

Retrograde Balloon Dilatation of Complete Cervical Esophageal and Hypopharyngeal Strictures

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ABSTRACT

Objectives: To evaluate and describe retrograde endoscopic dilatation of 100% strictures of the cervical esophagus and hypopharynx.

Methods and Materials: All patients who presented to the senior author (Y.D.) from September 1997 to September 2003 with strictures of the cervical esophagus and hypopharynx were retrospectively reviewed.

Results: Six patients with 100% strictures of the cervical esophagus and hypopharynx were available for review. Eighty-three percent of these patients were successfully treated endoscopically with the outlined technique. All were able to handle their secretions successfully, and four were no longer dependent on a gastrostomy tube.

Conclusions: Retrograde dilatation of complete strictures of the hypopharynx and cervical esophagus appears to be safe, reliable, and associated with a high rate of ultimate success. It should be considered a first-line treatment prior to open approaches, which may be reserved for failures.

SOMMAIRE

Objectifs: Évaluer et décrire la dilatation endoscopique rétrograde des strictures complètes de l'oesophage cervicale et de l'hypopharynx.

Méthodes: Nous avons revu les dossiers de tous les patients qui se sont présentés à l'auteur sénior (Y.D.) de septembre 1997 à septembre 2003 avec des strictures complètes de l'oesophage et de l'hypopharynx cervicaux.

Résultats: Nous avons pu évaluer six patients présentant des strictures complètes de l'oesophage et de l'hypopharynx. Quarante pourcent de ces patients ont été traités avec la technique décrite. Tous pouvaient avaler leurs sécrétions avec succès et quatre ne dépendaient plus d'un tube de gastrostomie.

Conclusion: La dilatation rétrograde des strictures complètes de l'hypopharynx et de l'oesophage cervicale semble être sûre, fiable et liée à un taux élevé de succès. Cette technique devrait être considérée comme approche principale avant les approches ouvertes, qui résultent parfois en des échecs.

Key words: dysphagia, esophagus, hypopharynx, stenosis, strictures

Strictures of the hypopharynx and cervical esophagus represent a potentially serious complication of radiotherapy for head and neck malignancies, with a reported incidence of 3.4%.¹ A stricture typically presents with progressive dysphagia and weight loss and may be

associated with an increased risk of aspiration owing to an inability to effectively transfer the oral bolus into the esophagus. With the increased prevalence of primary combined therapy using chemotherapy in addition to radiation, there appears to be a higher incidence of mucosal injury and risk of developing a stricture.² Traditionally, hypopharyngeal and cervical esophageal strictures have been treated with bougie dilation with surgical procedures used for dilation failures. Reconstruction may be accomplished with local and regional flaps, including the pectoralis myocutaneous flap and the platysma myocutaneous flap, and a gastric pull-up procedure. Microvascular options include a radial forearm flap, colonic interposition, and jejunal free flap. During the past 6 years, we have used balloon dilation for hypopharyngeal and cervical esophageal strictures. Complete

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strictures present a difficult scenario because of the inability to pass the balloon catheter or dilator into the stenotic segment. We present our experience using an illustrative case of complete hypopharyngeal and cervical esophageal strictures treated successfully with balloon dilation after opening the stricture via a combined transoral and transgastric approach.

Methods and Materials

All cases of cervical esophageal and hypopharyngeal strictures treated by the senior author (Y.D.) from September 1997 to September 2003 were retrospectively reviewed. In this group was a subset of six patients with 100% stricture of the hypopharynx and cervical esophagus with a minimum of 12 months of follow-up.

Technique

Preoperatively, patients are evaluated with a barium swallow to identify the location of the stricture. Patients receive a dose of an intravenous antibiotic, most often cefazolin on call to the operating room. A thorough direct laryngoscopy and rigid esophagoscopy is performed with laryngoscopes and rigid esophagoscopes to confirm the location of the stricture and to evaluate for recurrence of malignancy. A biopsy is taken from the mucosa of the stricture. If there is no evidence of malignancy, then the gastric tube is removed, and an esophagogastroduodenal (EGD) scope is inserted through the gastric tube tract. After evaluation of the stomach, the scope is advanced proximally into the esophagus. With a laryngoscope suspended superior to the stricture, the EGD scope is advanced to the inferior limit of the stricture. All strictures were able to be transilluminated superiorly and inferiorly with both scopes in place. A microlaryngoscope blade is used to incise the superior extent of the stricture and is advanced through the stricture with confirmation of a central incision by the monitor for the EGD scope. A balloon catheter is then advanced through a port of the EGD, confirmed to be in the correct location by viewing the catheter on the EGD monitor and directly from above, and the strictured segment is serially dilated to 10 mm. A manometer is used to ensure that the dilation pressure is not excessive and corresponds to the manufacturer's recommendation relating dilated balloon size to pressure. Typically, the balloon is inflated for 30 seconds at a time as two to four dilations are performed. A nasogastric tube is placed to act as a stent. After the initial dilation, patients are

admitted overnight, receive intravenous antibiotics while hospitalized, and then receive 5 to 7 days of antibiotics per gastric tube. Repeat dilations are performed every 2 to 6 weeks and may be performed antegrade or retrograde. A retrograde approach has the advantage of not requiring endotracheal intubation and may be performed in an endoscopy suite. Once the strictured segment is found to remain patent, typically greater than a diameter of 10 mm, the nasogastric tube is removed and the patient is given a swallow challenge with liquids in the clinic. Patients with symptoms of aspiration or at increased risk of decreased laryngeal sensation secondary to previous resections are evaluated with a videoswallow study to determine the safety of oral intake.

