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Office-based treatment of dysphagia

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Dysphagia is a common symptom affecting many patients with several different causes. The use of thin, distal-chip, video esophagoscopes allows for a thorough evaluation and management of dysphagia in the office. Esophagitis should be recognized on endoscopy in addition to webs, rings, and strictures. Procedures to treat the cause of dysphagia can be performed in clinic with the use of topical anesthesia. Descriptions of how to perform procedures for dysphagia, including vocal fold medialization, diagnostic esophagoscopy, and esophageal procedures for intervention are reviewed.

Introduction

With the advent of thin, distal-chip, video esophagoscopes with a working port, the comprehensive evaluation and management of dysphagia from lips to stomach can now be performed in the clinic. Nearly 20% of the population experiences dysphagia, mostly as infrequent episodes while 3% report weekly occurrences.[1] The prevalence of dysphagia further rises to 50% in patients older than the age of 65 years.[2,3] The most common causes of dysphagia include gastroesophageal reflux, cricopharyngeus muscle dysfunction (CPMD), advancing age, progressive neurologic disease, and post-irradiation damage.[4] Given the high prevalence of dysphagia, it is essential for the otolaryngologist to have an advanced understanding of contemporary in-office esophageal procedures. Office surgery without anesthesia eliminates the risk of respiratory and cardiovascular complications of intravenous sedation[5] and is associated with cost savings exceeding $5,000.00 per case. The purpose of this article is to provide a beyond state-of-the-art review of office-based procedures for dysphagia.

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Diagnostic esophagoscopy

Indications

The decision to perform esophagoscopy relies on patient history and extent of dysphagia. The 10-item eating assessment tool (EAT-10) is a validated self-administered symptom index for dysphagia symptoms of all etiologies. It is used in our center to assess initial patient symptom severity and to monitor treatment efficacy. Unlike symptoms of voice and laryngopharyngeal reflux (LPR), which are present in varying degrees in normal individuals, otherwise healthy persons do not experience dysphagia. An EAT-10 >2 (Table 1) is considered abnormal and is our most common indication for esophagoscopy.[6]

The American Society for Gastrointestinal Endoscopy and American College of Gastroenterology have established relative esophageal indications for esophagoscopy (Table 2).[7,8] Of these indications, dysphagia, bleeding, choking, chest pain, odynophagia, and weight loss are considered danger signs warranting expeditious examination. The extraesophageal indications for esophagoscopy (globus, throat clearing, hoarseness, and cough) are still

Table 1 Eating assessment tool-10

Item	0 = No problem, 4 = severe problem				
1. I have lost weight due to my swallowing disorder.	0	1	2	3	4
2. I cannot eat out due to my swallowing disorder.	0	1	2	3	4
3. I exert too much effort swallowing while consuming liquid foods.	0	1	2	3	4
4. I exert too much effort swallowing while consuming solid foods.	0	1	2	3	4
5. I exert too much effort while taking pills.	0	1	2	3	4
6. I feel pain during swallowing.	0	1	2	3	4
7. My swallowing condition impacts the pleasure I take while eating.	0	1	2	3	4
8. Food gets held (stuck) in my throat while swallowing.	0	1	2	3	4
9. I cough while I eat.	0	1	2	3	4
10. Swallowing creates tension on me (swallowing stresses me out).	0	1	2	3	4

being defined. The necessity for esophagoscopy in patients with signs and symptoms of LPR is uncertain. Data exist, however, that suggest extraesophageal symptoms better predict the presence of esophageal cancer than the typical esophageal symptoms of heartburn and regurgitation.[9] It is therefore our practice to screen the esophagus of patients we diagnose with LPR.

Technique

Informed consent is obtained for all office esophagoscopy. Every examination is digitally recorded for later frame-by-frame playback and analysis. Office esophagoscopy is better performed if the patient has fasted for 3 hours before the examination. Although a full stomach is not a contraindication to the procedure, food in the stomach can exacerbate patient nausea and emesis and obscure the endoscopic view within the stomach. Patients are therefore requested to fast for 3 hours before the procedure. The patient is placed in the seated upright position. The nasal cavity is topically anesthetized and decongested. The outer diameter of a typical transnasal esophagoscope is approximately 5.3 mm (Olympus VISERA PEF-V, Olympus America, Center Valley, PA). This is approximately 30% larger than a typical laryngoscope. Thus, it is imperative to adequately anesthetize the nose to optimize patient comfort and increase the likelihood of a successful examination. We utilize 4 puffs of combination oxymetazoline 0.05% and lidocaine 4% nasal spray into the more patent nasal cavity.

