Management of Tracheo-Esophageal Fistula (TEF)

Siva Raja MD, PhD, FACS

Surgical Director: Center for Esophageal Diseases

Associate Professor of Surgery

Lerner College of Medicine, CWRU Medical School

Cleveland Clinic Foundation

Cleveland, Ohio, USA

Disclosures

- No Relevant Disclosures

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TEF 101

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TEF

- TEF can be congenital or acquired
- Esophageal cancer is the most common malignant etiology for acquired TEF
- Benign TEF are multi-factorial
  - Tracheostomy injury
  - Iatrogenic during esophagectomy
  - Granulomatous disease
  - ETT balloon injury from prolonged intubation
  - Esophageal Stent related injuries

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TEF
Clinical Presentation

- cough (56%)
- aspiration (37%)
- fever (25%)
- Dysphagia (19%)
- pneumonia (5%)
- hemoptysis (5%)
- chest pain (5%)
- Ono’s sign (worsening cough with oral intake)

Ann Thorac Surg 1991; 52: 1222–1228.

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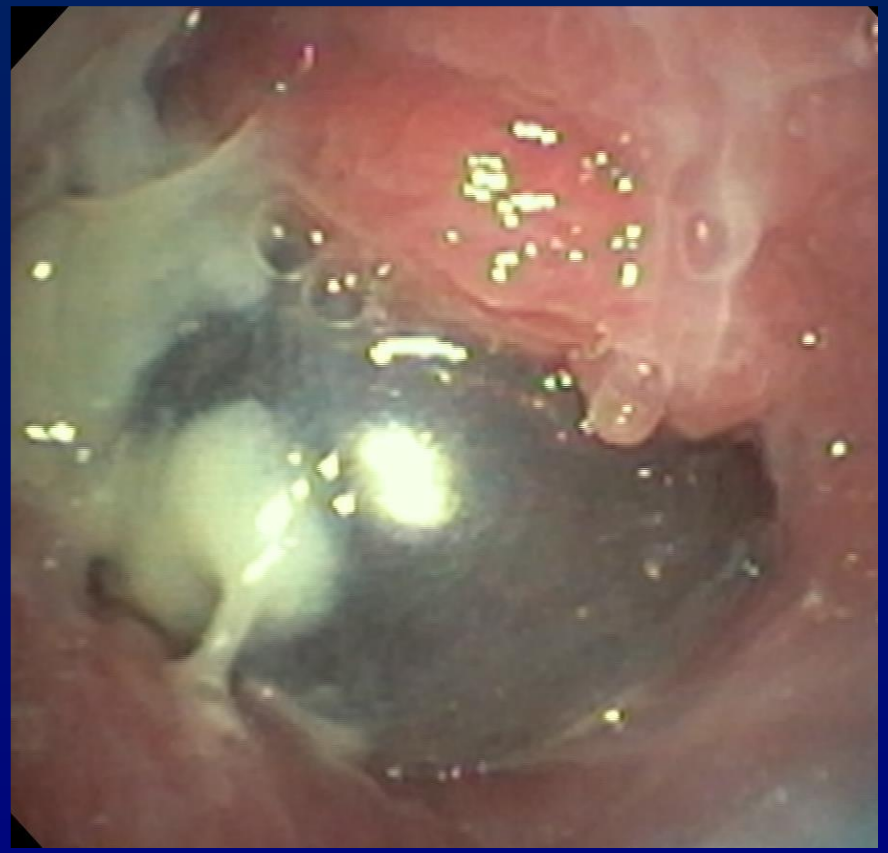
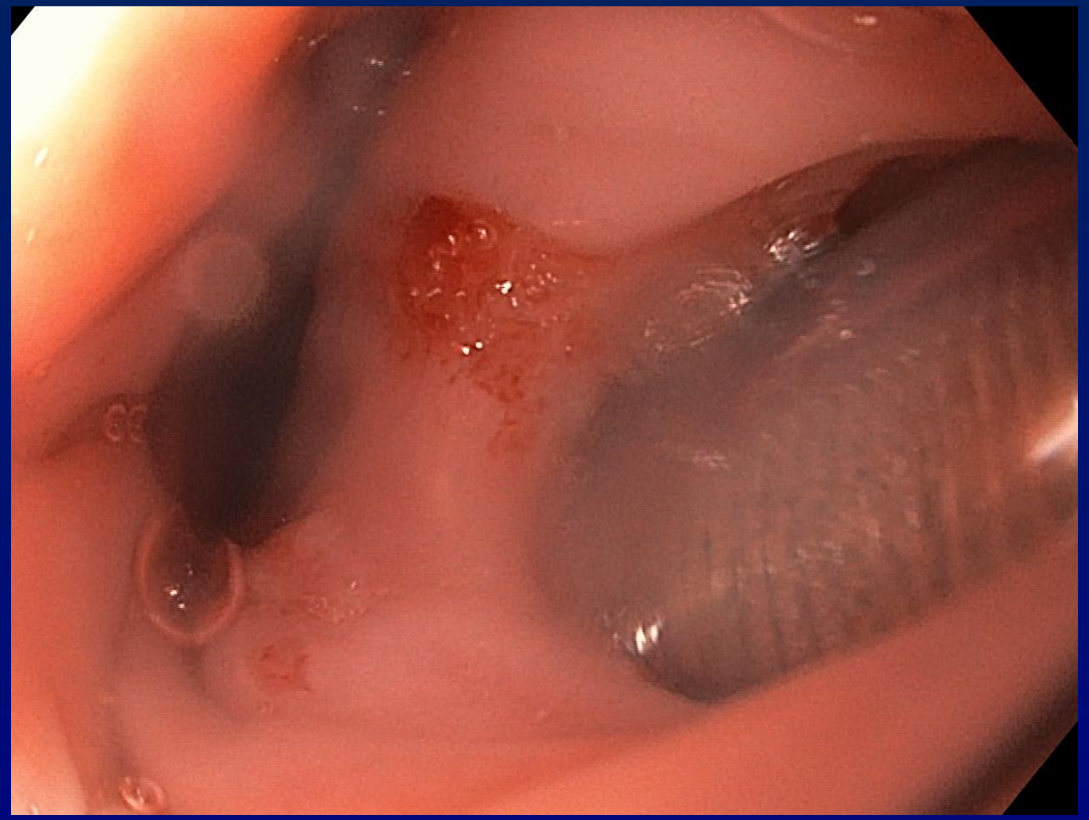
TEF





