Closure of Tracheoesophageal Fistula: The Reconstructive Ladder

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Abstract

Purpose: A voice rehabilitation option after laryngectomy is tracheoesophageal fistula (TEF) for a prosthesis. TEF closure may be indicated if there are complications. Surgical closure can be challenging. We present a straightforward technique for TEF closure.

Methods: 86-year-old man status post laryngectomy had a successful closure of a TEF with a two-layer tracheoplasty and esophagoplasty. PubMed review was also performed.

Results: Moving up the reconstructive ladder, options for TEF closure include: removing prosthesis to heal by secondary intention, local injection of granulocyte-macrophage colony stimulating factor, augmentation filler, cauterization, primary closure, submucosal purse-string suture, multi-layer closure, local muscle rotation flaps, pedicled pleural flap, and radial forearm free flap.

Conclusions: Multiple surgical techniques have been described for TEF closure, which speaks to its difficulty. Our technique is ideal for small TEFs in non-radiated tissue. Advantages include good exposure, technical simplicity, low morbidity, and avoidance of nasogastric tube.

Case Presentation

- 86 yo man s/p total laryngectomy and partial esophagogastrectomy for esophageal cancer 8 yrs ago.
- Persistent TEP leaking X 3 years.
- Trialed several different brands of voice prosthesis and removed his TEP for extended periods to allow spontaneous closure without success.
- Learned to use an electrolarynx and was satisfied with this mode of communication.
- He had surgical closure of the TEF: A two-layer tracheal-esophagoplasty with tracheal advancement.
- Uncomplicated hospital stay.
- MBS at 1 week showed no leak/stricture and the patient advanced to a regular diet.
- Pre and 1 month post-operative photos are shown (Figures 1A and 1H).

Figure 1: Two layer tracheal-esophagoplasty and tracheal advancement. A) Preoperative photo of the tracheoesophageal fistula. The superior aspect of the stoma (the posterior wall of the trachea) is to the top of the photo, and the inferior aspect of the stoma (the anterior tracheal wall) is to the bottom of the photo. B) A circumferential incision of approximately 230 degrees is made at the superior aspect of the stoma. The dissection separates the posterior tracheal wall from the esophagus or neo-pharynx. C) The tracheoesophageal fistula tract is isolated with a vessel loop. D) The tracheoesophageal fistula tract is transected with a 15 blade. E) The esophageal and tracheal ends of the fistula tract are imbricated. F) To separate the closure of the tracheal and esophageal mucosa, the trachea is advanced externally and an ellipse of trachea is removed. The fresh edge of the cut trachea is sutured to the external skin. G) Postoperative photo of the repair. A Penrose is inserted in the lateral cervical space. H) Diagram of the stoma after it has healed.

Table 1: The Reconstructive Ladder

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<th>Surgical Technique</th>
<th>Case Presentation</th>
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| Removing prosthesis and allow healing by secondary intention | Jacobs et al
| Local injection of granulocyte-macrophage colony stimulating factor | Margolin et al
| Topical application of recombinant platelet-derived growth factor-BB (bepacelmin) | Jakubowics et al
| Cauterization of the fistula with silver nitrate or electrocautery | Brasnu et al, Wetmore et al
| Local injection of an augmentation filler | Laccourreye et al, Remacle et al, Rokade et al, Lorincq et al
| Submucosal purse-string suture | Jacobs et al
| Primary Closure – Transtracheostomal approach | Moerman et al
| Primary Closure – Transcervical approach | Hosal and Myers
| An inverting suture of the esophagus with a cranial transposition of the trachea | Koch et al
| Two layer tracheal-esophagoplasty and tracheal advancement | Hu et al*
| Interposition of local muscle rotation flaps | Singer et al, Remmert et al
| Pedicled mediastinal pleural flap | Altorjay et al
| Free flap (Fasciocutaneous radial forearm free flap) | Delaere et al

* Presented technique

References