Case Report

A 58-year-old female with a history of T4N2B squamous cell carcinoma of the tonsil was treated with a near-total laryngectomy, total pharyngectomy, bilateral neck dissections, tracheotomy, and reconstruction with a radial forearm free flap. The patient received a gastrostomy tube at the time of her extirpative surgery. She received postoperative radiotherapy to the primary site and bilateral neck regions. A barium swallow demonstrated a moderate hypopharyngeal stricture. Direct endoscopy and biopsy of the strictured segment were negative for carcinoma. Eighteen months postoperatively, she presented with complaints of dysphagia. The patient reported that she had been unable to swallow her saliva and had been forced to constantly carry a cup to spit it out. A modified barium swallow demonstrated 100% stricture of the reconstructed hypopharynx (Figure 1). Direct laryngoscopy and esophagoscopy confirmed a complete stricture in the postcricoid region. The stricture appeared to be composed of a wall of scar tissue, and biopsies of the stenosis were negative for carcinoma. The patient declined to undergo open surgical reconstruction and possible completion laryngectomy but was agreeable to endoscopic attempts to open the strictured segment.

Using the combined approach, the transparent fibrotic tissue was incised in its central portion with a microlaryngoscope blade. The esophagoscope then dilated the stricture initially from below using a balloon dilator (Figures 2 and 3) to 10 mm. She was treated 2 weeks after the initial dilation with retrograde balloon dilation to 12 mm. The stenotic segment had remained patent, allowing removal of the nasogastric tube. She reported resolution of dysphagia after the second dilation and removal of the nasogastric tube. During her fourth and final dilation, the



Figure 1. Barium swallow of the patient with complete cervical esophageal stricture. This patient was able to tolerate a liquid diet following retrograde dilation.

postcricoid region was found to be widely patent after her previous dilation to 20 mm. She remains dependent on a gastric tube secondary to aspiration confirmed on videofluoroscopy owing to her remaining true vocal cord to adequately protect her airway. She is able to take small sips of liquids for comfort. Follow-up contrast swallow examinations have revealed a patent hypopharynx. She was followed for 16 months after her last dilation without recurrence of dysphagia.

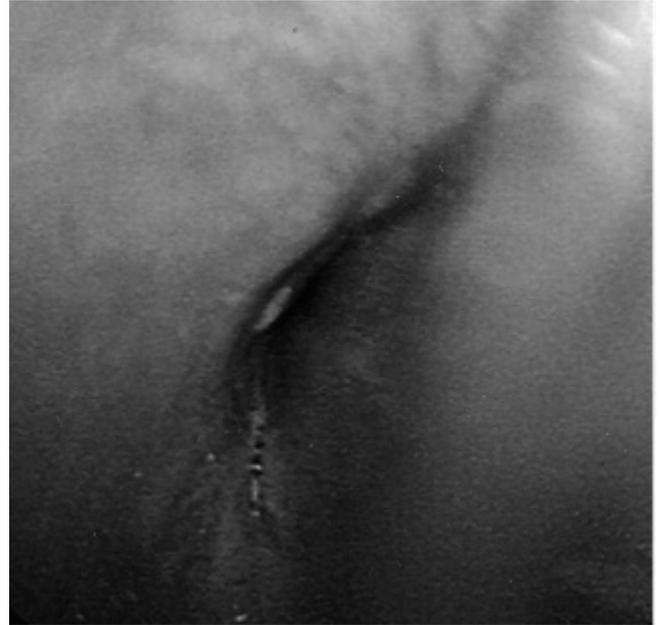


Figure 2. View from below of the cervical esophageal stricture.

Results

All of the study patients were unable to be dilated antegrade with both bougie dilation and balloon dilation. No lumen was visible on preoperative swallowing studies. As one would expect, all of these patients (four females, two males; average age 56.5 years) were completely dependent on a gastrostomy tube and unable to handle oral secretions. All had received radiation therapy for a head and neck carcinoma, and four of the subset had received concurrent chemotherapy. All of the complete strictures were able to be transilluminated with the