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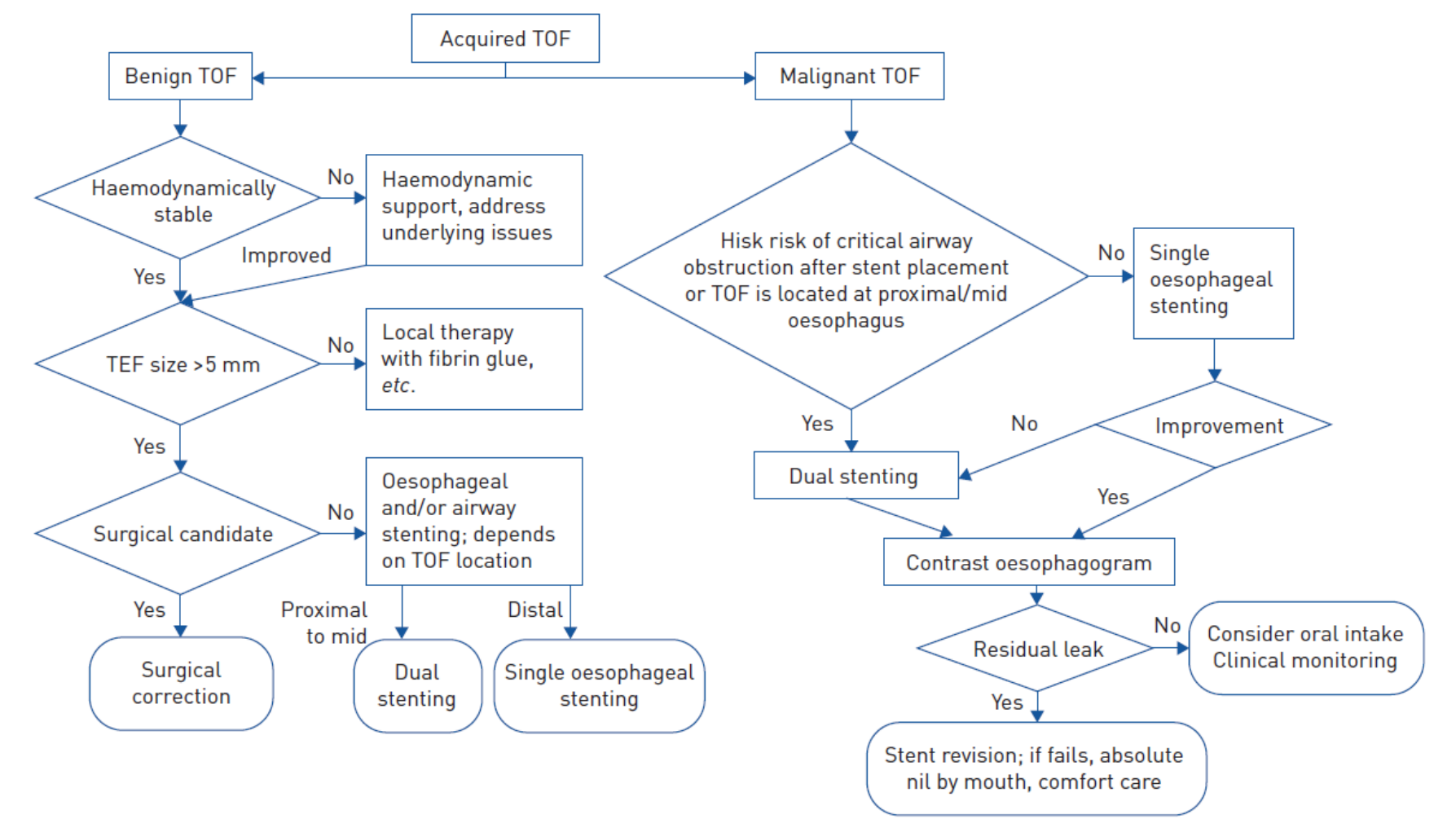