Table 2 Indications for esophagoscopy

Dysphagia or odynophagia	Choking
Esophageal ulcer	Treatment of bleeding lesions
Suspected neoplasm	Banding or sclerotherapy of varices
Esophageal stricture or obstruction	Biopsy of pathology
Removal of foreign bodies	Unexplained persistent vomiting
Management of achalasia	Esophageal reflux symptoms
Dilation of stenotic lesions	Despite medical therapy
Placement of a feeding tube	Anorexia and weight loss

In addition, the endoscope is continuously lubricated with 2% viscous Lidocaine gel (Roxane Laboratories, Columbus, OH) throughout the examination. Pharyngeal anesthesia is unnecessary for the most of patients. Patients with a significant gag reflex, however, are asked to gargle a teaspoon of the 2% lidocaine gel. The lidocaine gel can adhere to mucosal surfaces within the esophagus and make visualization during the examination more difficult. Copious irrigation once the endoscope is introduced into the esophagus can help clear the viscous medication. After nasal anesthesia has been applied, the endoscope is passed through the nasal cavity and positioned in the "home" position just above the epiglottis. Eye contact is made with the patient and a hand is placed on the shoulder (Figure 1). This endoscopist-patient contact is essential to alleviate patient anxiety and optimize comfort. The patient is then asked if they are "okay" and the patient is informed that, "*We are going to have you swallow the camera. Imagine that it is a large piece of spaghetti. Close your lips and swallow hard.*" The scope is advanced into the pyriform sinus and blindly advanced into the mid-esophagus as the patient swallows. The proximal esophagus is examined as the endoscope is withdrawn. Once the scope is introduced, eye contact is again made with the patient and a hand is placed on the shoulder. The esophagus is suctioned and the patient is given 30 seconds to get accustomed to having the

Figure 1 Reassuring the patient while the scope is in "home" position. (Color version of figure is available online.)

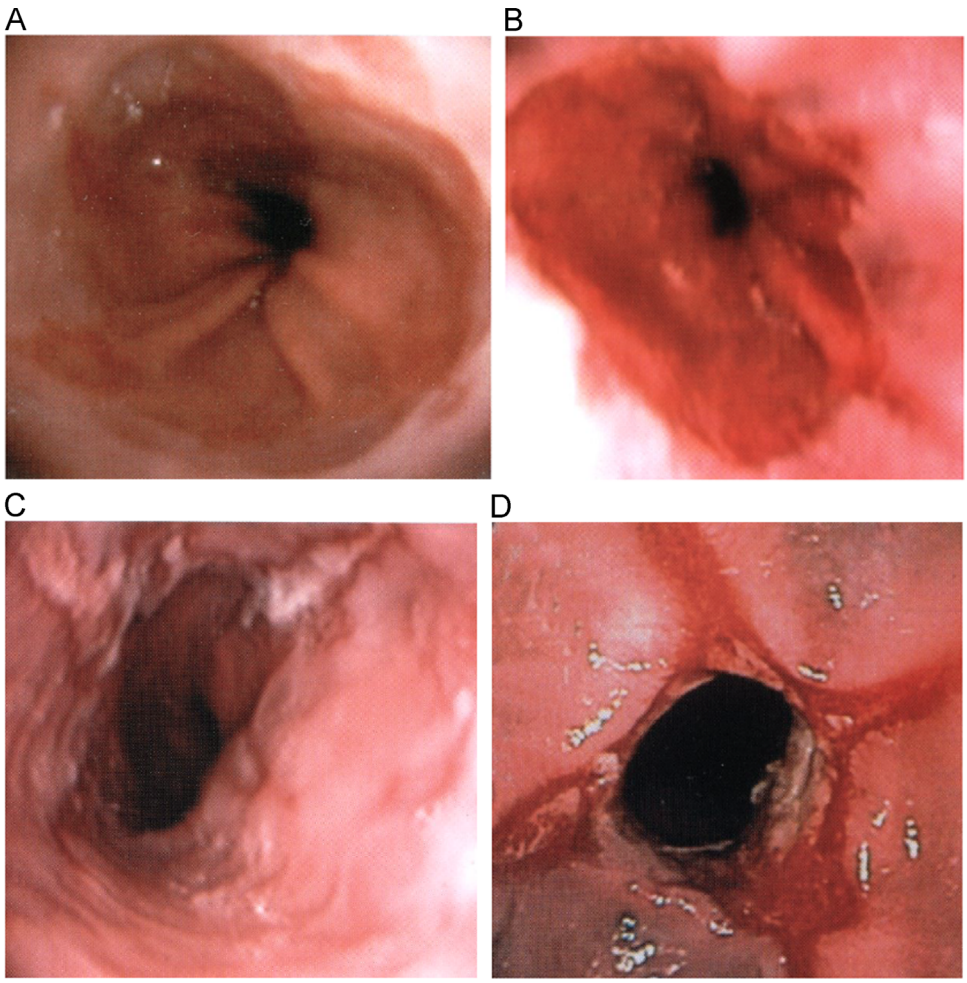

Figure 2 Los Angeles classification of erosive esophagitis—Grade A through D. (Color version of figure is available online.)

