

Tracheal advancement with myomucosal island flap for partial laryngopharyngectomy defect reconstruction

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Section Editor: Peter Andersen, MD

Abstract

Background: Restoring the anatomy and function of a partial laryngopharyngectomy with hemiricoid defect is an extremely challenging area in head and neck cancer surgery. Procedures such as tracheal autotransplantation described for these defects are complex and attempted in very few centers. Therefore, the purpose of this article was to share our technique of reconstructing such defects with tracheal advancement with myomucosal island flap for laryngopharyngeal defect (TAMMIL), which allows functional reconstruction of the larynx.

Method: A 49-year-old man with carcinoma of the right pyriform sinus, postneoadjuvant chemotherapy with progressive disease underwent vertical partial laryngopharyngectomy. The resultant defect was reconstructed with tracheal advancement and islanded facial artery myomucosal (FAMM) flap.

Result: The patient is 1-year postsurgery, free of disease, decannulated, and taking oral feeds. Video fluoroscopy showed no evidence of aspiration.

Conclusion: This technique is single-staged, easier compared to existing techniques, aids “like-for-like” reconstruction, and allows surgical organ preservation in selected laryngeal and hypopharyngeal cancers.

KEYWORDS

conservative laryngeal surgery, facial artery myomucosal (FAMM) flap reconstruction, laryngeal carcinoma, pyriform fossa tumor, vertical partial laryngopharyngectomy with cricoid resection

1 | INTRODUCTION

Vertical partial laryngopharyngectomy involves removal of the ipsilateral structures above the cricoid cartilage¹ and is indicated for selected laryngeal and hypopharyngeal tumors. Glottic cancers with subglottic extension and pyriform fossa cancers involving the apex require an extended form of partial laryngopharyngectomy with hemiricoid resection for clear margins. Rigid support in the area of lost laryngeal cartilages and adequate soft tissue for pharyngeal defect are necessary to restore the functions of the larynx and pharynx.² The purpose of this case report was to share our experience in such a defect with a novel

single-stage reconstruction without the need for microvascular surgery.

2 | CASE REPORT

A 49-year-old man with squamous cell carcinoma of the right pyriform sinus, post 2 cycles of neoadjuvant chemotherapy with cisplatin and 5-fluorouracil, with progressive disease and with no other comorbidities, was referred to our department for consideration of surgery. On examination, the patient had a Karnofsky performance score of 90. On videolaryngoscopy, an ulcerative lesion involving the apex and the medial and lateral walls of the right pyriform sinus extending



FIGURE 1 Preoperative endoscopy view [Color figure can be viewed at wileyonlinelibrary.com]

superiorly up to the pharyngoepiglottic fold was noted. Both vocal cords were mobile (see Figure 1). Significant bilateral cervical lymph node enlargement was present. An MRI of the neck showed extralaryngeal spread of the tumor (see Figure 2).

Surgery was planned as depicted in the schematic diagram (see Figure 3). A vertical partial laryngopharyngectomy and bilateral selective neck dissection was done. The right hemilaryngopharynx, including the hemicricoid, hemithyroid, part of the epiglottis, and the right half of the hyoid bone were excised. Superiorly, resection involved part of the base of the tongue (see Figure 4). To reconstruct the laryngeal defect, tracheal mobilization and advancement were planned. The junction between the trachea and cricoid was incised and separated. First, 3 rings of the trachea were cut at the junction of the cartilaginous and membranous part. Mobilization of the trachea was done by dissecting into the superior mediastinum, taking care not to disturb the lateral blood supply below the cut ends. The membranous trachea corresponding to the cartilaginous cuts was removed. The trachea was pulled, rotated, and advanced to the level of the preserved left true vocal cord. Fixation sutures were taken from the tracheal rings to the cricoid and thyroid cartilages using 3-0 polyglactin (see Figure 5).