FIGURE 3 Management algorithm for acquired tracheo-oesophageal fistula (TOF).

Eur Respir Rev 2020; 29: 200094

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Pre-operative management

- Primary goal is lung protection from soilage
  - If needed intubate patient with balloon beyond the defect
  - Possible stent to temporize
- Optimize nutrition
  - Feeding access
- Dual video Endoscopy
- Esophqgram
- Antibiotics
- Nil Per Oral
- DO NOT OPERATE ON A PATIENT WHO CANNOT COME OFF THE VENTILATOR

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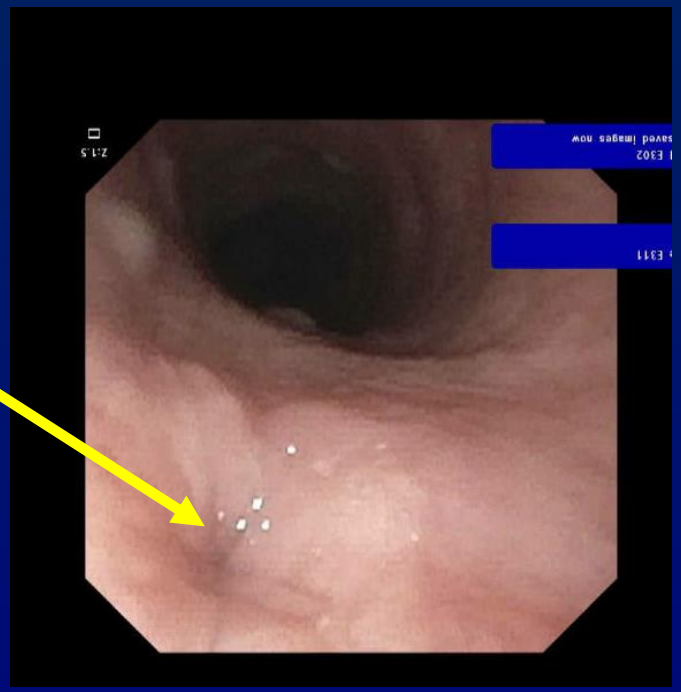
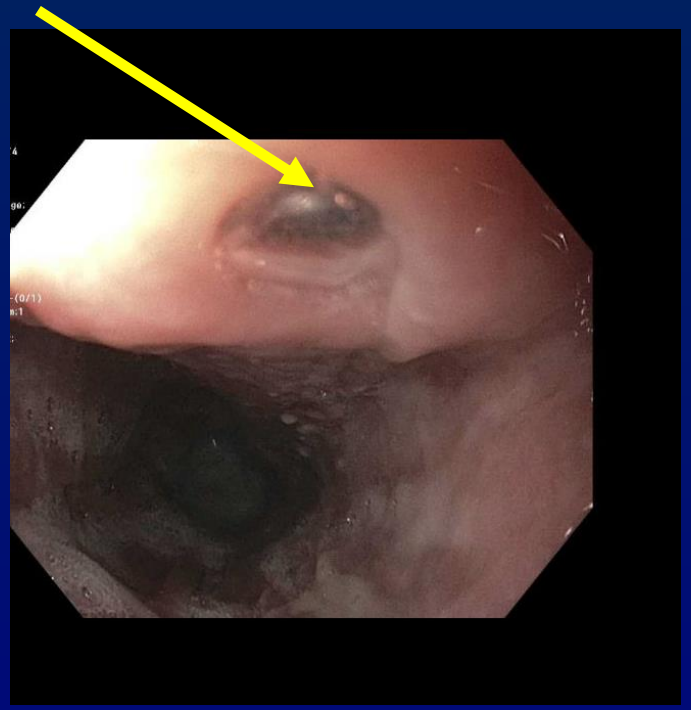
TEF