endoscope traverse the upper esophageal sphincter. The patient is informed that, "*this is as bad as it is going to be*" and asked if they are okay to proceed. The distal esophagus is visualized with particular attention to the squamo-columnar and esophago-gastric junctions. The endoscope is then passed into the stomach. Gastroscopy is performed and a retroflexed view of the gastric cardia and fundus obtained. Adequate air insufflation is necessary to perform a comprehensive gastroscopy. The patient is instructed to inform the endoscopist if the insufflated air becomes uncomfortable. The esophagoscope is then withdrawn. The entire length of the esophagus is examined at this time as withdrawing centers the endoscope, and the distal tip affords an optimal view. Any abnormal appearing mucosa is biopsied. The pharynx and nasal cavity are suctioned during removal and the examination is complete.

Findings

In patients undergoing esophagoscopy for dysphagia from 2000-2006, the cause of dysphagia was noted to be stricture in nearly 40% followed by esophagitis in 22%.[10] Further studies suggest that esophagitis, primarily resulting from gastroesophageal reflux disease (GERD), is becoming the most frequent cause of dysphagia in adult patients regardless of age.[4,11] The Los Angeles (LA) classification is widely used to categorize the extent of mucosal breaks at the lower esophageal sphincter (LES) from A-D (Figure 2).[12,13] After grading the site appropriately, all abnormal appearing mucosa should be biopsied to rule out dysplasia and metaplasia. Diagnosis of a hiatal hernia can also be made either through retroflexion demonstrating laxity around the scope or after insufflating the stomach and noting gastric rugae extending above the diaphragmatic pinch from within the esophagus. Placement of a wireless pH capsule with in-office esophagoscopy can be performed safely and successfully in the most of patients to quantify GERD and assess for association with extraesophageal symptoms including cough, throat clearing, etc.[14,15]

The inherent concern with GERD is the development of Barrett's esophagus, seen endoscopically as tongues of columnar epithelium that extend into the esophageal mucosa or islands of squamous epithelium distal to the squamo-columnar junction. To ensure adequate screening, biopsies should be performed in all 4 quadrants every 1-2 cm throughout the columnar-lined esophagus.[16,17] The suggested protocol for surveillance is 2-5 years for no dysplasia, 6-12 months for low-grade dysplasia, and every 3 months for high-grade dysplasia.[18]

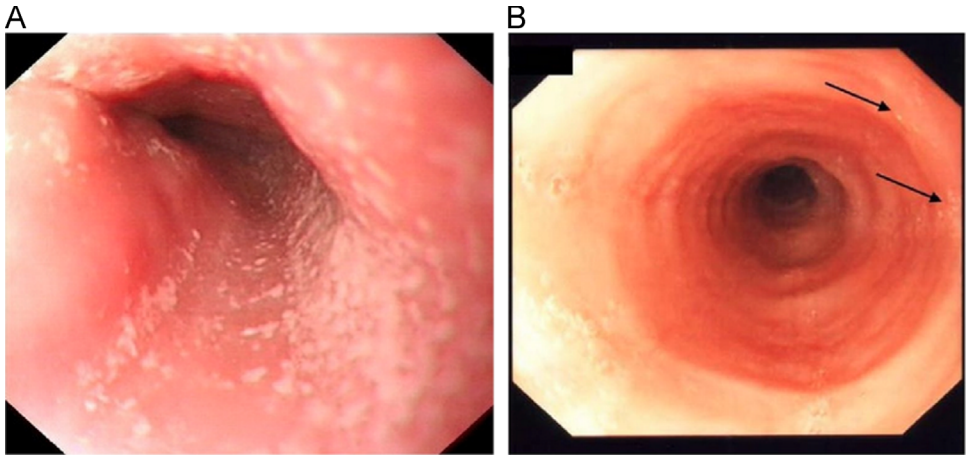

Figure 3 Whitish plaques with linear furrowing and trachealization of esophagus seen in eosinophilic esophagitis. (Color version of figure is available online.)

