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Endoscopic cricopharyngeal myotomy

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Dysphagia secondary to cricopharyngeal muscle dysfunction (achalasia) is not uncommon. Dysfunction can be seen in isolation, in association with Zenker's diverticulum, or as a contributing component to more global dysfunction of the swallowing mechanism. Treatment has traditionally involved an open transcervical approach under general anesthesia, with complete lysis of the muscle fibers and concomitant extraction of the associated diverticulum when indicated. In select patients, the muscle can be divided endoscopically. Endoscopic myotomy offers several advantages over traditional open myotomy, including the avoidance of an incision, no risk of recurrent laryngeal nerve or great vessel injury, and low risk of perforation and fistula. In addition, endoscopic myotomy affords precise targeting of the affected muscle. This article will describe the technique, its indications, and its potential complications.

Cricopharyngeal achalasia can produce dysphagia, aspiration, and weight loss; is associated with the formation of Zenker's diverticulum; and negatively impacts the quality of life of affected patients. Numerous treatments exist, including dilation, injection of botulinum toxin, and myotomy.[1] Traditional surgical myotomy uses a transcervical approach.[2,3] Complications range from 8% to 16% and include pharyngocutaneous fistula, recurrent laryngeal nerve paralysis, hematoma, and infection.[4-6]

These complications are also seen in open Zenker's diverticulectomy, and an effort to minimize these complications has driven interest in treating this disorder endoscopically. As this has gained acceptance, greater interest in accessing the cricopharyngeus muscle endoscopically has also increased.[7-9] Endoscopic cricopharyngeal myotomy is commonly performed in Europe, less commonly in the United States. Unfamiliarity with the surgical anatomy coupled with concern for perforation and the subsequent risk of mediastinitis may have slowed adoption of a purely endoscopic approach to the cricopharyngeus muscle in this country. Despite this, we have found endoscopic myotomy to be a safe and effective technique in the treatment of cricopharyngeal achalasia and expect that the technique will evolve and popularize in the United States as experience with it grows.

Indications

Clinically, patients may present with dysphagia, aspiration, chronic cough, weight loss, or pneumonia. In patients with associated diverticula, regurgitation of undigested material may be seen. Symptoms may be present for years. Patients may report a history of gastroesophageal reflux. This is an important factor to elicit in the history, as reflux may be worsened after cricopharyngeal myotomy.

Diagnosis of cricopharyngeal dysfunction is controversial. Videofluoroscopy has been traditionally used to identify a "bar"—the posterior indentation or prominence of the cricopharyngeus muscle that narrows the esophagus and restricts the passage of barium at the level of the cricoid ring (Figure 1).[10,11] Lateral evaluation of the upper esophageal sphincter maximal diameter between C3 and C6 may also be used, with a reduction of around 50% (0.30 cm) seen in patients with cricopharyngeal achalasia.[12] Electromyography has also been used to evaluate cricopharyngeal pathology. The cricopharyngeus muscle demonstrates tonic con-

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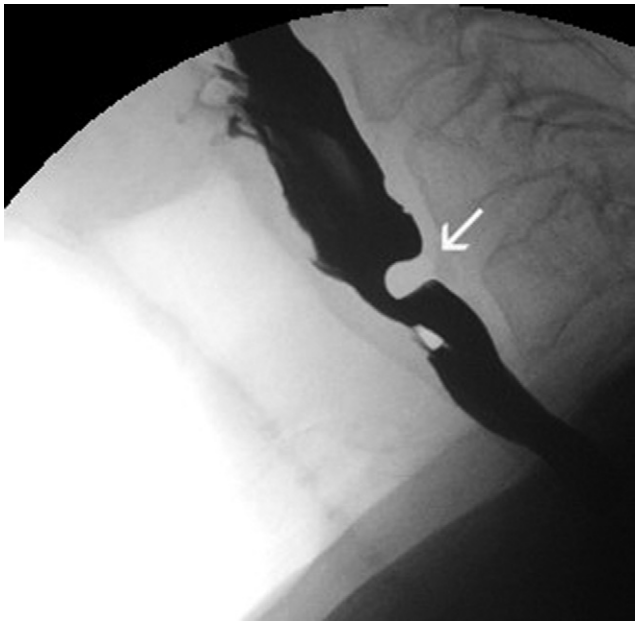

Figure 1 Videofluoroscopic image demonstrating classic cricopharyngeal "bar" (arrow)—posterior indentation of cricopharyngeus muscle with concomitant narrowing of esophageal lumen.