Trachea



Esophagus

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TEF
Intra-operative considerations

- Ventilation strategy must be sorted out well ahead of time
- Account for volume loss on positive pressure ventilation
- Fiberoptic intubation is likely better
- Place balloon beyond the defect (if possible)
- ECMO may be needed based on underlying lung pathology such as pneumonia.
- For cervical fistula, on-table ventilation is reasonable
- If stenosis is involved, tracheal resection is needed

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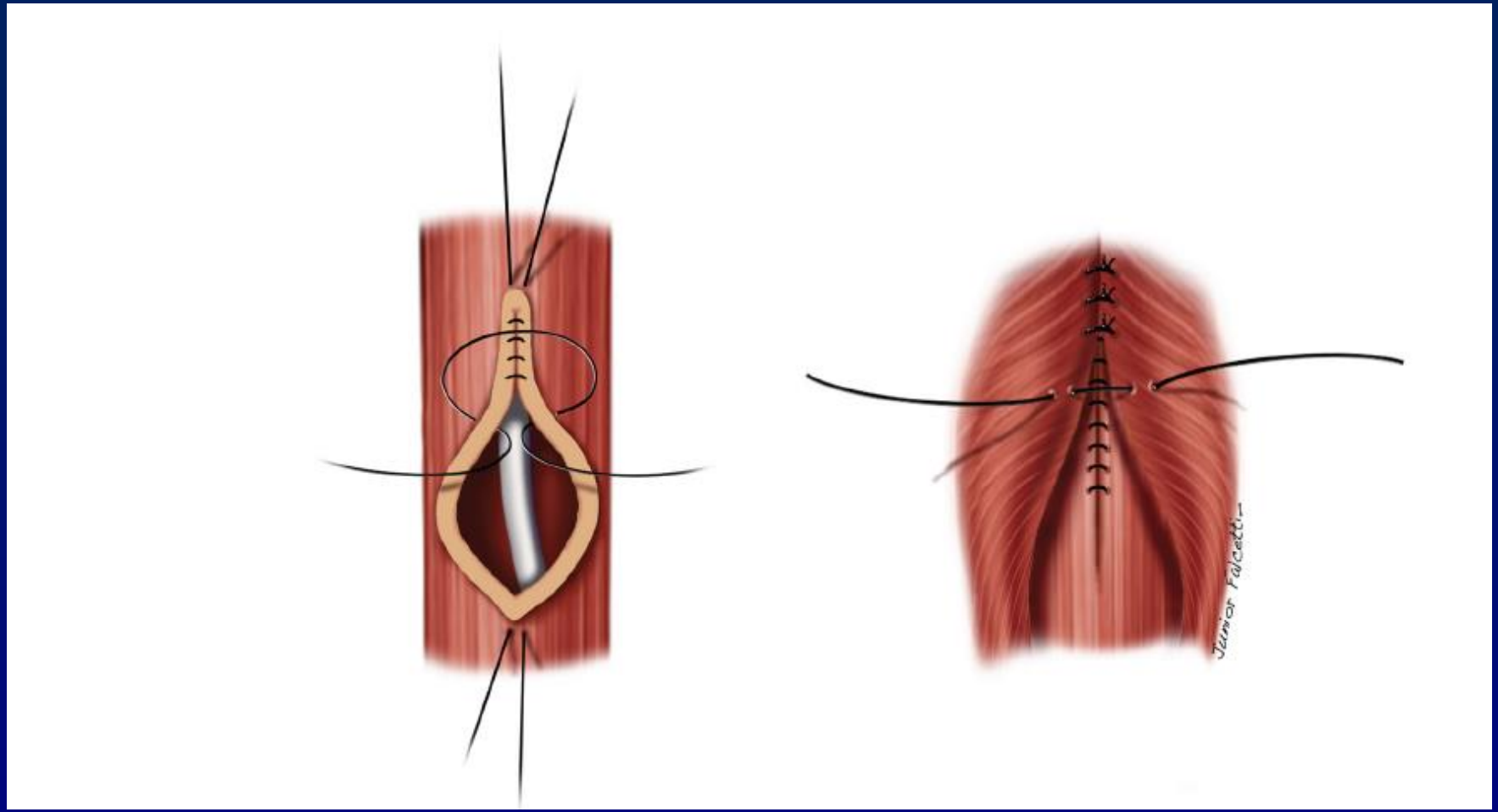