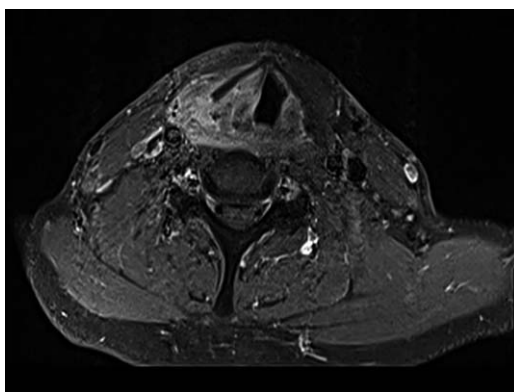


FIGURE 2 Preoperative MRI scan showing extralaryngeal tumor spread

The pharyngeal defect was reconstructed using the right-sided buccinator myomucosal flap brought down into the neck, islanded on the facial artery and facial vein. The flap size was 7×4 cm (see Figure 6). The donor site defect was resurfaced with a buccal pad of fat. A temporary tracheostomy was done with a small straight horizontal incision at a level approximately 3 cm below the lower end of the tracheal releasing incision.

The postoperative period was uneventful. The patient was discharged from the hospital after 7 days. Based on the histopathology report, the patient underwent intensity-modulated radiotherapy to the primary tumor and the neck. The tracheostomy tube was retained until the completion of radiation. Feeding during the radiation period was via percutaneous endoscopic gastrostomy tube. The tracheostomy tube was removed 2 weeks after the completion of radiation. The patient was slowly started on a semisolid diet. The video-fluoroscopy done 3 months after the completion of radiation showed preserved swallowing function with no aspiration and the patient was started on oral feeds. The patient is now 1-year postsurgery and is consuming a normal diet orally. He has xerostomia as postradiation sequelae and preferred to retain the percutaneous endoscopic gastrostomy tube for some more time for supplemental nutrition. Videolaryngoscopy at 1 year shows good healing with no aspiration (see Figure 7). An MRI scan at the end of 1 year shows no evidence of locoregional recurrence (see Figure 8).

3 | DISCUSSION

A partial laryngopharyngectomy defect involving resection of the hemicricoid ring is perhaps the toughest challenge in head and neck reconstruction. This is because it involves reconstruction of the cricoid ring, glottis, and pharynx, all of which should work synchronously to maintain the important functions of airway protection, swallowing, and speech. Descriptions of partial laryngopharyngectomy, in studies by authors like Ogura et al³ and Laccourreye et al,⁴ had regarded invasion of apex of pyriform fossa and subglottic extension as contraindications for the conservative surgery. Unilateral carcinoma of the hypopharynx or larynx, which would require resection of the hemicricoid ring for oncologically safe margins, are usually considered incompatible with decannulation.^{5,6} Patients with laryngeal or hypopharyngeal cancers with this extent of disease usually undergo a total laryngectomy in most centers due to the difficulty in reconstructing the complex defect of conservative resection.

Reports of reconstruction of conservative laryngopharyngectomy defect involving the hemicricoid ring have been rare. Delaere et al⁶ described one of the most promising techniques for reconstruction of a conservative laryngopharyngectomy defect involving the hemicricoid ring,

