

Management of Acquired Benign Tracheoesophageal Fistulae



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KEYWORDS

• Tracheoesophageal • Fistula • Acquired • Benign • Postintubation • Cuff hyperinflation

KEY POINTS

- Intense cough after swallowing in patients leads to suspicion of tracheoesophageal fistula (TEF), which is a rare condition, yet life threatening.
- TEF has numerous causes, but the most common cause arises from complications related to injuries sustained from hyperinflation of endotracheal tubes and tracheostomy tubes cuffs.
- The diagnosis is confirmed by endoscopic procedures (bronchoscopy and esophagoscopy), which should be carried out immediately once TEF is suspected.
- The goal of treatment is a complete repair without recurrence using an effective approach, all of which must be achieved at a single-staged repair.
- Postoperatively, evacuation of the remnants of tracheobronchial soilage bronchoscopically, active chest physiotherapy, and early ambulation are conservative but effective measures that aid quick recovery.

INTRODUCTION

Intense cough after swallowing in patients will make us suspect a tracheoesophageal fistula (TEF). Acquired benign TEF is a rare pathology and a challenging clinical problem. It is a life-threatening condition due to the pulmonary complications from an ongoing tracheobronchial contamination and interference with nutrition. There are numerous variable causes shown to play significant roles in such a complication. Tracheal intubation with cuff-related injuries is the most common cause of nonmalignant TEF.¹ A patent connection from the airway to the upper gastrointestinal tract bypasses the normal protection provided by intact laryngeal reflexes and, hence, presents with significant difficulties to both the surgeon and the anesthetist alike. The proximity of the esophagus, trachea, upper mediastinal structures, and great blood vessels can further complicate anesthesia and surgical interventions.²

Several management options, including single- or multiple-staged management, have been offered. This management depends on the presence or absence of other associated pathologies, yet the optimal treatment still remains controversial. Surgical intervention seems to be the only viable option for repair, as spontaneous healing is not expected even in very small fistulae.³ Most TEFs in patients presenting for surgical repair are usually from iatrogenic causes, typically, as mentioned earlier, resulting from tracheal postintubation injury. Accordingly, operative treatment requires skillful airway reconstructive techniques to close the fistula and restore a functional airway and upper digestive tract.

CAUSE

The last 4 decades have witnessed a gradual shift in the cause of acquired benign TEF from infection,

Disclosure Statement: The author has nothing to disclose.

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Thorac Surg Clin 28 (2018) 385–392

<https://doi.org/10.1016/j.thorsurg.2018.05.004>

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which was widely recognized initially as the predominant cause, to iatrogenic and inflammatory causes.⁴⁻⁶ Presently, about 50% of acquired TEFs are benign.⁵ The cervicothoracic junction is the most common location of the acquired TEF. Benign causes of acquired TEF are as listed in **Box 1**.

Iatrogenic Causes

Tube-related causes

Of the acquired benign TEFs reported in the literature, more than 75% resulted from endotracheal cuff-related trauma in patients on prolonged mechanical ventilation.² The increased use of cuffed tubes for ventilation was associated with a corresponding increase in postintubation TEFs. The first report of cuff injury was by Flege⁷ in 1967. The widespread use of the cuffed tube was witnessed after the introduction of intermittent positive pressure ventilation in patients with respiratory failure around the 1950s, even though the first tracheostomy tube with an inflatable cuff had been described by Trendelenburg⁸ about a century earlier.⁹ A postintubation TEF results from overinflation of the ventilatory cuff, usually exerted against a firm nasogastric tube in the esophagus, mostly for the purpose of feeding (**Fig. 1**). Secondary erosion of the tracheal and esophageal walls then occurs with a 0.3% to 3.0% incidence in mechanically ventilated patients.⁶

The posterior wall of the trachea may also be lacerated during introduction of a percutaneous tracheostomy tube. This laceration usually results from poor stabilization of the guidewire and/or guiding catheter during percutaneous tracheostomy.¹⁰ Other reported mechanisms of injury apart

from traumatic intubation include severe airway suctioning and vascular compression of the tracheal wall resulting in ischemia and subsequent ulceration. Associated risk factors noted in patients predisposed to the development of tube-related TEF are excessive motion of the tube, prior infective process, hypotension and its associated tissue ischemia, use of steroids, diabetes, and the presence of a nasogastric tube.¹¹

Prior surgery on the trachea or esophagus

Previous neck surgeries and benign tracheal stenosis can predispose to tracheoesophageal fistula. TEF also occurs in 4% of patients who undergo esophagectomy for various indications, which is typically seen in the proximal and middle-third of the trachea.¹² Most are because of devascularization of the trachea and its resulting ischemia from local surgical dissection. Notable predisposing factors include a transthoracic approach with restricted access, extensive circumferential tracheal dissection, and neoadjuvant chemoradiotherapy to the neck. Anastomotic dehiscence from local inflammation and infection may also lead to acquired TEF.²

Trauma-Related Causes

Most of the traumatic fistulae results from motor vehicular accidents causing crushing chest wall injuries from steering wheel impact.^{5,6} Blood supply is disrupted, and laceration occurs when the trachea and esophagus are compressed between the sternum and the thoracic spine following impact. Presentation in this scenario is usually delayed, taking between 3 days and a week because of the ongoing process of necrosis in the devitalized tissue. A much more acute presentation is seen when the injury is a traumatic rupture of the trachea and the esophagus. This presentation is, however, not as common as the former.⁵ Operative mortality approaches 15% in traumatic TEFs, which is commonly at the carina, a more fixed portion of the airway. Mediastinal contamination from leakages from damaged aerodigestive tracts and the subsequent rapid spread of mediastinal infection also adds to the risk of high mortality.

Granulomatous Infections Within the Mediastinum

In the author's part of the world, contagious granulomatous diseases like tuberculosis (TB) are one of the common causes of benign acquired TEF. It can present in the acute or chronic form. In the acute form, patients are toxic with large inflamed mediastinal lymph nodes causing erosion of the

Box 1

Causes of benign acquired tracheoesophageal fistula

Iatrogenic

- Tracheostomy tube placement
- Esophageal stenting
- Endoscopy (esophagoscopy/bronchoscopy)
- Tracheal intubations

Trauma (blunt/penetrating)

- Previous surgeries on trachea/esophagus
- Granulomatous mediastinal infections
- Ingestion of foreign body
- Ingestion of corrosives
- Infections

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