Tracheal Stenting for Malignant Tracheoesophageal Fistula: A Case Report with review of literature.

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Abstract

Background: Malignant tracheoesophageal fistula (mTEF) is a serious complication of advanced esophageal cancer, often the result of tumor eroding into the airway. Without prompt intervention, aspiration and respiratory compromise can rapidly become life threatening.

Case: We describe a 76 year old male with middle esophageal squamous cell carcinoma, previously treated with chemo-radiotherapy and immunotherapy, followed by semi covered self-expanding metallic stent (SEMS) placement in esophagus for palliation of dysphagia. Due to tumor spread above esophageal SEMS causing dysphagia, stent over stent was placed. Later he developed mTEF, 3 cm above carina of about 1 cm diameter with upper margin of esophageal SEMS just below the fistulous opening. A 6 cm long fully covered tracheal SEMS was deployed via rigid bronchoscopy to seal the defect, accompanied by percutaneous endoscopic gastrostomy (PEG) placement to secure enteral nutrition. His symptoms resolved immediately, and follow-up at two months showed the stent remained well positioned.

Conclusion: For patients with advanced esophageal cancer and mTEF due to tumor invasion, rigid bronchoscopy guided fully covered tracheal stenting offers rapid airway protection and effective palliation, especially when esophageal stenting is not feasible or it fails.

Keywords: Tracheoesophageal fistula; Invasion; Stents; Bronchoscopy; Percutaneous Endoscopic Gastrostomy;

Introduction

Tracheoesophageal fistulas (TEFs) caused by tumor invasion occur in a subset of patients with advanced esophageal squamous cell carcinoma, with an incidence estimated at 5–15% of cases.[1] In these patients, the posterior membranous tracheal wall becomes vulnerable to direct infiltration due to its lack of cartilaginous support, compounded by prior radiotherapy and ongoing tumor progression. Leading to mTEF formation, patient's condition deteriorates causing coughing during swallowing, recurrent chest infections, and severe weight loss.[2]

The immediate priorities in management are to protect the airway from aspiration, maintain adequate nutrition, and prevent infection. Endoscopic stenting either of the esophagus, airway, or both , remains the primary palliative strategy.[3] Esophageal stenting is often the first choice when the defect is small and sealing is achievable, but airway stenting becomes the preferred option when there is significant airway compromise or when esophageal stenting cannot seal the defect.[4] Dual stenting is used in larger or complex fistulas, with some data suggesting improved symptom control in selected patients.[5]

This report details a case of tumor-induced mTEF successfully managed with rigid bronchoscopy guided covered tracheal stenting and PEG feeding, highlighting both clinical decision making and alignment with current evidence.

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Case Presentation

A 76 year old male with squamous cell carcinoma of middle third of esophagus (25-31 cm from central incisors) clinically stage III, underwent neoadjuvant chemo-radiotherapy as per ChemoRadiotherapy for Oesophageal cancer followed by Surgery Study (CROSS) protocol.[6] After initial treatment on re-evaluation with PET-CT, it revealed disease progression with new right adrenal metastasis. He then continued to receive chemotherapy with immunotherapy with Nivolumab.[7]

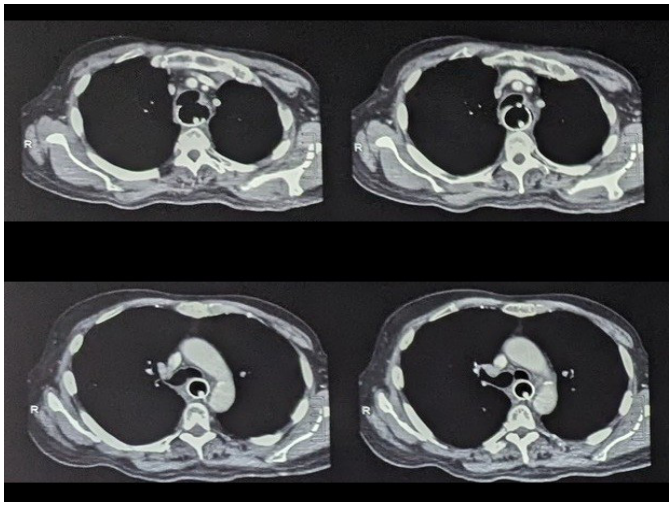
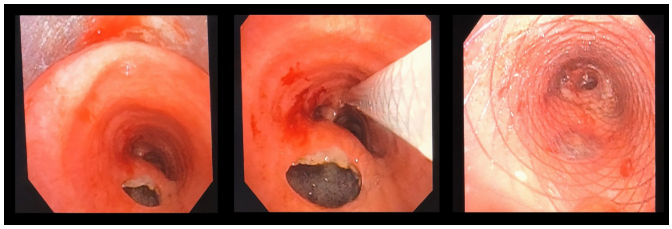


Fig. 1: CECT Chest showing TEF with stent insitu.

