The Journal of Laryngology & Otology (2008), ***122***, *303–306.*

doi:10.1017/S0022215107000084
Printed in the United Kingdom
First published online 26 July 2007

Short Communication

Transnasal oesophagoscopy-guided in-office secondary tracheoesophageal puncture

V S Doctor, D J Enepekides, D G Farwell, P C Belafsky

Abstract

Objective: Tracheoesophageal puncture is recognised as an effective and reliable method for voice restoration following total laryngectomy. Several techniques have been described, ranging from rigid oesophagoscopy under general anaesthesia to more recent endoscopic techniques utilising intravenous sedation or local anaesthetic. We describe our technique for secondary tracheoesophageal puncture utilising unsedated transnasal oesophagoscopy in an office setting.

Method: Retrospective review of all total laryngectomy patients undergoing in-office transnasal oesophagoscopy-assisted tracheoesophageal puncture between October 1 2004 and December 31 2006.

Results: Eleven patients undergoing transnasal oesophagoscopy-guided tracheoesophageal puncture were identified. Successful tracheoesophageal puncture placement was achieved in 10 of 11 patients (91 per cent). In one patient tracheoesophageal puncture could not be performed due to anatomic constraints. One patient had bleeding from the puncture site requiring silver nitrate cautery. All patients tolerated the procedure well. Voice results were satisfactory in all cases.

Conclusions: Transnasal oesophagoscopy-guided tracheoesophageal puncture provides a simple, safe option for secondary voice rehabilitation in laryngectomy patients.

Key words: Larynx Neoplasms; Laryngectomy; Voice; Oesophagus; Endoscopy; Tracheoesophageal Puncture

Introduction

Tracheoesophageal puncture is recognised as an effective and reliable method for voice restoration following total laryngectomy. Initially described by Singer and Blom[1] as a secondary procedure following laryngectomy, tracheoesophageal puncture may also be performed primarily at the time of laryngectomy. While there is evidence for more successful voice restoration with primary tracheoesophageal puncture,[2–4] secondary tracheoesophageal puncture is still indicated in patients who fail alternative voicing techniques, whose prosthesis becomes dislodged and cannot be replaced, or who undergo extensive surgery with free flap or gastric pull-up reconstruction.

In recent years, transnasal oesophagoscopy has become more prevalent in many otolaryngology practices. Utilising only topical anaesthetic, the entire upper aerodigestive tract can be evaluated in the office setting. The utility of the transnasal oesophagoscope in performing secondary tracheoesophageal puncture was first described by Belafsky *et al.*[5] and later by Bach *et al.*[6] Advantages include the need for only topical and local anaesthetic without systemic sedation and direct visualisation of the oesophageal lumen during the entire procedure. This maximises both safety and accuracy of tracheoesophageal puncture placement. We describe our technique for transnasal oesophagoscopy-guided secondary tracheoesophageal puncture and report our outcomes in 11 patients.

Patients and methods

A retrospective review was performed of all patients undergoing transnasal oesophagoscopy-guided secondary tracheoesophageal puncture at the University of California Davis Medical Center between 1 October 2004 and 31 December 2006. Permission to conduct this investigation was granted by the Institutional Review Board at the University of California, Davis. Eleven patients were identified who had undergone secondary in-office transnasal oesophagoscopy-assisted tracheoesophageal puncture. There were nine men and two women. The mean age was 60.5 years (range 44–86 years). All but one patient had received prior radiation therapy. One patient had a prior tracheoesophageal puncture which had dislodged with closure of the tract. The median interval between laryngectomy and tracheoesophageal puncture was 15 months (range 8–88 months).

Operative procedure

Patients are seated upright in the otolaryngology clinic examination chair. All materials are assembled and prepared (Figure 1). The steps for unsedated transnasal oesophagoscopy-guided tracheoesophageal puncture are as follows.

1 The patient's nasal cavity is anaesthetised with aerosolised 0.05 per cent oxymetazolin and 4 per cent lidocaine in a 1:1 ratio.

From the Department of Otolaryngology-Head and Neck Surgery, University of California at Davis, Sacramento, California, USA.
Presented at the Annual Meeting of the American Academy of Otolaryngology-Head and Neck Surgery, 17–20 September 2006, Toronto, Canada.
Accepted for publication: 15 May 2007.

