

## Safe and simple method for secondary tracheoesophageal puncture using curved forceps

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### Abstract

**Introduction:** Secondary tracheoesophageal puncture is sometimes difficult and has a higher complication rate. In the irradiated neck, where neck extension is difficult, the traditional tracheoesophageal puncture method of insertion with a rigid endoscope is not possible. We describe a simple, safe and effective alternative method of tracheoesophageal puncture using curved forceps (Kocher's curved intestinal clamp forceps or Mixer forceps).

**Surgical technique:** The procedure is performed under local or general anaesthesia with equal ease. Maximum neck extension is achieved. The curved intestinal forceps are passed through the mouth into the oesophageal lumen. The instrument tip can easily be seen or felt at the posterior wall of the tracheostoma. A small incision is made in the mucosa to allow the forceps tip to emerge, and a guide wire is passed through this incision out of the mouth. The prosthesis can be guided over the guide wire, in retrograde fashion, to fit the puncture hole.

**Results:** Secondary tracheoesophageal puncture was performed in five cases with severe neck fibrosis. In all cases, valve insertion was easily achieved after secondary tracheoesophageal puncture, without any peri-operative complications.

**Conclusion:** This is a safe, simple and effective method for secondary tracheoesophageal puncture. It can be performed easily in any setting and is not associated with any complications.

**Key words:** Laryngectomy; Alaryngeal Speech; Trachea; Oesophagus

### Introduction

Tracheoesophageal puncture with siting of a voice prosthesis has become the preferred method of post-laryngectomy voice rehabilitation.<sup>1,2</sup> Although a primary tracheoesophageal puncture can be created, many centres prefer to perform the procedure at a second stage, for various reasons.<sup>3-5</sup> However, performing a secondary tracheoesophageal puncture is not always easy and has a higher complication rate. Prior irradiation or chemoradiation may cause significant fibrosis of the neck, preventing neck extension. In such situations, the conventional, rigid endoscope technique becomes almost impossible.

We describe a simple alternative method for performing secondary tracheoesophageal puncture, using curved intestinal clamps (Kocher's curved intestinal clamp forceps) or right-angled forceps (Mixer forceps).

### Surgical technique

In our institute, all patients who have undergone laryngectomy without voice prosthesis siting are offered secondary tracheoesophageal puncture along with voice prosthesis insertion. The procedure is performed under local anaesthesia in an out-patient setting, or under general anaesthesia in select cases.

Either curved intestinal clamps or right-angled forceps are used. Kocher's curved intestinal clamp forceps are long, slender forceps with very long flanges and two gentle reciprocating curves that perfectly match the curve

of the oral and oropharyngeal cavity (Figure 1). Mixer forceps are long, slender, right-angled forceps with straight flanges that turn at a right angle near the tip (Figure 1). In a patient whose neck can be extended, right-angled forceps can be used effectively (Figure 2a), whereas in patients whose neck cannot be extended, curved intestinal clamp forceps are more convenient (Figure 2b).

The patient is placed supine and maximum neck extension is achieved. The procedure can be performed under general anaesthesia or local anaesthesia with equal ease. Where used, general anaesthesia is induced and maintained by a small (number five or six) tracheostomy tube. Alternatively, local anaesthetic is sprayed in the oropharynx and also infiltrated into the proposed tracheoesophageal puncture site.

The mouth is opened fully and the tongue retracted anteriorly out of the mouth. The curved intestinal clamp is passed gently from the mouth into the oesophagus until it reaches the posterior wall of the tracheostoma (Figure 2a). A large bulge is produced in the posterior wall of the trachea, which can be easily seen and felt. The puncture site remains the same as described in the standard technique, i.e. 5 to 8 mm below the mucocutaneous junction on the posterior wall of the tracheostoma. A small stab incision is made on the posterior wall, keeping the bulge as a guide. This delivers the tip of the instrument (Figure 2c and Figure 3). There is no risk of injuring the posterior oesophageal wall with this method, and the puncture is made easily with a single

