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PRIMARY TRACHEOESOPHAGEAL PUNCTURE WITH SUPRACLAVICULAR ARTERY ISLAND FLAP AFTER TOTAL LARYNGECTOMY OR LARYNGOPHARYNGECTOMY

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Abstract

The supraclavicular artery island flap (SCAIF) is increasingly employed for laryngectomy reconstruction with excellent success. Although tracheoesophageal puncture (TEP) with intraoperative prosthesis placement is also positively reported, this is not described in patients following SCAIF. We review our experience with primary TEP with prosthesis placement and voice outcomes in patients after SCAIF reconstruction. Seven patients underwent SCAIF with primary TEP after laryngectomy from 2011- 2013. Five underwent total laryngectomy (TL) and two underwent TL with partial pharyngectomy. All patients had 16 French Indwelling Blom-Singer prostheses placed intra-operatively without complications. Six patients achieved tracheoesophageal voice (median time = 1.5 months). Two patients required cricopharyngeal segment Botox® injections. One patient remained aphonic. One patient developed prosthesis leakage addressed with prosthesis replacement. Our preliminary data demonstrates that, similar to free tissue transfer reconstruction, primary TEP with intraoperative placement of the voice prosthesis at the time of SCAIF reconstruction is safe and effective.

Keywords

Supraclavicular artery island flap; tracheoesophageal puncture; voice prosthesis; voice restoration; total laryngectomy

INTRODUCTION

Tracheoesophageal speech is considered the gold standard for voice restoration following laryngectomy. Tracheoesophageal puncture (TEP), which allows for a tracheoesophageal voice prosthesis, may occur at the time of laryngectomy (primary TEP) or postoperatively

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(secondary TEP).¹ Primary TEP with intraoperative prosthesis placement has been associated with earlier voice acquisition, is safe and has higher rates of successful voice rehabilitation as compared to secondary TEP.^{2,3-4} Successful voice outcomes have also been reported in primary TEP with laryngopharyngectomy that require advanced reconstruction techniques, such as free tissue transfer.^{4,5}

The supraclavicular artery island flap (SCAIF) is an effective alternative to free tissue transfer and is being used with increasing frequency after laryngectomy.^{6,7} The SCAIF has potential associated benefits of a pedicled flap, including improved wound healing and ease of harvest.(Kokot, 2014) There are limited data, however, on primary TEP placement or voice restoration following SCAIF reconstruction, which theoretically should be equivalent to free tissue transfer. Herein, we describe 1) our perioperative experience of primary TEP with intraoperative placement of the voice prosthesis for patients undergoing total laryngectomy (TL) or total laryngectomy with partial pharyngectomy (TLPP) requiring SCAIF reconstruction; 2) TEP voice outcomes in this patient cohort after one year of follow-up.

METHODS

Institutional review board approval was obtained from the Massachusetts Eye and Ear Infirmary (MEEI). A retrospective chart review of patients who underwent SCAIF reconstruction following TL or TLPP at MEEI between January 2011 and October 2013 was performed. Primary TEP was performed after TL or TLPP and prior to SCAIF reconstruction in the same fashion as insertion prior to inset of free tissue transfer as previously described.⁸ An indwelling 16 French Blom-Singer prosthesis (InHealth Technologies, Carpinteria, California) was placed in all patients. Two senior surgeons (K.E. and D.D.) performed the TEP and SCAIF reconstruction and evaluated patients postoperatively.

RESULTS

A total of 14 patients underwent SCAIF reconstruction following TL or TLPP. Primary TEP was performed in seven patients; six had prior chemoradiation for laryngeal squamous cell carcinoma. One patient had a dysfunctional larynx from radiation treatment for tonsillar squamous cell carcinoma. The average patient age was 64.1 years. There were two women and five men. Five patients underwent TL and two patients underwent TLPP. Six patients underwent SCAIF patch graft reconstruction of the anterior pharyngeal wall defect and one patient underwent SCAIF pharyngeal interposition graft reconstruction.

There were no intraoperative TEP-related complications, such as prosthesis displacement, or fistula widening in the perioperative period. One patient developed prosthesis transluminal salivary leakage after three months that resolved with prosthesis re-sizing. One patient developed a peristomal pharyngocutaneous fistula that healed by secondary intention and was unrelated to TEP.

