

**Case
Report**

Post-Intubation Tracheoesophageal Fistula: Surgical Management by Complete Cervical Tracheal Transection

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We report successful surgical management of post-intubation tracheoesophageal fistula (TEF) in an adult patient requiring long-term mechanical ventilation. A complete tracheal transection without tracheal resection, via an anterior cervical approach, followed by direct closure of tracheal and esophageal defect, and interposition of muscle flap between the suture lines and tracheal reconstruction was performed. In selected cases, this surgical procedure may be a viable alternative to traditional techniques used to treat post-intubation TEF via the anterior or lateral cervical approach.

Keywords: tracheoesophageal fistula, surgery, alternative technique

Introduction

Tracheoesophageal fistula (TEF) is a congenital or acquired abnormal communication, in one or more places, between the posterior wall of the trachea and the adjacent anterior wall of the esophagus. In patients undergoing prolonged mechanical ventilation, the most common cause of acquired post-intubation TEF is the chronic cuff pressure on the posterior membranous tracheal wall against the rigid nasogastric tube that leads to

ischemic necrosis.¹⁾ In these patients, the most common site of TEF is the cervicothoracic junction, and small fistulas without tracheal stenosis or circumferential injury usually are managed by surgical direct closure via the lateral cervical approach with dissection of the trachea off the esophagus in the region of the fistula or the anterior cervical approach with anterior transverse tracheotomy at the level of the fistula.¹⁻⁴⁾ Here we report a case of complete tracheal transection without tracheal resection, via an anterior cervical approach, followed by direct closure of the tracheal and esophageal defect: in selected cases, this surgical procedure may be a viable alternative to traditional techniques used to treat post-intubation TEF.

Case Report

A 44-year-old female with a chronic lower cervical spinal cord injury from car accident, developing respiratory insufficiency due to impairment of tracheobronchial secretion clearance and bilateral pneumonia, was hospitalized and underwent tracheostomy for prolonged mechanical ventilation. On the 30th post-tracheostomy day, progressive abdominal bloating with ongoing ventilation raised the suspicion of TEF and a 6-mm fistula tract at the posterior wall of trachea, 2 cm distal from the stoma, was confirmed by bronchoscopy. In consideration

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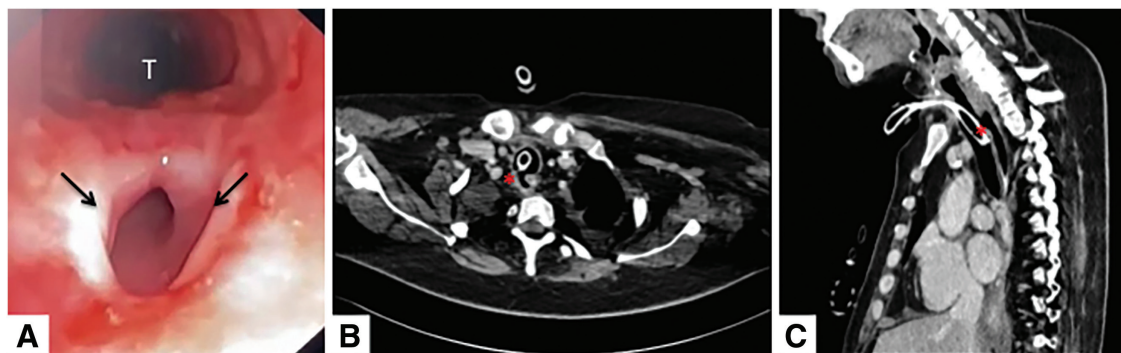


Fig. 1 (A) Endoscopic visualization of the TEF (black arrows) from the trachea using flexible bronchoscopy. (B and C) Axial and sagittal chest computed tomography scans showing the TEF (red asterisk) at the level of the thoracic inlet. TEF: tracheoesophageal fistula; T: trachea