Eosinophilic esophagitis (EE) is a chronic inflammatory disorder characterized by a lack of response to gastroesophageal reflux therapy and changes suggestive of an allergic reaction.[29] The gold standard for diagnosis is a biopsy in symptomatic patients that demonstrates >15 eosinophils per high-powered field.[33] Endoscopically, the presentation of EE (Figure 3) is varied and includes linear furrowing, esophageal rings, trachealization, decreased vascularity, and white plaques.[34] Given the variety of appearances, a biopsy in all 4 quadrants is necessary to rule out EE in patients with suggestive history.

Esophageal dilation

Indications

Some of the most common causes of dysphagia include CPMD, esophageal webs, rings, and stricture (Table 3). All of these disorders are amenable to esophageal dilation. Dilation can be performed either by bougienage or balloon dilation.[19,20] We prefer the precise visualization, control, and ability to dilate to greater diameters afforded by radial expansion balloons (Hercules 3-stage wire-guided balloon dilators, Cook Medical, Bloomington, IL). These balloons allow dilation of the esophagus and pharyngoesophageal segment (PES) in the office without sedation. Although literature on in-office transnasal esophageal dilation is minimal,[21] a series of 54 procedures in 38 patients showed that procedures were performed easily in the clinic with only topical anesthesia.[5] Benefits of in-office dilation include lower complication rate, enhanced practice efficiency, reduced cost, and the ability to provide patient feedback during dilation. Challenges to performing in-office dilation include pain or discomfort, laryngospasm, and gagging. Selecting appropriate patients is essential, and if any reservation exists, the procedure can be performed in an outpatient setting under light intravenous sedation. Steroids can be injected following the dilation to reduce stricture or stenosis recurrence.[22-25] A randomized trial comparing dilation alone vs dilation with steroid injection demonstrated both reduced need for repeat dilation and an increase in the average time to repeat dilation.[26]

Technique

A comprehensive esophagoscopy is performed to rule out concurrent pathology. Pharyngeal anesthesia with 1-2 teaspoons of 2% viscous lidocaine gargle and swallow may be performed to enhance patient comfort. At the completion of the diagnostic esophagoscopy, dilation of the pathologic site may is performed (Table 4). With the endoscope in the esophagus, a guidewire is passed through the working channel and advanced distal to the pathology. A medical assistant is required to pass the guidewire and insufflate the balloon. In a patient with severe CPMD, a narrow stenosis, or a Zenker diverticulum, intubation of the esophagus may prove difficult. The wire may need to be passed through the PES without prior visualization of the esophagus. Once the guidewire is advanced to 30 cm without coiling in the pharynx, the clinician can be confident that the esophagus is intubated and can then "chase" the esophagoscope over the wire with greater pressure. If the esophagoscope can still not be advanced over the wire, dilation may need to proceed without first performing esophagoscopy. Once the guidewire is inserted, the endoscope is carefully withdrawn and passed "sidecar" next to the wire through the same anesthetized nasal cavity. If space is limited, the endoscope is re-inserted through the opposite nare.

A radial expansion balloon is then advanced along the guidewire under direct visualization. The initial size of the balloon that is selected is based on an estimation of the diameter of the narrowed lumen provided by prior endoscopy and videofluoroscopy. The size can be estimated relative to endoscope diameter (5.1 mm). The balloon is advanced to a position where the mid-portion of the balloon is at the site of pathology (Figure 4). Each balloon has 3-staged diameters that correspond to a pressure required for saline insufflation. The balloons range in size from 6, 7, 8 to 18, 19, 20 mm balloons. The patient is coached not to speak

Table 3 Indications for esophageal dilation

Cricopharyngeus muscle dysfunction
Postsurgical or postradiation UES stenosis
Schatzki ring
Esophageal webs
Benign stricture

UES, upper esophageal sphincter.

or swallow during the procedure and to raise their left hand if significant discomfort is encountered and they would like the clinician to go down on the balloon. Recent evidence suggests that the region of the upper esophageal sphincter is not round, and we frequently employ a technique of PES dilation utilizing 2 balloons and dilation to 120 Fr.[27,28] These super-physiologic dilations are usually associated with greater patient discomfort and are frequently performed under intravenous sedation in our outpatient endoscopy suite. Once dilation to a given diameter is complete, the mucosa is assessed for injury. If no mucosal tears are evident, the procedure may proceed to a greater diameter. If bleeding or mucosal injury is encounter, the procedure is terminated.