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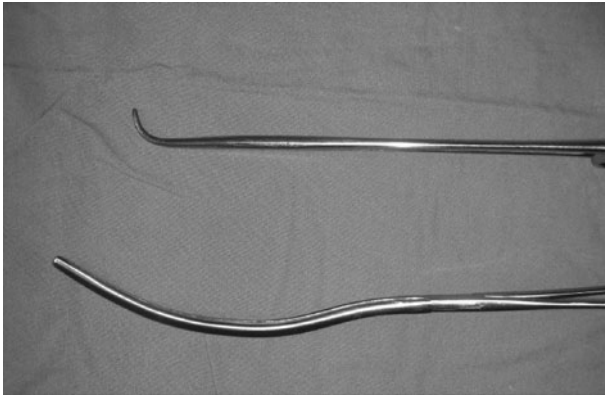


FIG. 1

Kocher's curved intestinal clamp forceps (below) and Mixer right-angled forceps (above).

stab. Guide wire (or silk thread) is locked between the tip of the two forceps flanges and is carried in a retrograde fashion out of the mouth (Figure 2d and Figure 4). The prosthesis is fixed to this guide wire and then pulled through the puncture into the tracheostoma (Figure 2d and 2e and Figures 5 and 6).

In patients with pharyngeal stenosis due to irradiation, dilatation is performed first and then tracheoesophageal puncture. In these cases, a Ryle's tube is first passed through the tracheoesophageal puncture. A track is allowed to form, and after 10 days the prosthesis is inserted in an anterograde manner, either with a Provox<sup>®</sup>2 Single-use insertion tube (ATOS MEDICAL AB, Hörby,



FIG. 3

Intra-operative view showing forceps tip emerging from the posterior wall of the tracheostoma.

Sweden), or a Blom–Singer gel cap<sup>®</sup> insertion system (INHEALTH<sup>®</sup>, Carpinteria, United States of America). This obviates the need to pass the guide wire and pull the prosthesis through the stenotic pharyngeal segment.

### Results

We performed secondary tracheoesophageal puncture, using the above technique, in five cases. Three of these were referred from elsewhere following laryngectomy and adjuvant radiotherapy. The other two cases had undergone total laryngectomy and partial pharyngectomy