of the uncomplicated ventilation, site of the fistula in the cranial half of the trachea, absence of circumferential tracheal injury, and radiological signs of mediastinum involvement, a conservative treatment was initially provided due the underlying health conditions. It included endotracheal intubation with the cuff, slightly inflated, positioned under endoscopic control distally to the lesion; regular bronchoscopic aspirations; appropriate antibiotic and mucolytic therapy; removal of nasogastric tube; gastrostomy to control reflux of gastric contents; and jejunostomy to provide access for nutrition. Progression of emphysema during ventilation and increase in the size of the fistula, exceeding 1 cm in length, revealed by bronchoscopy and computed tomography scan examination, required a surgical management of the TEF (**Figs. 1A–1C**). A curved, collar incision, centered upon the tracheostomy scar, was made. After mobilization of the sternocleidomastoid muscles and strap muscles laterally from the suprasternal notch, the trachea was identified in the midline and mobilized along its anterior aspect. Due to adhesions in the tracheoesophageal groove, we performed, at the level of the stoma, a complete tracheal transection without tracheal resection, via an anterior cervical approach: the retraction of the distal tracheal stump then allowed the individuation and division of the fistula tract (**Fig. 2A**). A double-layer simple interrupted closure and a single-layer simple interrupted closure, using sutures of polydioxanone 4/0 (PDS; Ethicon, Somerville, NJ, USA), were performed to repair respectively the esophageal and the tracheal defects (**Fig. 2B**). Finally, after interposition of a sternocleidomastoid muscle flap between the suture lines, the trachea was reconstructed: once the posterior wall anastomosis was completed with a continuous suture of PDS 4/0, the lateral wall of the trachea was anastomosed with single

interrupted sutures of polyglactin 3/0 (Vicryl; Ethicon); then the anterolateral aspects of the tracheal stumps were sutured to the skin to form a new tracheostomy, and the cervical incision was closed. The postoperative course was uneventful. On the seventh postoperative day, esophagography confirmed the absence of esophageal leak and the oral feeding was resumed. The bronchoscopy performed 20 days after surgery showed no evidence of the previous TEF. The patient was discharged on the 30th postoperative day with a permanent airway T-tube.

Discussion and Conclusion

A post-intubation TEF most commonly occurs in the proximal or mid third of the trachea and is usually approached with a cervical approach. Most authors recommend, in case of large fistula associated with extensive circumferential tracheal damage or tracheal stenosis, a segmental tracheal resection and anastomosis with primary esophageal closure.^{2,5} In patients with a small fistula and a normal trachea, direct closure of the tracheal and esophageal defects, through a lateral or anterior cervical approach, has been proposed as a viable option.^{2,4,6,7} The lateral cervical approach, through the separation of the trachea and esophagus via a lateral cervicotomy, allows identification and division of fistula followed by direct suture of the esophageal and tracheal defects. Some authors have, however, highlighted some disadvantages of this approach such as risk of recurrent laryngeal nerve injury, increased chances of tissue devascularization from mobilization, and limited exposure, especially inferiorly.^{2,8,9} An anterior cervical approach has been alternatively proposed to overcome these limits, performing an anterior transverse tracheotomy at the level of the TEF, without tracheal resection, in patients with

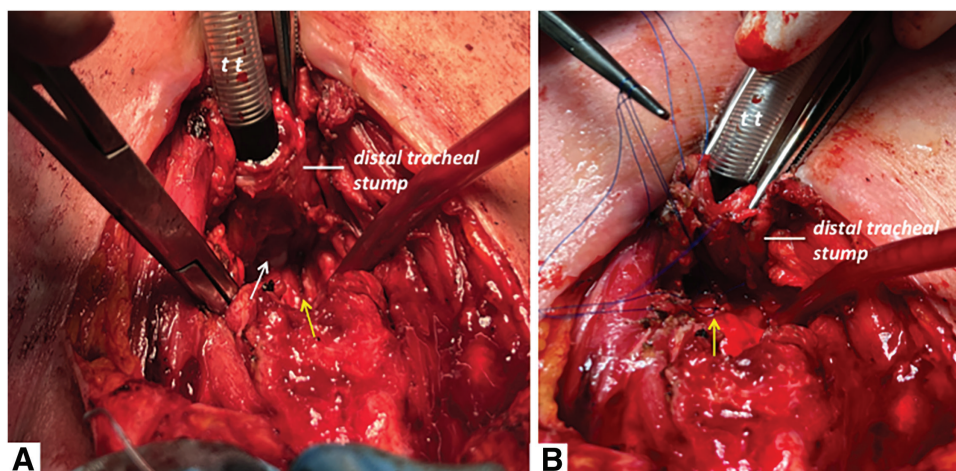


Fig. 2 Intraoperative view of the TEF. (A) The retracted distal tracheal stump allows the identification of the esophageal (yellow arrow) and tracheal (white arrow) defects. (B) Closure of the esophageal defect with interrupted sutures (yellow arrow). TEF: tracheoesophageal fistula; tt: tracheal tube