Due to progressive dysphagia, semi covered esophageal SEMS was inserted nine months back along with continuation of chemo-immunotherapy. Later five months after esophageal SEMS placement he again developed dysphagia reveling progression of disease above the stent and also invasion of trachea, thus stent over stent was inserted. Despite this, he developed frequent coughing during meals and episodes of aspiration. Three months back he visited our center on arrival, he appeared cachectic with an (ECOG) Eastern Cooperative Oncology Group performance score of 2. Chest auscultation revealed faint crackles bilaterally. Chest CECT (Contrast Enhanced Commuted Tomography) was performed which reveled tracheoesophageal fistula above SEMS. *(Figure 1).*

Patient underwent rigid bronchoscopy with propofol and fentanyl infusion and controlled ventilation. mTEF of about 1cm in diameter at mid third of trachea posterior wall, distal margin 3 cm proximal to the carina was confirmed. The upper margin of esophageal SEMS could be visualized through the fistula. A fully covered tracheal SEMS 6 cm in length and 18 mm in diameter was deployed, fully covering the defect *(Figure 2).* In the same setting, a PEG tube was placed to ensure safe enteral feeding.



a. Tracheoesophageal fistula (TEF) b. Deploying the SEMS (fully covered) c. After deploying SEMS and covering the fistula

Fig. 2: Bronchoscopy images of Tracheal SEMS placement to cover the mTEF

The patient's aspiration symptoms resolved immediately after the procedure. Nutritional intake via PEG was well tolerated, and respiratory function improved. At two-month follow-up, flexible bronchoscopy confirmed the stent remained in position with no migration or overgrowth.

Discussion

mTEF reflects advanced disease with limited treatment options. Key goals are airway protection, control of aspiration, infection prevention, and maintenance of nutrition.[5]The choice between esophageal, airway, and dual stenting should be guided by; fistula location and size, dominant symptomatology (airway compromise vs dysphagia), likelihood of sealing the communication and overall patient condition and prognosis.[2, 7]

Endoscopic stenting strategies include esophageal stenting alone (preferred when feasible for fistula sealing), airway stenting when airway compromise exists , esophageal stent gets closer to cricopharynx, and selected dual stenting for large or complex fistulas as mentioned by Freitag L et al.[4] Mo R et al. compared silicone stent vs fully covered SEMS and found similar safety and efficacy , affording flexibility based on operator preference and anatomical compatibility.[2]

Wang Q et al. suggests improved infection control and reduced pneumonia with stenting versus conservative management, especially when tailored to performance status and fistula size.[3] In practice, esophageal stenting may fail or exacerbate airway compromise, making tracheal stenting the pragmatic

choice, as in this case.

Airway stenting was favored in our patient because the fistula was large, located proximally, airway lumen was at risk and esophageal stenting was already done twice.[9] Recent evidence indicates that airway stenting in mTEF can match esophageal stenting in symptom relief when chosen appropriately, and dual stenting may offer further benefit in certain scenarios.

SEMS can be inserted through the flexible bronchoscope with larger instrument channel or rigid bronchoscope. We opted for rigid bronchoscopy as there was a major respiratory compromise and patient required ventilator support during the procedure.

Novel endoscopic closure techniques , including over-the-scope clips, cardiac septal occluders, and tissue sealants are increasingly reported, but their role in advanced malignant settings remains unclear, particularly when survival is short and rapid palliation is required.[10, 11]

Conclusion

We performed, to our knowledge the first rigid bronchoscopy guided fully covered tracheal stenting in Nepal for mTEF with respiratory compromise and esophageal SEMS kept previously and PEG in same setting which provided prompt palliation to patient. This case emphasizes the importance of individualized stent strategy selection, especially in advanced disease where palliation, airway protection, and nutrition are the primary goals.

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