Ann Transl Med 2018;6(11):210

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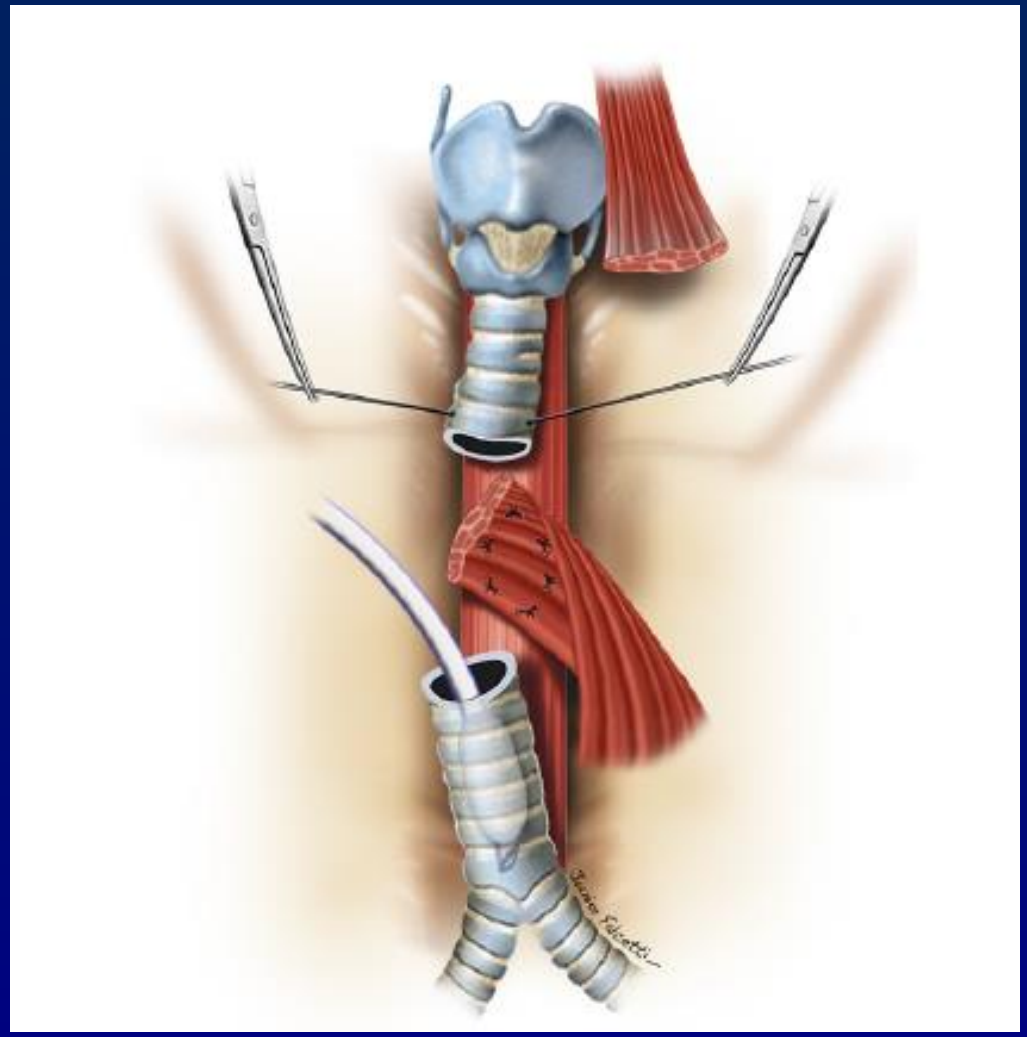