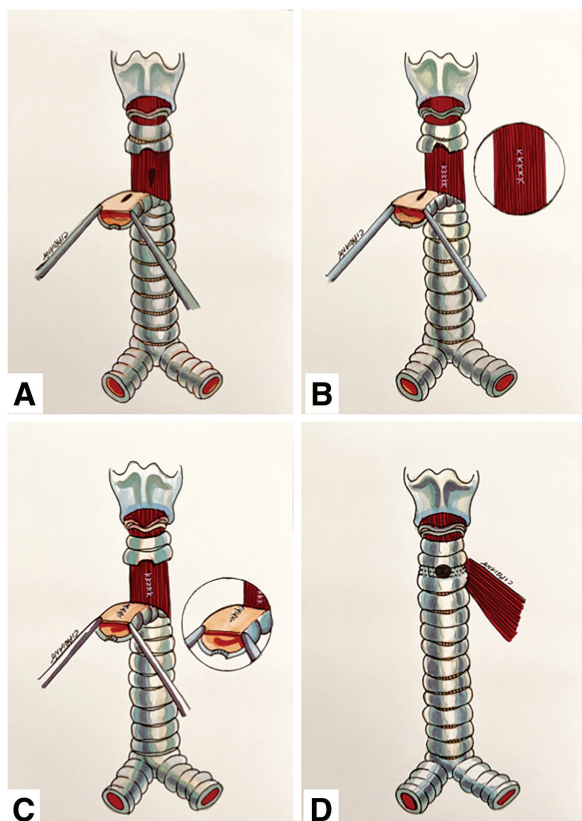


Fig. 3 Surgical procedure drawing. (A) Retraction of the distal tracheal stump after complete tracheal transection. (B and C) Direct closure of the esophageal and tracheal defects. (D) Tracheal reconstruction after mobilization of muscle flap.

subcentimetric fistula and no signs of tracheal stenosis.^{1,2,4)} In this instance, after a sharp division of the

fistula tract, the esophageal defect is closed in two layers, a muscle flap is transposed to buttress the esophageal repair, and the posterior membranous wall and the anterior surface of the trachea are repaired with absorbable suture. In our case, it was difficult to separate the posterior tracheal wall from esophagus in lateral dissection, due to adhesions in the tracheo-esophageal groove, and the fistula, without stenosis or circumferential injury, was >1 cm in size. For these reasons, we performed a complete tracheal transection at the level of the stoma, without tracheal resection, via an anterior cervical approach: in this way, through the retraction of the distal tracheal stump, we avoided an extensive dissection and an adequate exposure of both the esophageal and tracheal defects was achieved (Figs. 3A–3D). In patients with post-intubation TEF of size >1 cm, without tracheal stenosis or circumferential damage and associated with marked peritracheal adhesions, a complete tracheal transection without tracheal resection, via an anterior cervical approach, followed by direct closure of the tracheal and esophageal defects, may be a viable alternative to traditional techniques used to treat post-intubation TEF.

Authors' Contributions

Dario Amore contributed to research concept, drafting article, and the approval of the submitted and final versions.

Dino Casazza contributed to drafting article, and the approval of the submitted and final versions.

Umberto Caterino contributed to drafting article, and the approval of the submitted and final versions.

Marco Rispoli contributed to data acquisition and analysis, and the approval of the submitted and final versions.

Emanuele Muto contributed to data acquisition and analysis, and the approval of the submitted and final versions.

Alessandro Saglia contributed to data acquisition and analysis, and the approval of the submitted and final versions.

Carlo Curcio contributed to completing the approval of the submitted and final versions.

Consent

Informed consent was obtained from the patient.

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Disclosure Statement

We have no conflict of interest.

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