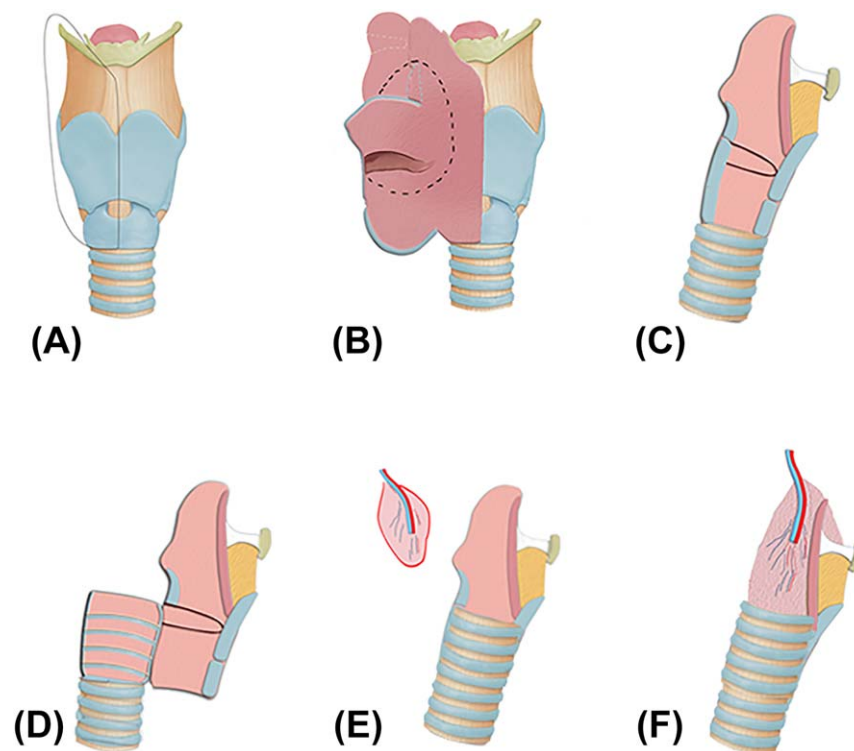


FIGURE 3 Schematic diagram of A. Outline of the resection, B. Endolaryngeal view showing the tumor extent, C. Sagittal view of the laryngopharyngeal defect, D. The first three tracheal rings cut at the membranous and cartilaginous junction, E. Trachea advanced to the level of glottis and pedicled facial artery musculomucosal flap delivered into the neck, and F. Final flap inset covering the pharyngeal defect [Color figure can be viewed at wileyonlinelibrary.com]

namely tracheal autotransplantation. Tracheal autotransplantation, which is a 2-staged procedure, involves vascularizing a segment of the trachea using an adiposofacial radial artery forearm flap in the first stage. Neck dissection is also performed during the first stage. Two weeks later, the primary resection, a vertical partial laryngectomy or laryngopharyngectomy, is carried out as a second stage. The vascularized segment of the trachea is cut, keeping the radial forearm pedicle intact, and this segment of the

trachea is opened up by removing the membranous part and is used to reconstruct the vertical partial laryngectomy defect. The advantage of tracheal autotransplantation is reconstruction of the cricoid and replacement of the glottic defect using the structural support of tracheal cartilages with preserved native vascularized airway mucosa. Good functional outcomes were reported by the authors. The pharyngeal defects were either absent or could be primarily closed in all the cases reported by the authors. The disadvantages of this procedure are its complexity, the

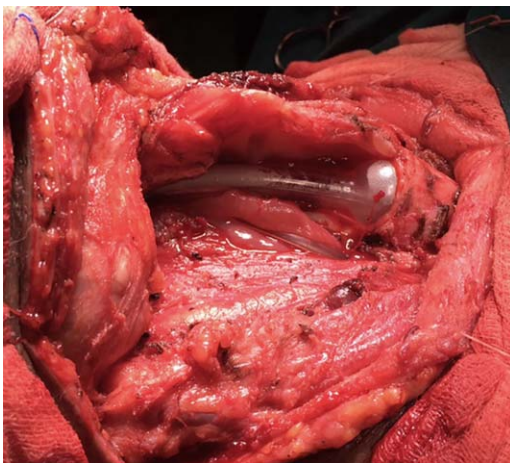


FIGURE 4 Intraoperative laryngopharyngeal defect [Color figure can be viewed at wileyonlinelibrary.com]

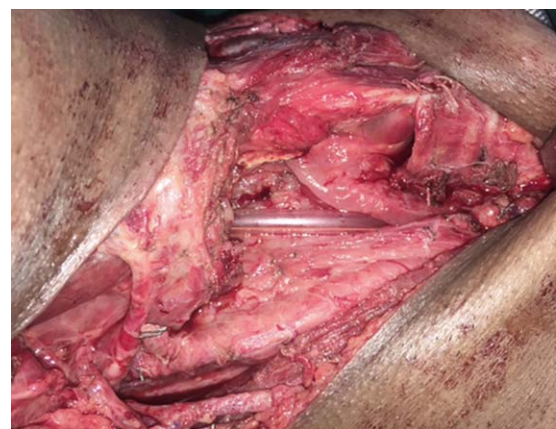


FIGURE 5 Trachea advanced to the level of the glottis [Color figure can be viewed at wileyonlinelibrary.com]