Ann Transl Med 2018;6(11):210

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Ann Transl Med 2018;6(11):210

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TEF
post-operative complications

- Twenty patients (56%) experienced postoperative morbidity
- Six patients (17%) required tracheostomy or T-tube placement for pneumonia, airway obstruction, or partial anastomotic dehiscence
- TEF recurred in four patients (11%).
- Pneumonia and wound infection each occurred in three patients (8%).
- Mortality was 10.5% in the first period (1975-1991)
- Mortality was 2.8% in the second period (1992-2010)

Ann Thorac Surg 2013;95:1141-6.

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TEF 201

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What makes a TEF challenging

- Large defects
- Prior radiation
- Prior surgeries
- Intra thoracic location
- Marginal pulmonary function

- Each scenario requires creative solutions
  - Basic principle of TEF repair still apply

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Case 2: TEF

- 44 y.o male with stage III distal esophageal cancer s/p definitive CRT
- Post-radiation stricture treated with serial dilation ultimately treated with esophageal stent
- Presents with stent erosion into the carina extending into LMB
- Prior PEG tube noted
- Seen in clinic on room air

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Case 2: TEF
Pre-op Imaging

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Case 2: TEF
Peri-operative course

- V-V ECMO
- Stent removal
- Total muscle sparing Right thoracotomy
- Distal esophagectomy
  - Just below the level of the fistula
- Proximal right cervical esophagostomy
  - Just above the fistula

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Case 2: TEF
Peri-operative course

- Defect exclusion with Alloderm
  - Anteriorly to the airway
  - Posteriorly to the esophageal wall/prevertebral fascia
- Return on POD 1 for muscle flap reinforcement by Plastics
- Delayed chest closure
- Daily Bronchoscopy for pulmonary toilet of clots and mucus

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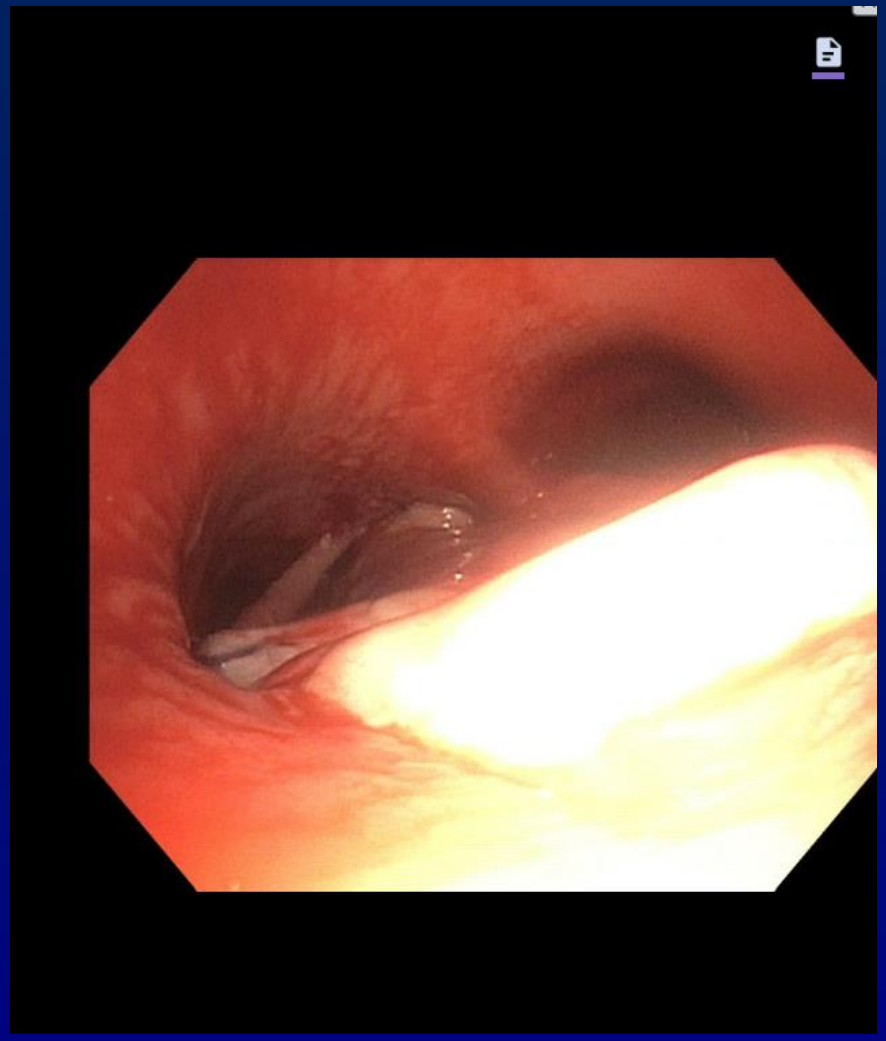
Case 2: TEF
Post-op Imaging