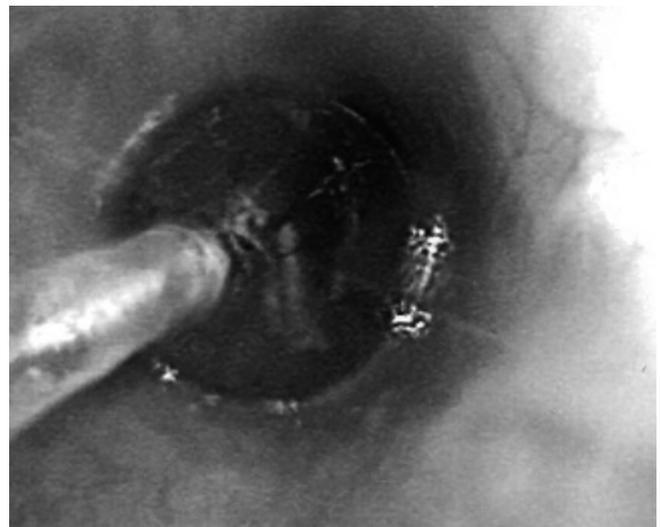


Figure 3. View from below of the distal end of the balloon dilator in position within the esophageal stricture.

combined approach. A mean of 1.2 dilations (range 1–2) were performed in this series. Following the outlined technique, five of the six patients have maintained a patent hypopharynx and esophagus with a minimum follow-up of 12 months. All five were able to be successively dilated to at least 15 mm. Four (66.7%) are no longer dependent on a gastrostomy tube. Of these four patients, two are able to tolerate solid and two are able to tolerate soft mechanical oral intake. The patient presented has a patent hypopharynx but remains dependent on a gastric tube secondary to aspiration. She is able to take small sips of liquids for comfort, and her dysphagia has resolved. The stenosis around the nasogastric tube recurred after each of two dilations. She was treated with an open pharyngoplasty with success. No complications occurred in the six patients.

Discussion

The development of a postradiation hypopharyngeal and cervical esophageal stricture is a morbid complication that may significantly impact a patient's quality of life. Strictures may develop after postoperative radiotherapy or with primary radiation treatment. The use of chemotherapy increases the incidence of mucosal injury and the risk of stricture formation.² A stenotic segment may result in significant dysphagia and increases the risk of aspiration of oral intake. Patients are often troubled by the inability to tolerate oral intake and the necessity of gastric tube feeding. Despite decreased salivary production after radiotherapy, a complete stricture may result in dysphagia and aspiration secondary to the inability of any saliva to pass into the esophagus.

Postradiation hypopharyngeal strictures are commonly managed with bougie dilation. Laurell and colleagues reported a 78% success rate with dilation of hypopharyngeal strictures secondary to radiotherapy for head and neck malignancies. Patients with moderate to severe strictures required one to eight dilations. Their mortality rate was 5% secondary to esophageal perforation.² Dilation with balloon catheters has been described as a safer alternative to the use of bougies. Advantages include placement of the dilator under direct vision to decrease the risk of false passage. Additionally, balloon dilation produces radial forces oriented perpendicular to the stricture. The lack of an axially directed force, which is present with bougie dilation, is proposed to lessen the risk of iatrogenic injury.¹ Gurpinar and Dogruyol successfully treated 10 of 12 pediatric patients with esophageal strictures secondary to a variety of etiologies with balloon

dilation.³ All of the patients had previously failed bougie dilation.

Options for open surgical treatment of a hypopharyngeal stricture include local flap and free tissue reconstruction. Friedman and colleagues described the use of a platysma myocutaneous flap in three patients with a hypopharyngeal stricture after lye ingestion.⁴ The flap may be based superiorly on the facial artery or inferiorly on the transverse cervical artery. However, this flap is limited to patients with strictures secondary to caustic ingestion or other benign processes. Reported contraindications include previous neck dissection or radiotherapy.⁴ The pectoralis myocutaneous flap is capable of providing a large surface area to reconstruct the hypopharynx. A major disadvantage, however, is the bulkiness of the flap.

Free tissue transfer techniques have expanded the options for reconstruction of the hypopharynx. Varvares and colleagues reported 20 cases of hypopharyngeal reconstruction with a radial forearm free flap.³ The flap provides thin, pliable tissue and allowed 85% of patients in their series to resume oral alimentation. Tubing of the flap provided more rapid healing than sewing the lateral margins of the flap to the prevertebral fascia.

During the past 6 years, the senior author has routinely used balloon dilation for hypopharyngeal strictures. The vast majority of patients have achieved relief of dysphagia, and no significant complications have occurred. Although mild stenosis may require only one dilation, serial procedures have been used with severe strictures. A complete stricture prevents the passage of a bougie or balloon catheter. A combined transoral and transgastric evaluation of the six complete strictures demonstrated that each was composed of a thin membrane of fibrous tissue. Transillumination of the strictures on the inferior surface with the EGD scope defined the location for an incision in the central portion of the stricture. In addition, the EGD scope was passed through a virgin area that had been unaffected by external beam radiotherapy. The transillumination improved the safety profile of access from above and allowed for real-time evaluation of balloon placement to verify correct positioning. Owing to the small size of the balloon catheter, an incision of only a few millimetres is required to allow placement of the catheter for dilation. To decrease the risk of recurrence of complete obliteration, a nasogastric tube is used as a stent.

Conclusion

We report a technique of safely dilating complete strictures of the cervical esophagus and hypopharynx. A combined

transoral and transgastric endoscopic approach is a useful first-line approach to postradiotherapy complete strictures, with open surgical therapy reserved for failures.

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