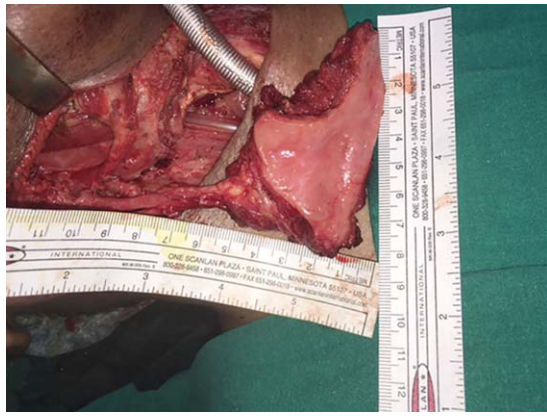


FIGURE 6 Facial artery musculomucosal flap used to cover the pharyngeal defect [Color figure can be viewed at wileyonlinelibrary.com]

waiting period for primary resection, and the 2 stages involved. Other authors, such as Urken et al,² who have worked on the reconstruction of laryngopharyngeal defect with hemithyroid/hemicricoid resection have described the use of a sensate radial artery forearm flap with cartilage graft, whereas Mayot et al⁵ have reported vascularized scapula as a reconstructive option. Both reported satisfactory functional results with acceptable morbidity. Compared with these techniques, tracheal autotransplantation had the advantage of retaining the native vascularized airway mucosa.^{2,5}

The patient reported in this article is in his 40s and well preserved, but had financial problems. We considered that a vertical partial laryngopharyngectomy with hemicricoid resection would provide oncologically safe margins in this patient with a possibility of laryngeal function preservation. Because the method described by Delaere et al⁶ was 2-staged with a waiting period of 2 weeks for primary tumor resection, and with the considerable financial burden and risk of disease progression, we thought of a method incorporating some of its concepts, but simpler and single-staged. Tracheal advancement with myomucosal island flap for laryngopharyngectomy defect (TAMMIL) achieves most of these objectives.



FIGURE 7 Postoperative endoscopy view at the end of 1 year [Color figure can be viewed at wileyonlinelibrary.com]

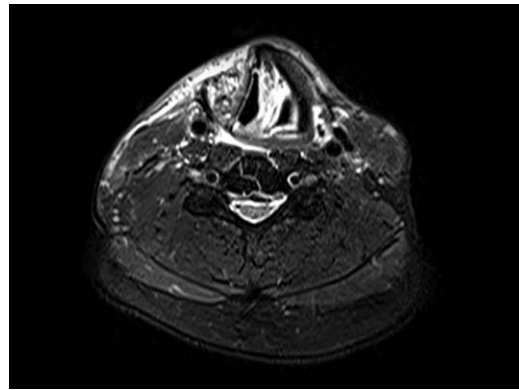


FIGURE 8 Postoperative MRI scan at the end of 1 year

Tracheal advancement to the level of the contralateral glottis ensures native airway mucosal and cartilage cover. As the continuity of the trachea is maintained, fixing it to the preserved hemicricoid and hemithyroid is sturdy and stable. In addition, the continuity of the tracheal mucosa in this technique is likely to preserve the mucosal sensation, which is important in cough reflex, in contrast to tracheal autotransplantation in which the mucosal continuity is disturbed.

Pharynx reconstruction can be done with various flaps, such as the split jejunum and gastroesophageal flaps, which provide adequate mucosal surface when used but it cannot be sensate and is associated with mucous production that can cause airway issues.² Replacing the pharyngeal mucosa with islanded facial artery myomucosal (FAMM) flap ensures “like-for-like” reconstruction with considerably less morbidity compared with most free flaps, as proposed by Massarelli et al⁷ and Joseph et al.⁸ In our experience of FAMM flaps in oral cancers, it acquires sensation within a few months’ period, which can be a significant advantage in pharyngeal reconstruction as it aids swallowing rehabilitation.

In selected cases of advanced laryngeal and hypopharyngeal cancers, TAMMIL retains all the advantages of tracheal autotransplantation but at the same time avoids the necessity of a 2-staged procedure and microvascular reconstruction. In addition, the myomucosal island flap permits its use in larger defects. It is safer, more physiological with like-for-like reconstruction, demands lesser stay in the intensive care unit, and reduces overall hospitalization, thereby reducing financial burden.

ACKNOWLEDGMENTS

The authors thank A. Bijoy for his visual editorial service.

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How to cite this article: Joseph ST, Naveen BS, Mohan T. M, Tharayil TJ. Tracheal advancement with myomucosal island flap for partial laryngopharyngectomy defect reconstruction. *Head & Neck*. 2018;00:1–5. <https://doi.org/10.1002/hed.25089>