Objective: To describe the safety of transnasal balloon dilation of the esophagus.

Design: Retrospective case series.

Setting: Two tertiary care institutions.

Patients: All patients undergoing transnasal balloon dilation of the esophagus.

Main Outcome Measure: Complications.

Results: Fifty-four transnasal esophageal balloon dilations were performed in 38 patients. The mean age of the cohort was 65 years (range, 13-88 years). Twenty-nine patients were male (76%). Twenty procedures were performed using only topical anesthesia in the office setting. Seven patients (18%) were postlaryngectomy, and 15 patients (39%) had a history of head and neck radiation therapy. The upper esophageal sphincter (UES) was the most frequent dilation site (63%), followed by proximal/mid esophagus (26%), lower esophageal sphincter (LES) (7.4%), and both the UES and LES (3.7%). Indications included cricopharyngeal dysfunction, benign stricture, web, and Schatzki ring. Two procedures (3.7%) were aborted secondary to self-limited laryngospasm or gagging. There were no clinically significant complications.

Conclusions: Transnasal esophageal balloon dilation can be performed in unsedated or sedated patients with a very low complication rate. The procedure is well tolerated in 96% of patients. This technique, formerly available only through larger caliber oral gastroscopes and under sedation, allows for office-based esophageal balloon dilation in an otolaryngology practice.


The introduction of transnasal esophagoscopy (TNE) has expanded the otolaryngologist’s ability to evaluate esophageal disease in the office setting. These endoscopes have also facilitated the development of novel transnasal therapeutic procedures. Some of the procedures currently being performed through ultrathin transnasal endoscopes include placement of nasoenteric feeding tubes, esophageal botulinum toxin injections, and office tracheoesophageal puncture.

The use of TNE in conjunction with balloon dilation of the esophagus affords the physician an opportunity to dilate all areas of the esophagus through the nasal cavity. While balloon dilators have been used for decades in sedated endoscopy, the transnasal technique is novel and offers some important advantages over the traditional techniques. We evaluated the safety and efficacy of transnasal balloon dilation of the esophagus.

METHODS

This study was approved by the institutional review boards of the University of California–Davis School of Medicine (UCD) and the Wake Forest University School of Medicine (WFU). The medical charts of all persons undergoing transnasal balloon dilation of the esophagus at UCD and WFU from January 1, 2007, through December 31, 2008, were retrospectively reviewed. Information regarding patient demographics, indications, procedure efficacy, and complications was abstracted. All information was deidentified, coded, and recorded using SPSS software (version 16.0 for the Macintosh; SPSS Inc, Chicago, Illinois).

Transnasal balloon dilation of the esophagus can be performed with topical anesthesia or with the patient under conscious sedation, at the preference of the patient. The dilation technique is the same regardless of the anesthesia or dilation indication. The patient’s more patent nasal cavity is topical anesthetized and decongested with a combination of 1:1 oxymetazoline hydrochloride, 0.05%, and lidocaine hydrochloride topical solution, 4%. Oropharyngeal anesthesia is not routinely administered. If notable gagging is encountered,
the patient is administered 15 cm$^3$ of viscous lidocaine hydrochloride, 2%, on a spoon. The patient is placed comfortably in a seated or semirecumbent position. The Pentax VE-1530 transnasal esophagoscope with a 2-mm working channel (Pentax Precision Medical Co, KayPentax, Lincoln Park, New Jersey) and multidiameter hydrostatic wire-guided controlled radial expansion esophageal dilators (Boston Scientific, Natick, Massachusetts) were used in all procedures.

The endoscope is passed through the more patent nare to the hypopharynx and advanced gently into the esophagus. After examination of the esophagus and localization of the area in need of dilation, a flexible guide wire (Hydra Jagwire Guidewire, Boston Scientific) is passed through the working channel of the esophagoscope and advanced past the area of stenosis (Figure 1). The endoscope is then removed over the guide wire, and the guide wire is left in place. The esophagoscope is then placed through the same nasal cavity “sidecar” to the guide wire and advanced just proximal to the area of stenosis. If the UES is to be dilated, the endoscope is held in the hypopharynx to observe the larynx or neopharynx (in the case of total laryngectomy) during dilation. The size of the stricture or other abnormality can be estimated in reference to the endoscope tip (5.1 mm). The appropriately sized balloon dilator is passed over the guide wire and positioned across the area to be dilated. The balloon is then inflated with isotonic sodium chloride solution, and the stenosis is dilated (Figure 2). The balloons are 5 cm long and are inflated to 3 different diameters (eg, 8, 9, and 10 mm). The pressure ranges from 3 to 8 atm depending on the balloon size. The balloons are translucent and allow for visualization of the stricture during the dilation. A single balloon may be inflated to 3 different diameters without deflating between sizes, and we find this to be more comfortable for the patient than deflating and reinflating the balloon for each size. The expanded balloons are held in position for 30 to 60 seconds for each size. If further dilation is desired beyond the largest diameter of the current balloon being used, the balloon can be removed over the guide wire, and a larger one can be positioned at the site. The largest balloon dilator expands to 20 mm, roughly equivalent to a 60F catheter. The need for further dilation is assessed by the surgeon during the procedure, with a goal of attaining a size of at least 15 mm. After dilation, careful inspection of the dilated area is performed to assess for transmural esophageal injury (Figure 3). Patients are observed for 30 minutes and then discharged from the clinic.