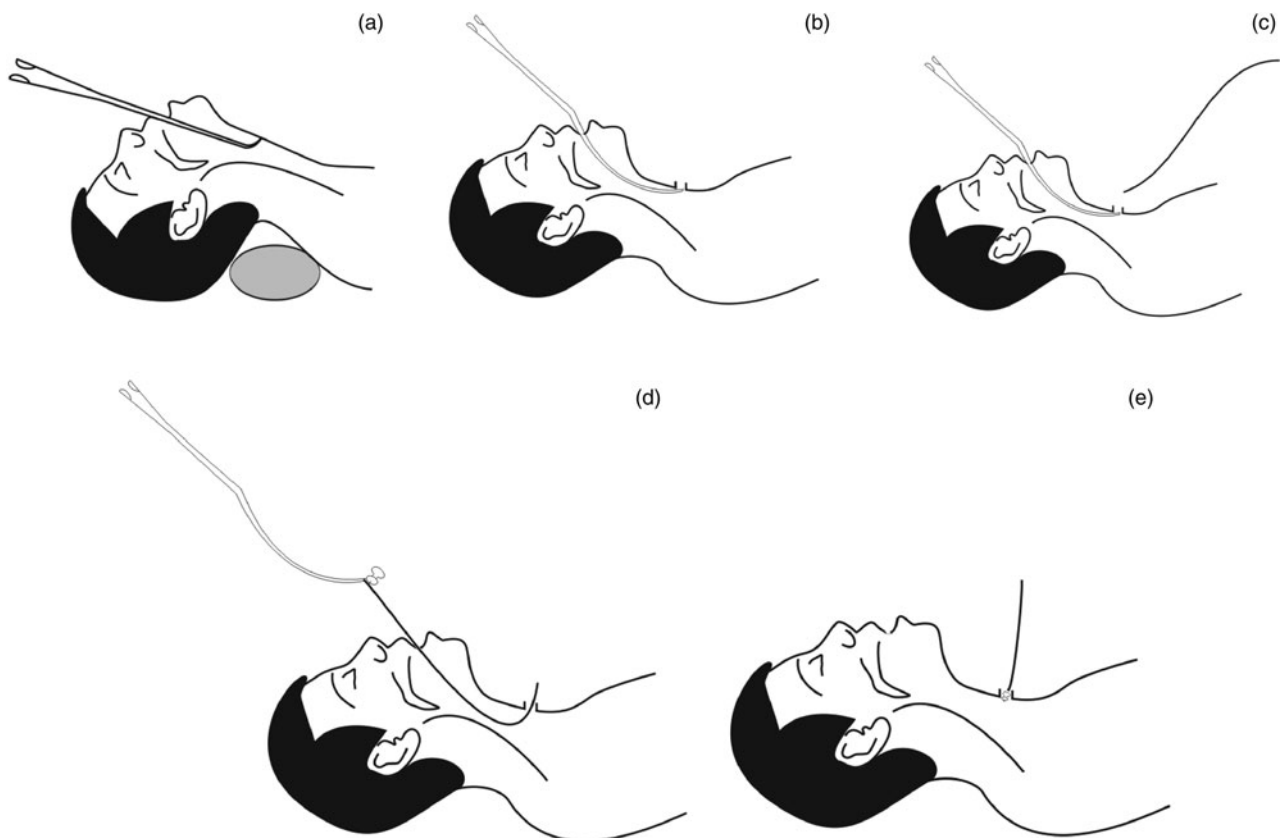


FIG. 2

Diagram of secondary tracheoesophageal puncture technique.



FIG. 4

Intra-operative view showing guide wire held between forceps flanges and pulled through mouth.

with patch pectoralis major muscle flap and adjuvant chemoradiotherapy. None of the patients had a speech valve. All patients had significant neck fibrosis, with only minimal neck extension possible, and conventional tracheoesophageal puncture with a rigid endoscope was not possible.

Tracheoesophageal puncture, using the above method, was successful in all five cases, without any complications. The procedure was performed under local anaesthesia in four cases and general anaesthesia in one case (in which simultaneous pharyngeal dilatation was planned). After tracheoesophageal puncture, valve insertion was easily achieved, and no patient developed post-operative peritracheoesophageal puncture leak. All patients underwent speech rehabilitation, resulting in intelligible speech.

### Discussion

Tracheoesophageal puncture and the use of a voice prosthesis (such as the Provox or Blom–Singer) has become widely popular for post-laryngectomy voice rehabilitation.<sup>1,2</sup> Primary tracheoesophageal puncture is performed at the same time as laryngectomy. It is easy to perform, has very few complications and enables immediate voice rehabilitation, and it has become standard care for patients undergoing laryngectomy. However, some centres still prefer to perform



FIG. 5

Intra-operative view showing guide wire pulled out through the mouth in a retrograde fashion, with the prosthesis attached.



FIG. 6

Intra-operative view showing the prosthesis being pulled with the guide wire through the puncture site.

tracheoesophageal puncture as a second stage procedure.<sup>3–5</sup> We prefer to perform secondary tracheoesophageal puncture in cases in which total laryngopharyngectomy has been performed with free jejunal or free Anterolateral thigh flap (ALT), gastric pull-up, or patch pectoralis major flap. Post-laryngectomy patients referred from elsewhere who do not have a voice prosthesis are also offered secondary tracheoesophageal puncture.

Conventional secondary tracheoesophageal puncture technique involves the use of a rigid oesophagoscope and a trocar-cannula, and may not be possible in all cases. Radiation causes significant fibrosis of the neck in some patients which can restrict neck extension, making use of a rigid endoscope very difficult.<sup>6–8</sup>

Few alternative techniques for secondary tracheoesophageal puncture have been described. Most use a flexible endoscope together with various instruments such as a trocar-cannula, dilators, forceps, laser, percutaneous endoscopic gastrostomy set, endotracheal tube and suction cannula.<sup>7–15</sup> Such techniques are relatively simple and effective but can have their own problems. In cases with pharyngeal stenosis, it is sometimes difficult to visualise the inner oesophageal wall with a flexible endoscope and to protect the posterior wall from injury. It is also difficult to pass the prosthesis through the stenotic segment.