We frequently perform postdilation steroid injections with 1-2 ml of triamcinolone 40 mg/ml (Bristol-Myers Squibb Company, Princeton, NJ). A flexible 23 gauge × 200 cm sclerotherapy needle (Injection Therapy Needle Catheter, Boston Scientific, Spencer, IN) is primed and advanced through the working channel of the endoscope. Depending on the length and extent of stenosis, 1-2 mL of steroid is injected submucosally through a 1 ml tuberculin syringe (Covidien, Mansfield, MA) in a circumferential fashion. If there is a significant mucosal laceration or concern for a potential perforation after the dilation, the steroid injection is not performed.

Patients are counseled to consume a bland diet for 5 days after the procedure and are maintained on reflux medication for 2 weeks to reduce acid exposure and promote wound healing. They are also informed to expect a postprocedure sore throat, mild epistaxis, or hemoptysis for 48 hours postprocedure. All patients are monitored for 30 minutes before discharge, and a thorough neck examination is performed to rule out subcutaneous emphysema.

Table 4 Steps in transnasal esophagoscopy with esophageal dilation

Complete diagnostic esophagoscopy
With scope in esophagus, pass guidewire through working port
Carefully remove esophagoscope while advancing guidewire
Continue until the scope is completely out of the patient
Pull guidewire all the way through the scope
Re-introduce the scope into the same nostril
Establish a view of the site of pathology
Advance selected balloon over the guidewire and into patient
Position the mid-point of the balloon at site of pathology
Dilate progressively until resistance is met and hold for a minute
Advance balloon and deflate
Remove dilation equipment while maintaining a view
If no mucosal tears, can consider injection of kenalog

Injection medialization of true vocal folds

Indications

Vocal fold immobility can be idiopathic or secondary to neurologic, iatrogenic, inflammatory, cardiovascular, or radiation injury. Patients with unilateral vocal fold partial or complete immobility primarily present with the complaint of dysphonia. Although under reported, further inquiry often reveals that patients with unilateral vocal fold immobility experience significant dysphagia. A review of 50 patients at our institution who underwent injection medialization revealed an average premedialization score of 12 on EAT-10. Following injection medialization, their EAT-10 score fell to 5.3 ($p < 0.0001$).

As a normal swallow requires airway protection, it is believed that patients with unilateral immobility suffer dysphagia secondary to glottal insufficiency. A strong voluntary cough is integral in airway protection, and methods to improve cough will improve dysphagia. Patients with unilateral vocal fold immobility have a weakened compressive phase of cough.[29] Ruddy et al[30] examined 3 patients who had dysphagia symptoms along with pooling of secretions who underwent in-office injection medialization. These patients demonstrated better cough effectiveness as measured by improvement in compression phase, cough volume acceleration, and expiratory phase peak airflow.

Although altered airway protection is immediately evident given the glottal incompetency, further biomechanical changes may be present. Videofluoroscopic swallow study is the gold standard for evaluation of dysphagia and was used to assess 25 patients with unilateral vocal fold immobility. Domer et al[31] demonstrated statistical significance in increase of the pharyngeal constriction ratio and prolonged total pharyngeal transit time, demonstrating pharyngeal weakness in this patient population. Further, upper esophageal sphincter opening, hyoid excursion, and hyoid to larynx approximation were all decreased although not statistically significant. These findings confirm that patients with unilateral vocal fold immobility experience dysphagia from difficulty with airway protection as well as pharyngeal weakness. Although further studies are needed to understand the full effects of unilateral vocal fold immobility on swallowing function, injection medialization appears to provide improvement in dysphagia and cough.

Technique

A total of 4 techniques are possible to access the true vocal fold for injection—transoral, percutaneous transthyroid cartilage, percutaneous thyrohyoid, and percutaneous cricothyroid. Of the percutaneous approaches, the thyrohyoid approach (Figure 5), initially described by Zeitler and Amin,[32] is preferred at our center. This approach provides