RESULTS

Fifty-four transnasal esophageal balloon dilations were performed in 38 patients at 2 institutions. The mean age of the cohort was 65.3 years (range, 13-88 years), and 29 (76%) were male. Seven (18%) were postlaryngectomy, and 15 (30%) had a history of head and neck radiation therapy for carcinoma. Twenty procedures (37%) were performed using topical anesthesia in the office setting. The remaining 34 procedures were performed with conscious sedation in an outpatient surgical suite. Intravenous sedation, usually with propofol and/or midazolam hydrochloride and fentanyl citrate, was administered by the anesthesia personnel.

Indications for dilation included cricopharyngeal dysfunction, benign stricture, web, and Schatzki ring. The most common site of dilation was the UES (63%). Mid esophageal locations were the next most common (26%), followed by the LES (7%) and both the UES and LES (4%).

There were no major complications or esophageal perforations. No patients were hospitalized after the procedure. There were 2 minor complications, resulting in the procedures being aborted (2 of 54 [3.7%]). These were self-limited laryngospasm in one patient and intractable gagging in a second patient. Both of these aborted procedures were attempted under topical anesthesia only.

Figure 1. The flexible guide wire is passed through the working channel of the esophagoscope and advanced beyond the area of stenosis.

Figure 2. The controlled-radial expansion balloon is inflated with isotonic sodium chloride solution to dilate the stenosis.

Figure 3. After dilation, careful inspection of the dilated area is performed to assess for transmural esophageal injury.
Thin-caliber endoscopes with distal chip charge-coupled device technology have allowed for excellent and rapid visualization of the esophagus in the office setting without the need for sedation.\(^1\)\(^-\)\(^3\) With this technology, more otolaryngologists are performing esophagoscopy in the office rather than risking the morbidity and mortality associated with anesthesia. Over 50% of complications associated with sedated endoscopy are cardiopulmonary events, and TNE in the unsedated patient obviates these risks.

A natural extension of office-based TNE is office-based esophageal dilation. Endoscopic dilations with both bougienage and balloon dilators are not a novel concept. Otolaryngologists and gastroenterologists have performed bougienage esophageal dilation for more than a century since Chevalier Jackson developed the rigid esophagoscope.\(^4\) Bougienage dilation using Savary dilators in the unsedated patient has also been described using TNE, although the dilators themselves have to be passed through the mouth.\(^9\) Balloon dilators have been in use by gastrointestinal endoscopists since 1981.\(^10\) The currently available balloon dilators use controlled radial expansion to dilate a 3-cm distance with radial forces. Two prospective trials\(^11\),\(^12\) comparing bougienage and balloon dilation indicate that they are equivalent methods in terms of effectiveness.

For the otolaryngologist, there are a number of advantages of balloon dilation over traditional bougienage. Many patients tolerate the procedure well with topical anesthesia only. Because the procedure is transnasal, not transoral, gagging is less of an issue, and it is not necessary for the patient to be completely unconscious during the procedure. Even when conscious sedation is preferred by the patient, very light sedation can be used because all of the instruments go through the topically anesthetized nose rather than the oropharynx. This is particularly advantageous in patients with altered airway anatomy secondary to surgery and/or head and neck radiation. For example, a patient who has undergone radiation therapy and who has severe trismus, airway edema, and a concomitant upper esophageal stricture would not be a candidate for transoral sedated dilation of the esophagus. This patient is more safely treated with dilation via the transnasal approach, during which sedation can be avoided and the patency of the airway can be visually assured throughout the procedure.

Another advantage of the balloon dilator technique is the ability to visualize the area being dilated during the entire procedure. The balloon dilators are clear and filled with isotonic sodium chloride solution when inflated. The surgeon can view the lumen through the balloon during the dilation. After the balloon is deflated, the area of interest can be easily reinspected prior to proceeding with the dilation. If there is a tight stricture that cannot be traversed with the small-caliber endoscope, the soft guide wire can be safely passed beyond the stricture. The area can be dilated enough to allow the scope to pass and further assess the distal esophagus. We have seen long-segment Barrett metaplasia distal to such strictures as well as esophageal carcinomas. Biopsies can be readily performed during the same procedure. Once the area has been reinspected, the surgeon can determine whether it is safe to proceed with further dilation.

In conclusion, this is the first reported series (to our knowledge) using a transnasal technique for esophageal balloon dilation. In this small retrospective series, there were no major complications and no esophageal perforations. Long-term follow-up and larger studies are needed to more fully understand the role of this procedure in the otolaryngology practice.

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REFERENCES