The method described here is simple, safe and effective. The instruments used are easily available and can be used in any setting. The procedure can be performed in an out-patient setting under local anaesthesia, minimising inconvenience to the patient. The procedure does not require any endoscopic guidance; despite this, there is no risk of injuring the posterior oesophageal wall or creating a false passage. The curved intestinal clamp used has two gentle reciprocating

curves which match the curve of the pharynx. It is very easy to insert, even in a flexed neck. Its tip bulges out beneath the posterior wall of the tracheostoma and can be easily seen and felt. The incision is made over the tip of the instrument, so there is no risk of damaging the posterior oesophageal wall. Right-angled forceps are equally easy to use in patients in whom the neck can be extended. In cases of severe stenosis, oesophageal dilatation is performed first and then tracheoesophageal puncture. Both instruments are long and slender and easily pass through the stenotic segment. In this way, antero-grad insertion of the valve is possible, avoiding dragging the voice prosthesis through the narrow, stenotic segment.

### Conclusion

We describe a simple, safe alternative technique for secondary tracheoesophageal puncture. The technique is quick, easy to perform in any setting (including under local anaesthesia) and gives good results.

### References

- 1 Brown DH, Hilgers FJ, Irish JC, Balm AJ. Postlaryngectomy voice rehabilitation: state of the art at the millennium. *World J Surg* 2003;**27**:824–31
- 2 Stafford FW. Current indications and complications of tracheoesophageal puncture for voice restoration. *Curr Opin Otolaryngol Head Neck Surg* 2003;**11**:89–95
- 3 Lau WF, Wei WI, Ho CM, Lam KH. Immediate tracheoesophageal puncture for voice restoration in laryngopharyngeal resection. *Am J Surg* 1988;**156**:269–72
- 4 Ruth H, Davis WE, Renner G. Deep neck abscess after tracheo-oesophageal puncture and insertion of a voice button prosthesis. *Otolaryngol Head Neck Surg* 1985;**93**:809–11
- 5 Andrews JC, Mickel RA, Hanson DG, Monahan GP, Ward PH. Major complications following tracheoesophageal puncture for voice rehabilitation. *Laryngoscope* 1987;**97**:562–7
- 6 Spiro JD, Spiro RH. Retropharyngeal abscess and carotid hemorrhage following tracheoesophageal puncture and voice prosthesis insertion: a case report. *Otolaryngol Head Neck Surg* 1990;**102**:762–3
- 7 Ng RW, Lam P, Wong BY. Insertion of Provox®2 voice prosthesis using the antero-grad technique immediately after secondary tracheoesophageal puncture. *J Laryngol Otol* 2005;**119**:988–90
- 8 Görür K, Ozcan C, Unal M, Ozkul MD. A new and simple modification of the prosthetic voice restoration technique. *J Laryngol Otol* 2003;**117**:365–7
- 9 Maniglia AJ. Vocal rehabilitation after total laryngectomy: a flexible fiberoptic endoscopic technique for tracheoesophageal fistula. *Laryngoscope* 1982;**92**:1437–9
- 10 Mazzara CA, Baredes S. Technique of tracheoesophageal puncture using flexible fiberoptic esophagoscopy. *Laryngoscope* 1993;**103**:928–9
- 11 Bach KK, Postma GN, Koufman JA. In-office tracheoesophageal puncture using transnasal esophagoscopy. *Laryngoscope* 2003;**113**:173–6
- 12 Shaw GY, Searl JP. Secondary tracheoesophageal puncture using a KTP laser. *Laryngoscope* 2000;**100**:1574–7
- 13 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
- 14 Rhys Evens PH. Tracheo-oesophageal puncture without tears: the forceps technique. *J Laryngol Otol* 1991;**105**:748–9
- 15 Padhya TA, Athavale SM, Morgan JM, McCaffrey TV. An alternative approach for secondary tracheoesophageal puncture in the difficult laryngectomy neck. *Laryngoscope* 2008;**118**:266–9

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