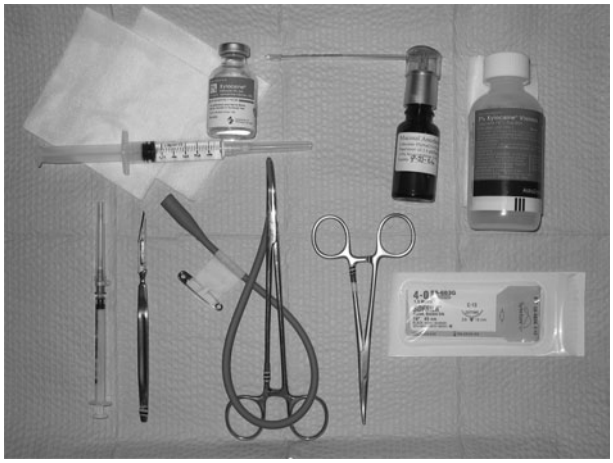

FIG. 1

Materials used for tracheoesophageal puncture (from left to right and top to bottom): 1 per cent lidocaine with epinephrine 1:100 000, topical mucosal anaesthetic, 2 per cent viscous lidocaine, 22-gauge needle, Number 11 blade, 14-French red rubber catheter, curved haemostat, 4-0 silk suture.

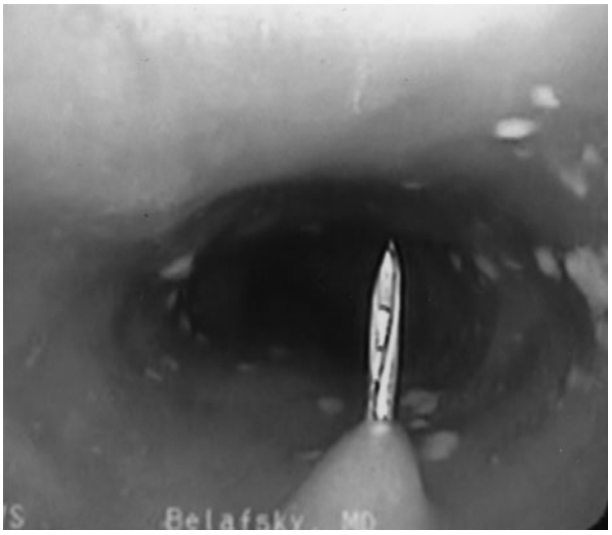

FIG. 2

A 22-gauge needle placed through the posterior tracheal and anterior oesophageal walls.

2 Two tablespoons of orally ingested 2 per cent viscous lidocaine is used to anaesthetise the pharynx and proximal oesophagus.
3 One millilitre of 4 per cent lidocaine is sprayed into the laryngectomy stoma for topical anaesthesia.
4 This is followed by injection of the posterior tracheal wall with 1–2 ml of 1 per cent lidocaine with 1:100 000 epinephrine at the planned site for tracheoesophageal puncture, 5–10 mm inferior to the mucocutaneous junction.
5 After waiting 10 minutes for adequate anaesthesia and vasoconstriction, the oesophagoscope (EE-1580K; Pentax Precision Instrument Corporation, Orangeburg, NJ) is lubricated with 2 per cent viscous lidocaine and inserted into the nasal cavity to the level of the proximal oesophagus.
6 The planned tracheoesophageal puncture site is visualised through the scope by placing the tip of a curved haemostat against the site. The surgeon then passes a 22-gauge needle through the posterior tracheal wall. Correct placement of the tracheoesophageal puncture is verified endoscopically by gentle pressure on the anterior oesophageal wall before entry of the needle into the oesophageal lumen (Figure 2).
7 A number 11 scalpel is used to make a stab incision into the oesophagus along the same tract (Figure 3).
8 A curved haemostat is then inserted and spread within the incision to dilate the tract (Figure 4).
9 A 14-French red rubber catheter is inserted through the tract (Figure 5) and directed into the distal oesophagus with the haemostat under endoscopic visualisation (Figure 6).
10 The red rubber catheter is secured to the skin and patients return to the speech pathologist one week later for sizing and placement of the prosthesis.

Total procedure time, excluding time for local anaesthesia, is less than 10 minutes.