The primary surgeon and a speech-language pathologist assessed voice outcomes. Six patients achieved tracheoesophageal voice within ten months after TEP placement, and most

occurred earlier (median time = 1.5 months). Of the six patients who achieved successful voice acquisition, two required cricopharyngeal muscle segment botulinum toxin (Botox®) injections with good response. The seventh patient was aphonic with prosthesis leakage. Shortly after prosthesis re-sizing the patient developed stomal recurrence and voice acquisition was deferred.

DISCUSSION

The SCAIF flap is an effective alternative to regional or free flaps for reconstruction after TL or TLPP.^{6,7} As with all types of vascularized soft tissue reconstruction, voice rehabilitation should be considered and planning should start preoperatively. As the SCAIF was only recently described, there is limited data on primary TEP placement with SCAIF. Chiu *et al.* mention voice outcomes in a cohort of twenty patients who underwent TL with partial or complete pharyngeal reconstruction with SCAIF between 2006 and 2009,⁹ noting only that patients who underwent TEP (primary or secondary) had reportedly better speech than electrolaryngeal speakers.

Our experience with primary TEP at the time of SCAIF is similar to primary TEP with free tissue transfer. While our cohort is small, we describe a high success rate with no intraoperative or immediate perioperative complications. This is consistent with our historical experience.^{4,8} Successful voice acquisition was attained in 86% of patients within ten months, comparable to rates reported with primary TEP at the time of other forms of reconstruction.⁵

Three patients did not achieve immediate tracheoesophageal voice acquisition. Pharyngeal constrictor spasm has been associated with poor voice outcomes after primary or secondary TEP.¹⁰ This was the most likely cause in two patients who responded to Botox® injections of the cricopharyngeal muscle segment. The third patient developed prosthesis leakage that resolved with prosthesis re-sizing. However, the patient remained aphonic likely due to recurrence of squamous cell carcinoma at the level of the stoma. One patient also developed peristomal pharyngocutaneous fistula, which was not believed to be related to placement of the prosthesis.

Primary TEP has many advantages for both the patient and surgeon. Primary TEP precludes the need for re-consultation or additional procedures and decreases risk of posterior esophageal perforation compared to secondary TEP.¹¹ Secondary TEP is associated with later voice restoration and may not be ideal with complex postoperative anatomy, as is often the case after laryngopharyngectomy.⁹ Primary placement of the TEP may be deferred in patients deemed higher risk for poor wound healing capability, fear of prosthesis displacement, or patient preference.⁸

In conclusion, SCAIF is becoming a widely adopted flap for reconstruction following TL or TLPP. Consideration and planning for voice acquisition remains a crucial part of the preoperative workup. Our preliminary experience suggests primary TEP is a safe and effective option for voice restoration in patients with SCAIF reconstruction.

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Figure 1. Endoscopic postoperative view of tracheoesophageal voice prosthesis following supraclavicular artery island flap

Note the low profile esophageal flange of the voice prosthesis.

Table 1

Summary of patient demographics, treatment characteristics and time to voice acquisition.

Patient	Gender	Indication	Prior treatment	Procedure	Type of SCAIF Reconstruction	Time to TEP voice (months)
1	M	Dysfunctional larynx	XRT	TLPP	Patch graft	1.5
2	M	Recurrent laryngeal carcinoma	Chemo/XRT	TL	Patch graft	1.5
3	M	Recurrent laryngeal carcinoma	Chemo/XRT	TLPP	Pharyngeal inner position graft	9.2
4	F	Recurrent laryngeal carcinoma	Chemo/XRT	TL	Patch graft	2.4
5	M	Recurrent laryngeal carcinoma	Chemo/XRT	TL	Patch graft	1.5
6	F	Recurrent laryngeal carcinoma	Chemo/XRT	TL	Patch graft	Voice acquisition deferred
7	M	Recurrent laryngeal carcinoma	Chemo/XRT	TL	Patch graft	1.5

M=male, F=female, XRT=radiation therapy, Chemo=chemotherapy, TLPP=total laryngectomy with partial pharyngectomy, TL=total laryngectomy