traction and electrical activity at rest, which should dissipate with swallowing. With cricopharyngeal dysfunction, the muscle remains hypertonic with electrical activity persisting through the swallow.[13] Manometry or manofluoroscopy may reveal incomplete cricopharyngeal relaxation or an elevated pressure gradient across the cricopharyngeus muscle during swallowing.[14] Esophagoscopy may reveal a tight esophageal inlet, and passage of an endoscope through the upper esophageal sphincter may be difficult. This may improve with muscle relaxation. In cases with associated Zenker's diverticulum, a posterior pouch may be evident. Because not all diagnostic modalities are readily available at all institutions and because of variability in inter-rater reliability with procedures such as videofluoroscopy, consistent diagnosis of cricopharyngeal achalasia between institutions may be problematic. We prefer videofluoroscopy because this modality is readily available in our institution, and we have found identification of the traditional "bar" the least controversial radiographic feature to interpret.

Technique

Patients are assessed for Mallampati classification, occlusion, trismus, condition of dentition, and ability to extend the neck. Favorable candidates have a relatively open oropharynx (Mallampati I or II), class 1 occlusion, no trismus, are edentulous or have no loose teeth, and can extend the neck without pain. Unfavorable candidates have a crowded oropharynx (Mallampati 3 or 4), class 2 occlusion (overbite), trismus, loose or unstable dentition or bridges, and kyphosis. These later factors can preclude the ability to place the operating endoscope, increase the risk of dental injury or tooth loss, or prevent adequate neck extension and visualization of the cricopharyngeus muscle. Patients with less than favorable physical findings should be counseled that open myotomy may be a more appropriate consideration. In all cases, patients are counseled that inadvertent esophageal injury or perforation is possible with endoscopic myotomy and that conversion to an open approach may be needed to treat such a complication.

Patients are maintained under general anesthesia and are given preoperative antibiotic prophylaxis, usually clindamycin (600 mg). Intubation with a reinforced endotracheal tube, usually 6.0, is preferred. A reinforced endotracheal tube resists compression and is less likely to interfere with the delivery of anesthesia. A microscope is coupled to a micromanipulator and a CO_2 laser. The CO_2 laser is set to 5 W, 200 mJ, and ultrapulse mode. The upper dentition when present is protected with a rubber dental guard. A Weerda esophagodiverticuloscope is introduced and suspended from a Mayo stand. The endoscope is carefully advanced posterior to the larynx and positioned immediately proximal to the cricopharyngeus muscle. Scope distension is adjusted to maximize and optimize exposure of the cricopharyngeus muscle (Figure 2). The mucosa overlaying the cricopharyngeal muscle is cut, exposing the underlying muscle fibers, which run transversely and are easy to see (Figure 3). These muscle fibers are cut in their entirety from an anterior to posterior direction, to the level of the buccopharyngeal fascia (Figure 4). The tension applied to the muscle fibers by the endoscope causes these fibers to retract neatly as they are cut (Figure 5). After it is completely cut, the mucosa is carefully repaired with 3 or 4 interrupted 4-0 vicryl sutures (Figure 6). Bleeding is usually minimal. No nasogastric tube is placed.

Patients are maintained on intravenous fluids and non per os for 72 hours with daily chest x-ray. If no signs of subcutaneous air or infection are seen, patients are started

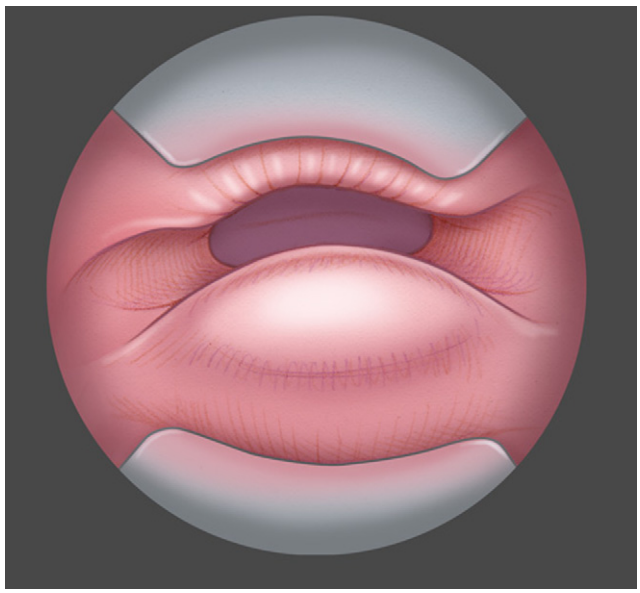

Figure 2 Endoscopic view of esophageal inlet, demonstrating optimal visualization of cricopharyngeal muscle prominence. (Image © Edward J. Damrose.) (Color version of figure is available online.)