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Case 2: TEF
Post-operative course

- Tracheostomy on POD 3
- Vent wean and Decannulation of ECMO on POD 14
- Silicone Airway stent placed to address possible Malacia
- Discharged to rehab on POD 32
- Clinical course initially complicated with several admissions for pneumonia
- On the schedule for sub-sternal gastric pull up in Fall 2024

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Case 2: TEF

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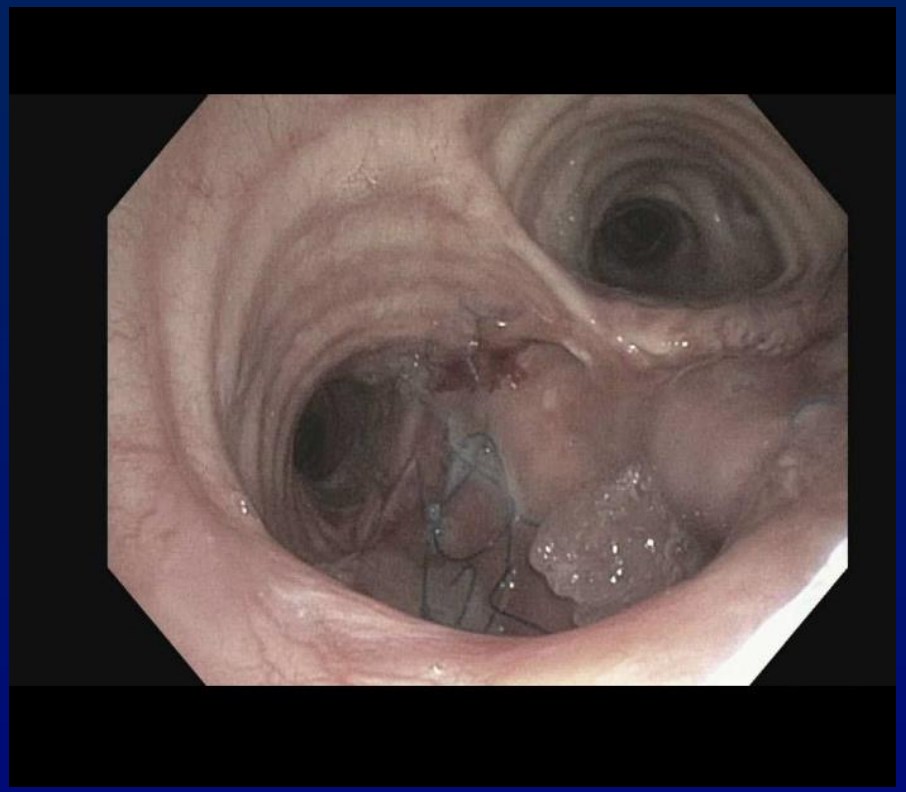
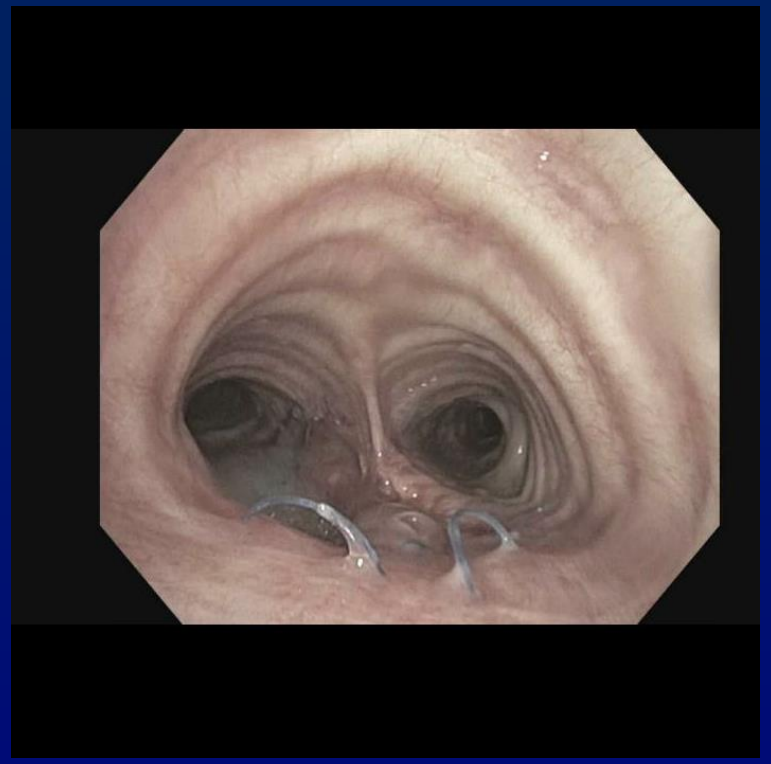
Case 2: TEF





