Endoscopic Laser Cricopharyngeal Myotomy to Salvage Tracheoesophageal Voice After Total Laryngectomy

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Development of voice after tracheoesophageal puncture, following laryngectomy, is sometimes hampered by spasm of the cricopharyngeal muscle. This problem has been addressed by various means, including bougienage, botulinum toxin injection, and open surgical division of the muscle. We believe that endoscopic carbon dioxide laser cricopharyngeal myotomy represents a direct, simple, and effective solution.


The current preferred method for restoration of voice and speech after total laryngectomy is the tracheoesophageal puncture, performed either primarily at the time of surgery or as a secondary procedure. This widely used technique has had a high success rate since it was first described by Singer and Blom. Occasionally, however, a patient does not develop satisfactory voice, even after being fitted with the appropriately sized prosthetic device. In this case, when xylocaine infiltration of the muscle results in 1 or 2 hours of excellent voice, spasm of the cricopharyngeal muscle is proved. Surgeons can currently evaluate and choose from among various techniques to relieve cricopharyngeal spasm: bougienage, botulinum toxin injection, and cricopharyngeal myotomy. Although we have used all 3 techniques, cricopharyngeal myotomy is currently our method of choice. We previously performed cricopharyngeal myotomy as an open surgical procedure, but, more recently, we used a carbon dioxide laser to perform the operation endoscopically, with success, in 2 patients. Marked advantages of the latter technique include ease of operation, low risk, early restoration of voice, minimal pain, and a short hospital stay. Because of the comparison afforded by our experience with open myotomy as well as with botulinum toxin A (Botox) injection, the method described herein has become our preferred initial approach and may deserve consideration by others.

**TECHNIQUE**

The diagnosis of cricopharyngeal muscle spasm is suspected when a patient fails to develop speech after an appropriate number of sessions with the speech pathologist for fitting of the voice prosthesis and training in its use. This diagnosis is confirmed in the office by injecting the muscle with 2% xylocaine to induce paralysis of the cricopharyngeal muscle. When spasm is the problem, the injection will immediately, though transiently, allow the aphonic patient to use his or her tracheoesophageal voice. Subsequent corrective surgery is performed with the patient under brief general anesthesia in the operating room. After induction of anesthesia, the hypopharynx and upper esophagus are examined with a short esophagoscope to rule out any other abnormality. Next, the Werda “bivalved” esophagoscope is inserted, and the bulge of the cricopharyngeal muscle projecting anteriorly from the posterior pharyngeal wall is identified just above the level of the tracheoesophageal puncture site.

The mucosa and muscle are divided using the microspot carbon dioxide laser...
at a 2- to 4-W setting through its entire vertical extent and all the way posterior to the areolar tissue anterior to the prevertebral fascia (Figure 1 and Figure 2). If necessary, bleeding is controlled with electrocautery. A shortened No. 7 suction drain is placed at the wound site within the pharyngoesophageal lumen and brought out retrograde through the nostril on one side. The drain is removed the next day, and the patient begins a liquid diet. Discharge home occurs on the first postoperative day within 24 hours of surgery. The patient maintains a full liquid diet for 5 days and then advances to a regular diet, as tolerated. Unrestricted voice use begins on the fifth postoperative day.

**COMMENT**

To date, we have used laser cricopharyngeal myotomy in 2 patients who were referred to us for voice failure over the past few years. In each case, the procedure was performed within 8 weeks of the laryngectomy after failure of bougienage to restore voice and with success of lidocaine hydrochloride infiltration. Both patients were formerly aphonic; excellent voice was restored within 24 hours, although unrestricted use of voice was not allowed for 5 days.

Having performed many open cricopharyngeal myotomies (most primarily; a few secondarily), we have never seen late “rejoining” of the muscle, nor have we needed to repeat the procedure once good voice was achieved. Therefore, it seems unlikely that the procedure will need to be repeated just because the muscle is cut via its internal rather than external surface. The results in our 2 cases (from no voice to excellent voice) have been sustained over time.

Based on suboptimal results in previous patients, botulinum toxin was not used in either of these patients. Botulinum toxin injection is certainly an option when cricopharyngeal muscle spasm prevents voice restoration after surgery. It would seem, however, that until such injections are made technically routine and reliable, and unless a single injection were shown to work long term, surgeons will want to keep other options, such as the one described herein, alive.

There have been no complications such as dysphagia or infection, and the diet was rapidly advanced to regular within a few days. Our patients experienced uneventful, even “easy” recoveries. Nevertheless, in the United States in particular, where the highly related endoscopic cricopharyngeal myotomy for Zenker diverticulum has never caught on, concern over the safety of this procedure might be an issue. To allay these concerns, one need only consider the large reported experience with the use of cricopharyngeal myotomy for Zenker diverticulum or cricopharyngeal dysfunction. For example, in 1960, Dohlman and Mattsson described the use of endoscopic myotomy via diathermy. In their series of 100 patients, there were no serious complications and no deaths. In 1994, Van Overbeek reported his series involving 545 patients who were surgically treated with electrocaagulation or laser. In that group, the morbidity rate was 8% and the mortality rate was less than 1%. These complication rates are clearly lower than would be seen with the use of an open approach. Also, regarding potential concerns about the safety of the cricopharyngeal myotomy, the deep planes should be relatively sealed from dissection and healing after total laryngectomy, thereby reducing the likelihood of deep space contamination.

It is our view that in cases in which cricopharyngeal myotomy is required to facilitate the development of voice after laryngectomy, endoscopic division of the muscle accomplishes the task expeditiously, safely, and economically, with minimal pain for the patient. The tracheoesophageal puncture site can be used for feeding tube insertion in the unlikely event of initial dysphagia due to pain or swelling. A similar procedure has been described using the potassium-titanyl-phosphate laser; however, the carbon dioxide laser is more readily available in most institutions and is therefore more economical.
REFERENCES