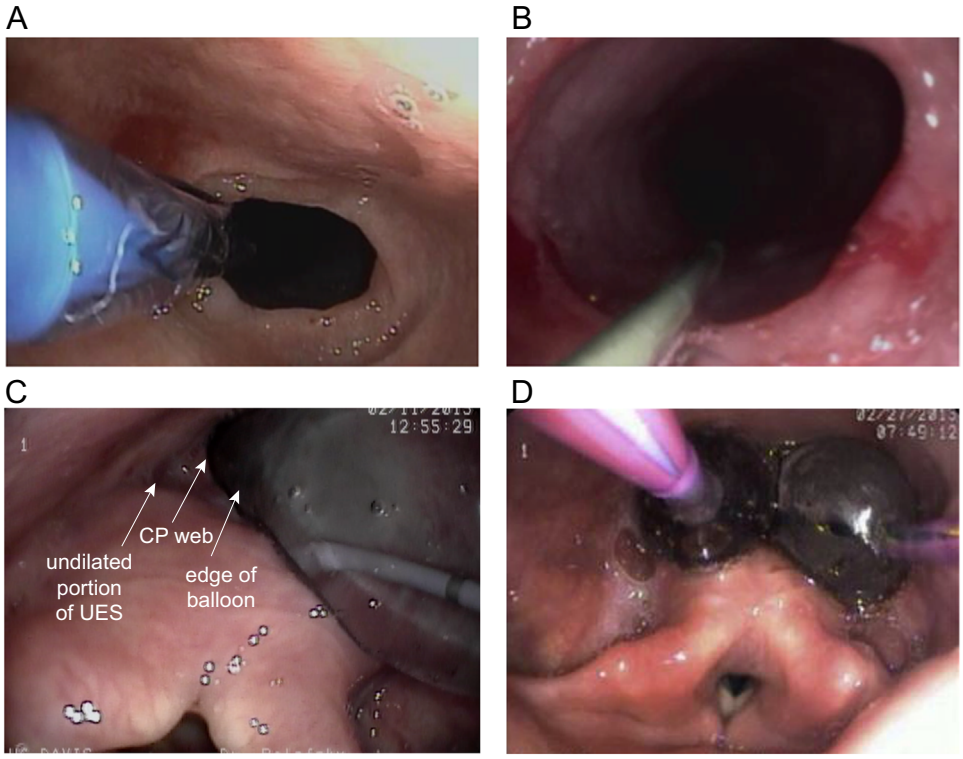

Figure 4 Esophageal dilation with radial expansion balloons; balloon in appropriate position before dilation; dilation of upper esophageal sphincter with single balloon demonstrating cricopharyngeal (CP) web and undilated portion; use of 2 balloons to achieve greater dilation; postdilation with appropriate mucosal erythema. (Color version of figure is available online.)

optimal needle positioning and visualization. Before starting the procedure, all of our patients are given a nebulizer treatment using 6 mL of 4% lidocaine connected to an oxygen tank set at 8 L per minute. The patient's nose is topically decongested with 4 puffs of combination Oxymetazoline 0.05% and lidocaine 4% nasal spray into the more patent nasal cavity. With a 25-gauge needle and 1% lidocaine hydrochloride with epinephrine 1:100,000, the subcutaneous tissues over the thyrohyoid membrane and thyroid cartilage are anesthetized. During this process, a superior laryngeal nerve block may also be performed. The laryngoscope is lubricated with 2% viscous lidocaine gel (Roxane Laboratories, Columbus, OH) and positioned by an assistant to allow visualization of the glottis. A needle filled with the desired

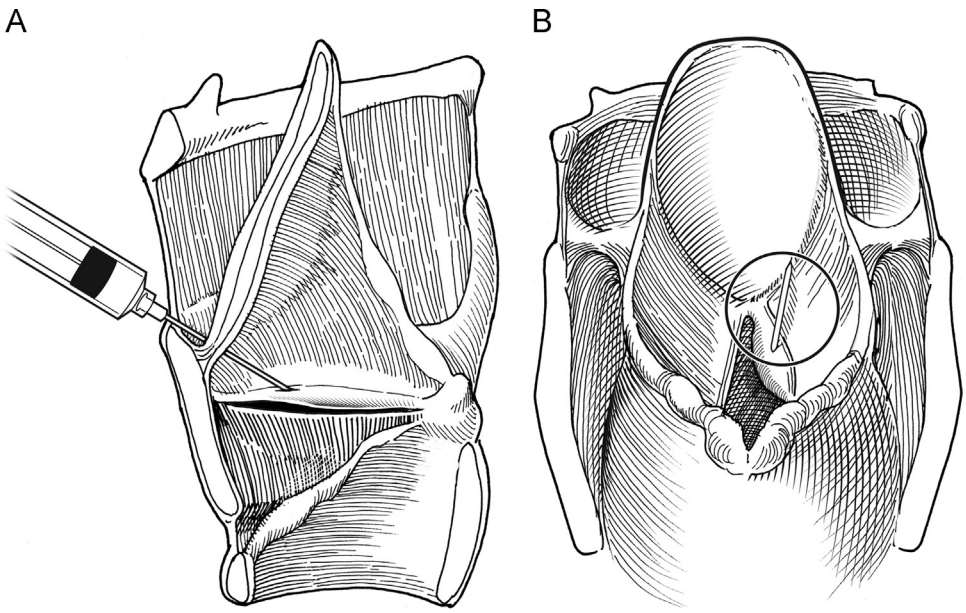

Figure 5 Thyrohyoid approach for injection medialization.

implant (eg, calcium hydroxylapatite) is attached to a 1.5-in, 25-gauge needle. The needle is passed just above the thyroid notch and passed through the subcutaneous tissues in a downward angle until visualized in the airway. The ideal entry site of the needle is at the petiole of the epiglottis where it can be easily advanced to the appropriate injection site. The amount of material injected is variable and dependent on each patient's disability and vocal fold position. Once desired medialization is achieved, the needle is slowly withdrawn from the vocal fold to avoid extrusion.

