A Preliminary Study of Office-Based Transnasal Endoscopic Balloon Dilatation of Pharyngoesophageal Stricture after Total Laryngectomy

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Objective: Pharyngoesophageal stricture formation and dysphagia following total laryngectomy negatively affect quality of life and result in nutritional compromise that can be successfully managed with various techniques. This study was conducted to describe our experiences of office-based balloon dilatation by transnasal endoscopy, which can be performed by an otolaryngologist.

Method: The present study investigated three patients who underwent transnasal endoscopy guided balloon dilatation of pharyngoesophageal stricture. The assessment was performed based on the number of procedures and recurrences, final subjective outcomes, and complications.

Result: There were no post-procedural complications. In one patient, a scarring band was found after the procedure; therefore, steroids were injected into the stricture site. There were 2–3 balloon dilatations and the interval between dilatations was 3–6 months. All patients were able to tolerate solid diet after 2 or 3 sessions.

Conclusion: Transnasal endoscopic balloon dilatation, which can be easily performed by an otolaryngologist in an office setting without sedation or general anesthesia, can be a useful modality for treating pharyngoesophageal stricture after total laryngectomy. (JKDS 2018;8:30-34)

Keywords: Pharyngoesophageal stricture, Total laryngectomy, Transnasal, Balloon dilatation

INTRODUCTION

Despite the rarity, development of pharyngoesophageal stricture and dysphagia after total laryngectomy negatively affect quality of life of patients, resulting in nutritional compromise. Factors previously implicated in stricture formation include types of reconstruction and history of radiation\(^1,2\). Especially, radiation is one of the most important factors that affect post-laryngectomy stricture\(^3\). Recently, radiation therapy has been increasingly applied in patients with laryngeal cancer due to need of organ preservation treatment.
strategy. Consequently, radiation-related complications increased, including pharyngoesophageal stricture\textsuperscript{6,7}.

Pharyngoesophageal strictures can be successfully managed with various techniques. Among them, endoscopically or fluoroscopically guided balloon dilatation and boogie dilatation are most commonly performed\textsuperscript{8-10}; however, no study has been performed to prospectively compare the effectiveness of each technique. Reconstructive surgery is reserved for patients with complete stricture, who are unresponsive to dilations. Regardless of the etiology, esophageal strictures significantly degrade quality of life of patients, particularly in those with high grade strictures because these patients require gastrostomy and repeated dilatations in order to reestablish patent alimentary tract. To date, few studies have reported on the long-term effectiveness of serial dilation for achieving this goal in patients with high-grade esophageal strictures\textsuperscript{11,12}. Considering that repeated procedure is inevitable in patients with high-grade strictures, consulting the radiologist or endoscopist and taking patients to operating room for general anesthesia are cumbersome for both physicians and patients; hence, an easy, simple, and office-based procedure is needed. Herein, we report our experiences of office-based balloon dilatation by transnasal endoscopy which can be performed by a single otolaryngologist.

**MATERIALS AND METHODS**

1. **Patients**

The protocol of this prospective preliminary study has been approved by the Institutional Review Board of our hospital, and the investigators have obtained written informed consent from each participant or each participant's guardian. We prospectively enrolled 3 patients with post-laryngectomy pharyngoesophageal stricture from July 2013 to July 2014. All patients were males and underwent total laryngectomy with postoperative radiation therapy. (Table 1) Although the patients were in disease-free state, they complained of difficulty in swallowing even the liquid diet. Pre-procedure esophagography was performed in all patients, except in those where the length of the stenotic lesion was too long or passage of contrast media was not observed during esophagography.

2. **Endoscopic balloon dilatation technique**

The procedure was performed under local anesthesia in the outpatient clinic. Patients were placed in the sitting position and topical lidocaine and epinephrine spray was applied to the nasal cavity for fiberoptic

| Patient no. | 1       | 2       | 3       |
|------------|---------|---------|---------|
| Age        | 74      | 77      | 80      |
| Sex        | M       | M       | M       |
| Initial tumor site | Hypopharynx | Larynx | Hypopharynx |
| Final stage | pT3N2aM0 | rT1aN0M0 | rT4aN2cM0 |
| Treatment  | TL+RT   | TL+RT   | TL+CCRT |
| Radiation dosage | 7200 cGy | 6500 cGy | 7000 cGy |
| Time to pharyngoesophageal stricture* | 18 years | 7 years | 10 years |
| Symptoms   | Dysphagia, odynophagia | Dysphagia, globus | Dysphagia |
| Number of dilatations | 3 | 2 | 2 |
| Frequency (months) | 3 | 5 | 6 |
| Maximal balloon diameter (mm) | 11 | 12 | 12 |
| Additional procedure | None | Steroid injection | None |
| Final outcome | Good | Good | Good |
| Complications | None | None | None |

TL: total laryngectomy, RT: radiation therapy, CCRT: concurrent chemoradiation therapy.

