Novel Management of Chronic Aspiration in the Setting of Laryngeal Stenosis

William G. Young, MD; Seth H. Dailey, MD
University of Wisconsin School of Medicine and Public Health • Department of Surgery
Division of Otolaryngology-Head and Neck Surgery • Madison, Wisconsin

Abstract

Objective: Discuss a unique management technique for laryngeal stenosis in the setting of persistent aspiration.

Method: Case report with pre- and postoperative imaging. A literature search was completed, investigating other similar surgical management options.

Result: The patient was a 76-year-old female that, despite a remote history of thyroidecmy for goiter, required multiple surgeries for papillary thyroid carcinoma. Her resulting bilateral vocal fold hypomobility required tracheostomy placement in two separate instances. She later developed solid and liquid dysphagia with an immobile right vocal fold and severely hypomobile left vocal fold. A modified barium swallow evaluation demonstrated aspiration when swallowing large, but not small, volumes of liquids despite postures or maneuvers. Due to her desire to continue an oral diet, a bilateral medialization laryngoplasty was offered to close her glottis gap, improve her phonation ability, and improve her swallow. Despite the understanding that her tracheostomy would be permanent, she elected to proceed. Her modified barium swallow evaluation completed 14 days postoperatively revealed no evidence of aspiration with thin liquids with a chin tuck and left head turn. By 5 months postoperatively, she was able to tolerate thin liquids using only a Passy-Muir valve.

Conclusion: Chronic aspiration in the setting of laryngeal stenosis from bilateral recurrent laryngeal nerve injury is a rare clinical scenario. While postoperatively tracheostomy tube dependence is ensured, bilateral medialization laryngoplasty is a unique reversible management strategy that can improve swallow and voice function and improve their quality of life.

Introduction

Bilateral vocal fold immobility (BVFI) or hypomobility is a serious problem affecting breathing, voice production, and swallowing. While dysphagia from a decreased laryngeal airway is the usual symptom that triggers treatment, patients with BVFI may have a similar incidence of aspiration as seen with unilateral vocal fold paralysis. In patients with BVFI with aspiration, the ideal treatment option is not clear. The swallowing effects of an open procedure for BVFI such as arytenoid suture abdution or endolaryngeal interventions, such as vocal fold laterofixation, arytenoidectomy (subtotal or total), cordotomy, or cordectomy, have not been well studied. Tracheostomy is another treatment option which preserves the voice and has minimal swallowing impacts, but comes with the increased care requirements as well as the body image and social implications that go along with tracheostomy placement.

Improved swallowing function via bilateral medialization laryngoplasty (ML) has been documented in the setting to BVFI, but postoperative modified barium swallow evaluations were not completed. We present a case report of aspiration and airway management in the setting of chronic laryngeal stenosis from unilateral vocal fold immobility and unilateral hypomobility through the use of tracheostomy with bilateral Gore-Tex ML.

Case Report

The patient is a 76-year-old female who developed papillary thyroid carcinoma 30 years following a total thyroidecmy for goiter. In spite of a preoperative videostroboscopy noting right vocal fold “bowing” and intact bilateral arytenoid mobility, her first completion thyroidecmy revealed a right recurrent laryngeal nerve encased by tumor. Although her right recurrent laryngeal nerve was surgically preserved, respiratory distress and dysmoble vocal folds on laryngoscopy led her to undergo tracheostomy later that day. During this hospital course, she underwent a videofluoroscopic swallow evaluation (VFS) demonstrating no evidence of aspiration and she remained on an oral diet. Two years later, she successfully completed a 72 hour capping trial with bilaterally hypomobile vocal folds with an interarytenoid space of 4-5mm on abduction and was subsequently decannulated.