Cricopharyngeus muscle botulinum toxin injection

Indications

Injection of botulinum toxin has been used to treat CPMD with reasonable but often unpredictable results.[33,34] A total of 3 studies with more than 20 patients have been conducted to assess the benefits of botulinum toxin for CPMD. Zaninotto et al[35] and Alfonsi et al[36] demonstrated only 42% and 50% improvement respectively. However, Kelly et al[37] evaluated 49 patients with 32 treated primarily with botulinum toxin and the remaining 17 with botulinum toxin and myotomy. They reported that 65% of patients showed a significant benefit. Videofluoroscopy and pharyngoesophageal manometry are utilized to diagnose CPMD and identify suitable patients for injection.[38] In-office cricopharyngeus muscle botulinum toxin injections can be performed in the clinic under electromyographic (EMG) or videofluoroscopic guidance or both. The cricopharyngeus muscle has a characteristic signal on EMG. Electrical activity at rest that relaxes with swallow allows the muscle to be readily identified. The addition of videofluoroscopy provides for more precise localization. Because the cricoid is in direct apposition to the cervical spine and obscures visualization of the PES and cricopharyngeus muscle, endoscopic-guided cricopharyngeus muscle injection cannot be performed in the clinic in a person with a larynx. In laryngectomy patients, however, suffering from poor voicing through a tracheoesophageal puncture or dysphagia secondary to CPMD, botulinum toxin injection can be performed through the working channel of a flexible esophagoscope. Of postlaryngectomy patients failing to voice after prosthesis placement, $>70\%$ or greater may have improved function following cricopharyngeus muscle botulinum toxin injection.[39,40]

A wide range from 15-100 units of Botox has been reported.[41-48] with doses being dependent on clinician preference, patient age, and patient response.

Technique

EMG-guided office injection of the cricopharyngeus muscle

The EMG electrodes are secured to the neck in a similar position as used for muscle localization for laryngeal dystonia botulinum toxin injection. Videofluoroscopy is used to position the tip of the injection needle adjacent to the posterior arch of the cricoid cartilage. The characteristic EMG signal of electrical activity at rest that relaxes with swallow is identified. Activity that increases with sniffing suggests localization within the posterior cricoarytenoid muscle and activity that increases with swallow or neck elevation suggests localization within a pharyngeal constrictor or strap muscle. Once precise cricopharyngeus muscle location is confirmed, 15-100 units of botulinum toxin are injected. The dose used depends on patient age, diagnosis, dysphagia severity, and presence of a feeding tube. Larger doses (60-100 units) may result in dissipation of toxin into adjacent pharyngeal constrictors and cervical esophagus and can cause transient worsening of dysphagia. We use larger doses (100 units) for younger patients with profound dysphagia and a preexisting feeding tube. Older patients with globus or mild CPMD may receive an initial dose as low as 15 units. The botulinum toxin is diluted into as a small volume as possible to avoid dissipation into adjacent swallowing musculature. Only 1 side is injected in case inadvertent injection into the posterior cricoarytenoid muscle occurs to avoid the potential for airway compromise.

TNE-guided office injection of the cricopharyngeus muscle

This procedure can only be performed in a patient after total laryngectomy. A comprehensive esophagoscopy is performed to rule out concomitant pathology. The endoscope is then utilized to identify the cricopharyngeus muscle. We routinely use 100 units of botulinum toxin as excessive toxin that dissipates into adjacent constrictors or esophagus is unlikely to exacerbate dysphagia in this patient population. Botulinum toxin (100 units) is mixed with 1 mL of injectable saline. A sclerotherapy needle is primed with the injectate and passed through the working channel of the endoscope (Figure 6). The toxin is injected into 3 sites along the muscle. The needle is flushed with air to compensate for the dead space inherent of the long device.