*All patients had no previous history of dysphagia or dilatation procedure after total laryngectomy.*
endoscope passage. The size and length of the stricture was estimated through pre-procedure esophagography and direct visualization of the stricture site. Disposable balloon dilatation catheters with diameters between 6 to 20 mm were used (Controlled Radial Expansion Balloon Dilator; Boston Scientific, Cork, Ireland). A catheter with an adequate balloon size was selected and passed into the stricture through the working channel (3.7 mm in diameter) of the video fiberoptic esophagoscope (EE-1580K; HOYA, Tokyo, Japan). (Fig. 1) After placing the balloon through the stricture, the balloon was inflated with air up to the recommended pressure for 60 seconds, and then was deflated for 60 seconds before the next inflation. (Fig. 2A, B) The balloon diameter was progressively increased by 1 to 1.5 mm until the diameter reached 12 mm (8 atm) in one or two sessions. Once the widening of stenotic site was observed, (Fig. 2C) the patient fasted for subsequent 12 hours post the procedure. Chest radiography was performed after the procedure in order to check for possible perforations. The success of the procedure was defined as restoration of the patient’s ability to swallow solid food.

RESULTS

Table 1 summarizes the results. There were no post-procedural complications. In one patient, a scarric band was found after the procedure; steroids were injected into the stricture site. Number of balloon dilatation performed was 2 to 3 times, and the time interval between balloon dilatations was 3 to 6 months. All patients were able to tolerate solid diet after 2 or 3 sessions of the procedure.

DISCUSSION

Our office-based transnasal endoscopic guided balloon dilatation can be performed with ease, and it can be repeated several times. Patients included in this study did not experience emesis during the procedure. This procedure can be applied not only in patients with mild to moderate stenosis, but also in patients with severe stenosis who inevitably need repeated procedure. Patients do not need to neither enter the operating room for general anesthesia nor consult endoscopist or radiologist for the dilatation procedure. An otolaryngologist, who is familiar with flexible endoscopy, can solely perform this procedure with ease. However, we believe that patients with complete long segment stenosis, in which the opening of the esophagus cannot be seen, are unsuitable for this procedure. Furthermore, extra caution are necessary in patients with severe stenosis,

Fig. 1. The instruments used for transnasal endoscopic balloon dilatation, (A) Transnasal esophagoscope, 60 cm length with 5.5 mm diameter, 1 working channel, (B) Balloon dilatation catheter, maximal balloon size up to 1.2 cm (8 atm).
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Fig. 2. Procedure. (A) Identification of the stricture at the pharyngoesophageal junction. (B) Insertion of balloon dilatation catheter into the pharyngoesophageal stricture. (C) Re-evaluation of the widened stricture site after balloon dilatation.

since post-procedural perforation can occur.

With an increase of laryngeal or hypopharyngeal cancer patients undergoing radiation therapy, the incidence of pharyngoesophageal stricture after total laryngectomy has increased as well. Pathophysiologically, coalescence and obstruction is mediated by fibrosis caused by obliteratorative endarteritis, which leads to ischemia of esophageal wall. Steroid injection can be performed for the treatment, and transnasal endoscopy with steroid injection can be feasible. In our study, one patient received balloon dilatation and steroid injection at the same time without any difficulty.

In our institute, we use transnasal esophagoscopy for this procedure. We have already described the role of esophagography that can be solely performed by an otolaryngologist. Traditional esophagoscopy is performed with a large caliber flexible endoscope requiring intravenous sedation for patient comfort, or with rigid endoscopes under general anesthesia in the operating room. On the other hand, transnasal esophagoscopy allows endoscopic visualization of the aerodigestive tract; it avoids delays, as well as lowering costs and risks of contrast studies and rigid endoscopy. Working channel in esophagoscopy can easily introduce the balloon catheter into the stenotic area. However, we think that conventional fiberoptic endoscopy, which most of the otolaryngologists are familiar with, is enough for this office-based procedure. Although a working cannal is not feasible, balloon dilatation catheter can be introduced into the stenotic area through the patient's mouth. Substantial amount of topical analgesic spray can reduce the gag reflex which can be caused by the catheter inserted through the mouth.

Study done by Rees further support the efficiency of transnasal endoscopic balloon dilatation.
of this method. Patients with cricopharyngeal dysfunction, post-radiation strictures, peptic strictures, and Schatzki’s rings received transnasal balloon dilation in an office setting and without any sedation. With only topical anesthesia, the author used 5.1 mm transnasal esophagoscope to reach the planned dilation region, then balloon was inflated and stayed in position for 60 seconds for dilation. Over 40 patients received this procedure, and there have been neither minor nor major complications, including perforation. This report confirms the effectiveness of transnasal endoscopic balloon dilation despite the small number of cases introduced.

CONCLUSION

In summary, pharyngoesophageal stricture after total laryngectomy is rare but it decreases the quality of life of the patients by inducing difficulty in swallowing and needing repeated dilatation procedures. As the use of radiation therapy increased, the occurrence of this complication is thought to be increased. Transnasal endoscopic balloon dilation can be easily and solely performed by an otolaryngologist in an office setting without sedation or general anesthesia. Observation of the status of mucosa before and after the procedure indicates that this procedure is safe and feasible in terms of the success of the procedure. We believe that transnasal endoscopic balloon dilation can be a useful modality for treating the pharyngoesophageal stricture after total laryngectomy.

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