Her second completion thyroidecmy, due to a recurrence in her right tracheoesophageal groove, was accompanied by a simultaneous tracheostomy placement due to her history of laryngeal neuropathy. Postlaryngoscopic revealed an immobile right true vocal fold and a hypomobile left with about a 5-6mm posterior glottis airway. She retained her tracheostomy due to airway concerns and presented again 1 year later, complaining of dysphagia and a “gargly” voice. Subsequent VFS revealed mild-moderate pharyngeal dysphagia and subsequent aspiration of large volumes of liquids, as well as pharyngeal stasis with puree and solid despite postures or maneuvers. Single sips did not progress to aspiration. It was thought that the pharyngeal stasis likely the due to decreased pharyngeal pressure secondary to incomplete laryngeal closure.

Due to her desire to continue an oral diet and have an optimal voice, a bilateral ML was offered to close her glottis gap, improve her phonation ability, and improve her swallow. Despite the understanding that her tracheostomy would be permanent, she elected to proceed.

She subsequently underwent a bilateral Gore-Tex (W.L. Gore, Newark, Delaware) ML 5 years after her initial completion thyroidecmy under local anesthesia with sedation. Utilizing a horizontal neck incision, the strap muscles were separated at the midline. After the thyroid cartilage was exposed, inferiorly based perichondrial flaps were elevated.

Discussion

Although multiple treatment options exist for BVFI, many compromise swallowing and voice to improve dyspnea complaints. The exact changes in swallow with these procedures have not been well described. Although swallowing function has been included in some of the outcomes research for endolaryngeal interventions, the reports are often rely on subjective swallowing quality of life instruments or Pearson ratings with no definitive assessment made via VFS.4-6

Because therapy options become limited when aspiration exists across all consistencies and with any postural maneuvers, initial treatment often becomes prolonged restriction on oral intake with gastric tube supplementation. When recurrent aspiration pneumonias occur despite this restriction, more aggressive aspiration management options include procedure such as laryngectomy, laryngotracheal separation, or vocal fold closure; however, these procedures remove the any possibility for laryngeal phonation and most are irreversible.10 Despite the requirement of tracheostomy placement, extension of ML to the setting of BVFI allows for an easily reversible procedure that has the potential of significantly improving both voice and swallow function while maintaining a large airway. While this study’s limitations are significant, it demonstrates a viable option for patients with BVFI and known aspiration who desire to maintain their ability for an oral diet.

Conclusions

Chronic aspiration in the setting of laryngeal stenosis from bilateral recurrent laryngeal nerve injury is a rare clinical scenario. While postoperatively tracheostomy tube dependence is ensured, bilateral ML is a unique reversible management strategy that can improve swallow and voice function and improve their quality of life.

References


Image 1: Glottic aperture in (A) abduction and (B) adduction prior to ML.

Figure 1. Glottic aperture in (A) abduction and (B) adduction prior to ML.

Glottic aperture in (C) abduction and (C) adduction post ML.

Image 2: Case Report (cont.)

The Montgomery thyroplasty implant set (Boston Medical Products, Inc., Westborough, MA) was used to create a 5 x 10 mm window in the thyroid cartilage bilaterally with the superior anterior corner of the window positioned 3mm posterior to the midline and at the vertical level of the true vocal folds as determined by half the measured height of the midline thyroid cartilage. The cartilage was cut with the oscillating saw and the paraglottic tissue elevated circumferentially around the window. Gore-Tex was placed into the posterior inferior aspect of the exposed paraglottic space on each side until the voice was optimized. The cartilage window was then replaced. The strap muscles were then reaproximated at the midline and wound was closed in a layered fashion.

Her post surgical course was complicated by an anterior fluid collection requiring surgical drainage. Her VFS completed 14 days postoperatively revealed no evidence of aspiration with thin liquids with a chin tuck and left head turn. By 5 months postoperatively, her VFS demonstrated the ability to tolerate thin liquids using only a Passy-Muir valve and no postural maneuvers.

Image 3: Figure 1. Glottic aperture in (A) abduction and (B) adduction prior to ML.

Glottic aperture in (C) abduction and (C) adduction post ML.