Botulinum toxin injection into the LES

Indications

In conditions of spastic disorders of the LES, botulinum toxin has been reliably used for over 15 years.[49-51] Indications (Table 5) for botulinum toxin injection in the LES include achalasia, distal esophageal spasm, nutcracker esophagus, obstructing muscular rings, and hypertensive LES.[52] Of these conditions, achalasia is the most common and widely reported. Injection of botulinum toxin at the LES for achalasia demonstrates success rates of 70% or more,[53] which is greater than reported benefits of calcium channel blockers or nitrates.[54] The benefits are noted usually within 1 month of injection with some benefit noted up to 2 years after injection.[55,56] However, it appears that the most of

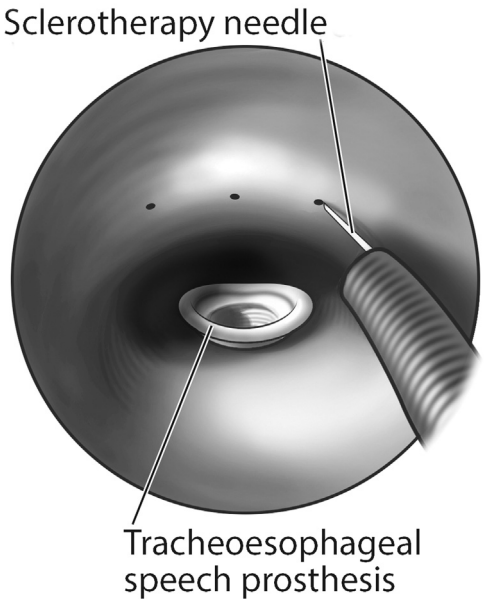

Figure 6 Botulinum toxin injection into cricopharyngeus muscle in postlaryngectomy patient.

benefit is present for only 1 year on average, and patients typically require repeat injection after that time.[57] The most reported complications are noncardiac chest pain and worsening gastroesophageal reflux.[55] Severe complications such as arrhythmias, gastroparesis, and mediastinitis are rare.[58]

Although efficacious, botulinum toxin injection has been shown to be inferior to balloon dilation of the LES and Heller myotomy. Although myotomy carries inherently greater risk than endoscopic methods, balloon dilation has been found to have greater long-term efficacy than botulinum toxin injection.[59] Further, a Cochrane review[60] of randomized, controlled trials comparing esophageal dilation to botulinum toxin demonstrated that, at 1 year after treatment, 1 of 3 of patients undergoing dilation had failed treatment while nearly 3 of 4 of patients had failed with botulinum toxin injection. Although dilation has been shown to be superior in length of efficacy, botulinum toxin injection remains a useful option for patients unsuitable for surgery because of age or comorbidities.[61] Although possible in clinic, balloon dilation of the LES for achalasia is typically performed under sedation in the operating room given the concern for injury and level of discomfort.

Although achalasia is the most common indication for botulinum toxin injection in the LES, patients with distal esophageal spasm and nutcracker esophagus can benefit.[52]

Table 5 Indications for botulinum toxin injection of lower esophageal sphincter

Achalasia
Muscular "A" rings
Distal esophageal spasm
Nutcracker esophagus

In hypercontractile or spastic motility disorders, botulinum toxin injections can show benefit for up to 6 months.[62] Manometry is invaluable in determining which patients may be better candidates, but further research is needed to predict response to botulinum toxin injection. Further studies will be necessary to compare the efficacy of botulinum toxin injection vs medical therapy for treatment of the LES in esophageal motility disorders other than achalasia.

Technique

A comprehensive diagnostic esophagoscopy is performed to rule out comorbid pathology. A 12-hour fast is recommended to ensure the absence of gastric and esophageal contents. The gastroesophageal junction is localized by identifying the gastric rugae and the termination of the linear esophageal vessels. Botulinum toxin (100 units) is mixed with 4 mL of injectable saline. A flexible 23 gauge × 200 cm sclerotherapy needle (Injection Therapy Needle Catheter, Boston Scientific, Spencer, IN) is primed with the injectate and advanced through the working channel of the esophagoscope. The hub of the sclerotherapy needle should be visible, and the needle can then be advanced under direct vision. Care is taken not to suction out toxin by depressing the suction button while the end of the needle is within the esophagoscope. Our protocol is to perform 4 injections from an anterograde view into the region of the LES and 3 injections from a retroflexed view of the LES from below in equal quantities of toxin. The patient is advised to follow-up in 1 month to monitor symptomatic improvement and in 6 months to evaluate the necessity for a repeat injection.

Conclusion

Dysphagia is a prevalent symptom with a diverse range of etiologies. The advent of the transnasal esophagoscope has improved our ability to assess and manage this challenging complaint. A comprehensive understanding of office-based esophageal procedures is essential to provide safe, efficacious, expeditious, and cost-effective treatment to all persons with dysphagia.

Disclosure statement

The authors reported no proprietary or commercial interest in any product mentioned or concept discussed in this article.

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