Results

Successful tracheoesophageal puncture placement was achieved in 10/11 patients (91 per cent). One patient required a second procedure for placement due to oedema of the anterior oesophageal wall from infiltration of too much local anaesthetic. The tracheoesophageal puncture was placed successfully at the second attempt. In one patient, tracheoesophageal puncture could not be placed due to anatomic constraints. The patient had both a short neck and an incomplete cricopharyngeal myotomy at the time of laryngectomy. As a result, the planned tracheoesophageal puncture site was within the cricopharyngeus. This prevented adequate insufflation and visualisation of the proximal oesophagus and the procedure was aborted. One patient developed bleeding from the puncture site within 24 hours of the procedure necessitating cautery with silver nitrate. There were no further complications. All patients tolerated the procedure well. All procedures were performed on an out-patient basis in the clinic without any sedation. Patients were fitted with

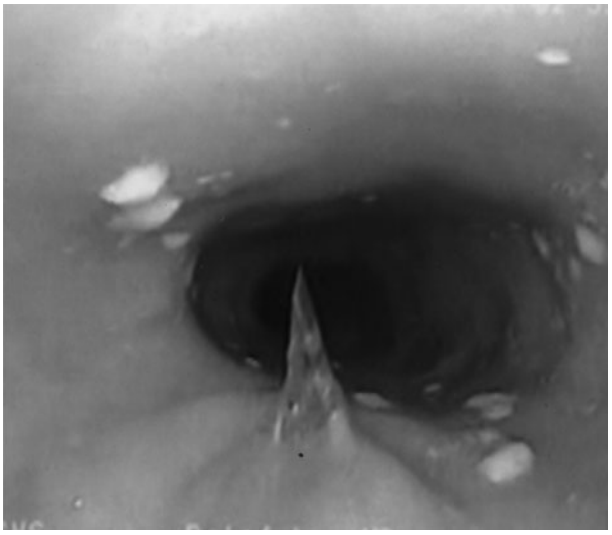

FIG. 3

Number 11 blade incision at tracheoesophageal puncture site. Of note, the patient had a diagnosis of candida oesophagitis treated with fluconazole.

https://doi.org/10.1017/S0022215107000084 Published online by Cambridge University Press

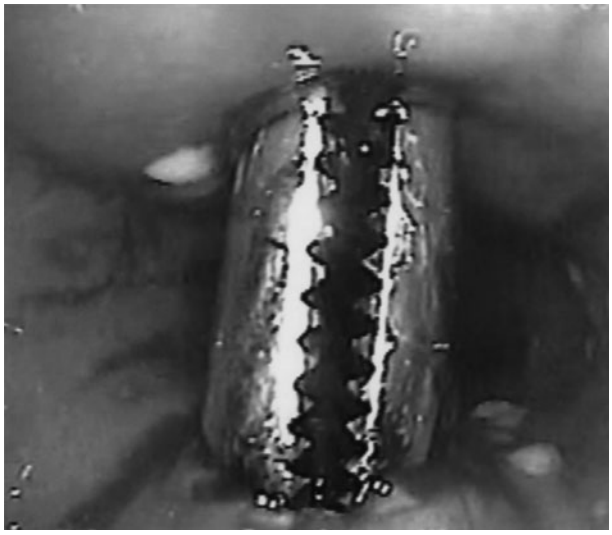

FIG. 4
Dilation of tract with a curved haemostat.

FIG. 6
Red rubber catheter directed into distal oesophagus.

prostheses one to two weeks after tracheoesophageal puncture, and all achieved functional voice results.

Discussion

Options for voice rehabilitation following laryngectomy include oesophageal speech, electrolarynx and tracheoesophageal puncture. Tracheoesophageal puncture is recognised as the preferred method for its superior speech quality. Tracheoesophageal puncture may be performed primarily at the time of surgery, but it is still performed as a secondary procedure by many surgeons. Indications for secondary tracheoesophageal puncture include failure of other voicing techniques, closure of a primary tracheoesophageal puncture fistula and extensive primary surgery with complex reconstruction. Previous radiation therapy is a relative contraindication to primary tracheoesophageal puncture placement. There is also a large cohort of patients who have undergone previous laryngectomy without primary tracheoesophageal puncture placement.

FIG. 5
Placement of 14-French red rubber catheter through puncture site.

Several techniques for secondary tracheoesophageal puncture have been described. Initial descriptions utilised rigid oesophagoscopes under general anaesthesia.[7,8] This incurs the morbidity of a second general anaesthetic as well as the risks and challenges of rigid oesophagoscopy in previously operated and irradiated patients. More recent techniques have utilised transoral flexible gastroscopes to provide insufflation of the proximal oesophagus and visualisation of the puncture site.[9–12] All involve serial dilation of the puncture site via a Seldinger technique under general anaesthesia or intravenous sedation.

Desyatnikova and Eerenstein have each described series in which secondary tracheoesophageal puncture was performed under local anaesthesia in an office setting.[13,14] While both series employed flexible laryngoscopes, neither provided direct visualisation of the oesophageal lumen during the puncture when risk to the posterior oesophageal wall is greatest. In addition, full evaluation of the upper aerodigestive tract for recurrence or second primary tumour is not possible with these techniques.

