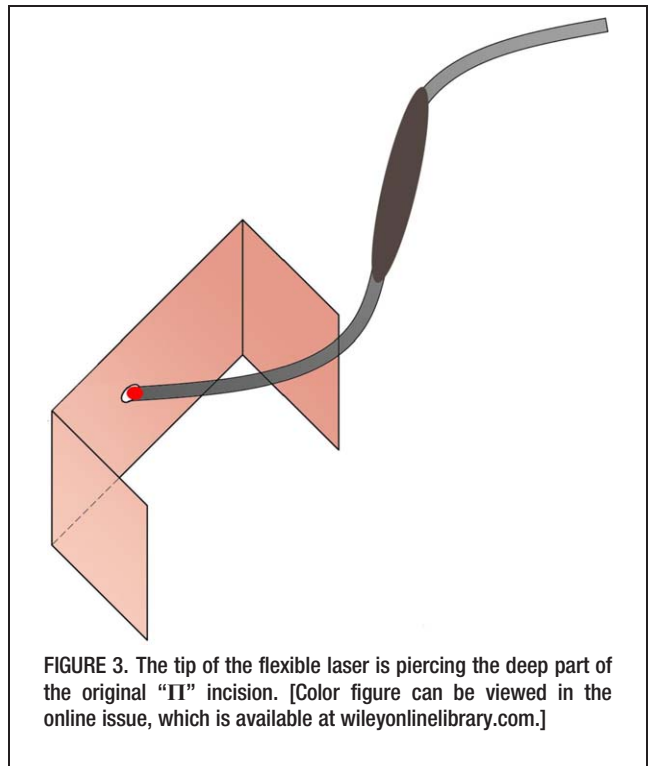


FIGURE 3. The tip of the flexible laser is piercing the deep part of the original “Π” incision. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

## DISCUSSION

The argument behind using the flexible laser is that, in many cases, we cannot adequately see the deep part of the Π-shaped incision. This is the area that almost always fills with granulation tissue in the immediate postoperative period, which may or may not cause airway stenosis and possible need for revision.<sup>3,4</sup> The advantage of the flexible laser is that it can be directed around corners and reach the deeper and more lateral part of the incision that cannot always be accessed with the conventional “line of sight” straight-aiming lasers, especially when access and

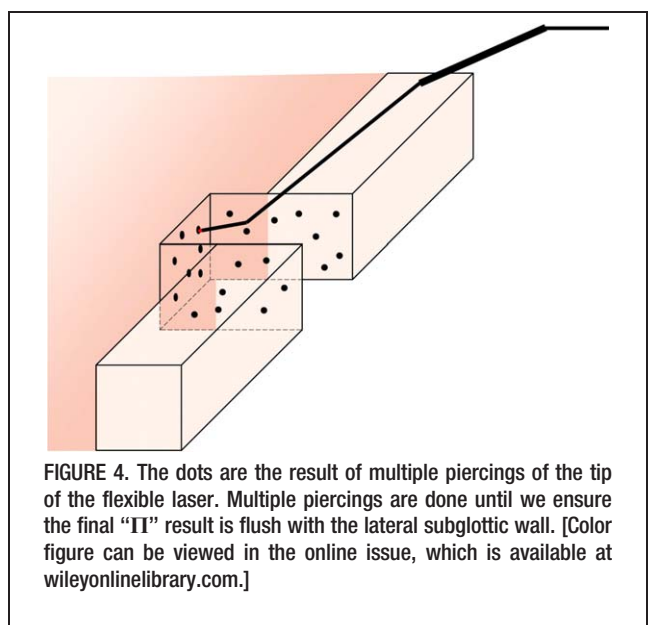


FIGURE 4. The dots are the result of multiple piercings of the tip of the flexible laser. Multiple piercings are done until we ensure the final “Π” result is flush with the lateral subglottic wall. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

laryngoscopy are difficult. For purposes of homogeneity, we only included 10 patients with postthyroidectomy BVFI, and, although long-term results are still pending, 18-months postoperatively they all remain decannulated with no airway issues. We have encountered no problems with restenosis or with granulation tissue so far with this technique, something that we often see after classic CO2 laser cordotomies.

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