Our technique utilises transnasal oesophagoscopy to facilitate safe and accurate placement of the puncture. Advantages of this technique include the ability to visualise the oesophageal lumen throughout the procedure for accurate tracheoesophageal puncture placement, the ability to simultaneously screen the upper aerodigestive tract for recurrence or second primary tumours and the ability to perform the procedure in a clinic setting under local anaesthesia.

This series verifies the safety and efficacy of transnasal oesophagoscopy-assisted secondary tracheoesophageal puncture. One case of post-procedure haemorrhage was easily controlled with silver nitrate cautery. The single patient requiring a second procedure for placement emphasises the need for judicious use of injected lidocaine, which can distort the party wall between the trachea and oesophagus. Aggressive topical anaesthesia minimises the need for local injection. While the procedure does require both an endoscopist and a surgeon, no other specialised instrumentation is required. Transnasal oesophagoscopy-guided tracheoesophageal puncture provides a simple and effective option for secondary voice rehabilitation in laryngectomy patients. The procedure is

https://doi.org/10.1017/S0022215107000084 Published online by Cambridge University Press

well-tolerated, safe, and easily performed in an office setting.

Conclusions

Transnasal oesophagoscopy-guided tracheoesophageal puncture provides a simple, safe option for secondary voice rehabilitation in laryngectomy patients.

References

1 Singer MI, Blom ED. An endoscopic technique for restoration of voice after laryngectomy. *Ann Otol Rhinol Laryngol* 1980;**89**:529–33
2 Cheng E, Ho M, Ganz C, Shaha A, Boyle JO, Singh B *et al*. Outcomes of primary and secondary tracheoesophageal puncture: a 16-year retrospective analysis. *Ear Nose Throat J* 2006;**85**:262:264–7
3 Chone CT, Gripp FM, Spina AL, Crespo AN. Primary versus secondary tracheoesophageal puncture for speech rehabilitation in total laryngectomy: long-term results with indwelling voice prosthesis. *Otolaryngol Head Neck Surg* 2005;**133**:89–93
4 Kao WW, Mohr RM, Kimmel CA, Getch C, Silverman C. The outcome and techniques of primary and secondary tracheoesophageal puncture. *Arch Otolaryngol Head Neck Surg* 1994;**120**:301–7
5 Belafsky PC, Potsma GN, Koufman JA. Replacement of a failed tracheoesophageal puncture prosthesis under direct vision. *Ear Nose Throat J* 2001;**80**:862
6 Bach KK, Postma GN, Koufman JA. In-office tracheoesophageal puncture using transnasal esophagoscopy. *Laryngoscope* 2003;**113**:173–6
7 Singer MI, Blom ED, Hamaker RC. Voice rehabilitation after total laryngectomy. *J Otolaryngol* 1983;**12**:329–34
8 Eliachar I, Wood BG, Lavertu P, Tucker HM. Improved endoscopic technique for establishment of tracheo-esophageal puncture. *Otolaryngol Head Neck Surg* 1994;**110**:242–5
9 Barkin JS, Hartford JD, Mikalov A, Flescher LM. Creation of tracheo-esophageal fistula for voice restoration using the flexible fiberoptic endoscope. *Gastrointest Endosc* 1991;**37**:469–70
10 Hong GS, John AB, Theobald D, Soo KC. Flexible endoscopic tracheo-oesophageal puncture under local anaesthetic. *J Laryngol Otol* 1995;**109**:1077–9
11 Singh V, Brockbank MJ, Flower N, Frost RA. Tracheoesophageal puncture using a flexible gastroscope and a percutaneous endoscopic gastrostomy set. *J Laryngol Otol* 1997;**111**:447–8
12 Koch WM. A failsafe technique for endoscopic tracheoesophageal puncture. *Laryngoscope* 2001;**111**:1663–5
13 Desyatnikova S, Caro JJ, Andersen PE, Cohen JI, Wax MK. Tracheoesophageal puncture in the office setting with local anesthesia. *Ann Otol Rhinol Laryngol* 2001;**110**:613–16
14 Eerenstein SEJ, Schouwenburg PF. Secondary tracheoesophageal puncture with local anesthesia. *Laryngoscope* 2002;**112**:634–7

Address for correspondence:
Peter C. Belafsky,
2521 Stockton Blvd. No. 7200,
Sacramento, CA 95817,
USA.

Fax: 1 916 456 7509
E-mail: peterb@ucdvoice.org

Dr P C Belafsky takes responsibility for the integrity of the content of the paper.
Competing interests: None declared