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Case 2: TEF
Challenges and lessons learned

- When to wean off ECMO?
- Will the alloderm hold?

- Suturing to the walls of the common cavity posteriorly is very challenging and sometimes a blind move
- Robust muscle flap was key to keep the defect closed
- Mucus from the remnant esophagus can cause pneumonia
- The esophagostomy is quite short!

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Case 3: TEF

- 62 y.o. female with a h/o right upper lobectomy 9 years ago for Stage IB NCSLC via right thoracotomy
- Definitive chemo RT 7 years ago for mediastinal recurrence
- Post radiation stricture requiring serial esophageal dilations
- Recently treated with esophageal stent
- Presents with a worsening cough
- Patient seen in clinic for evaluation

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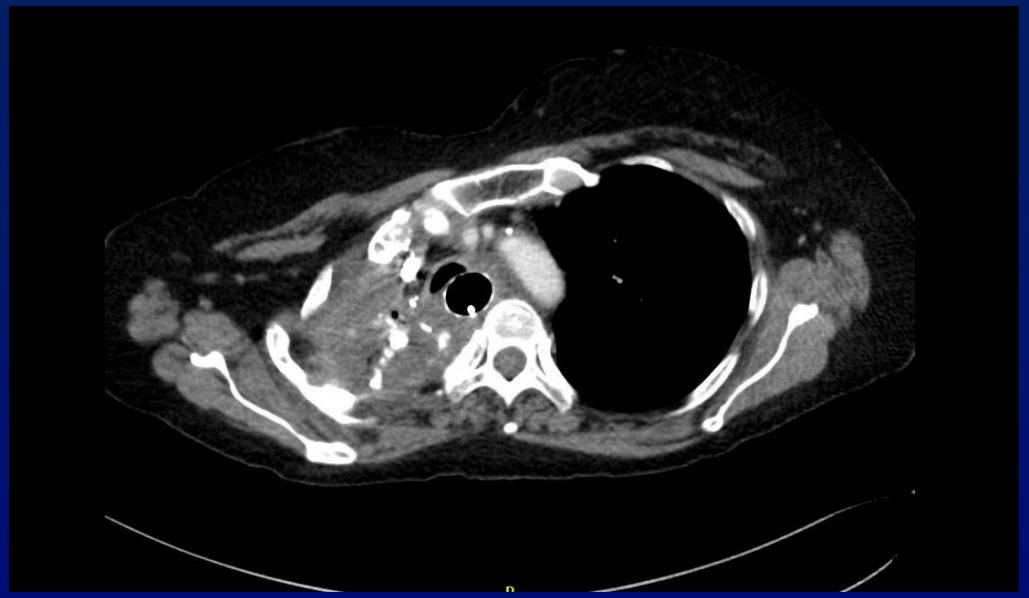
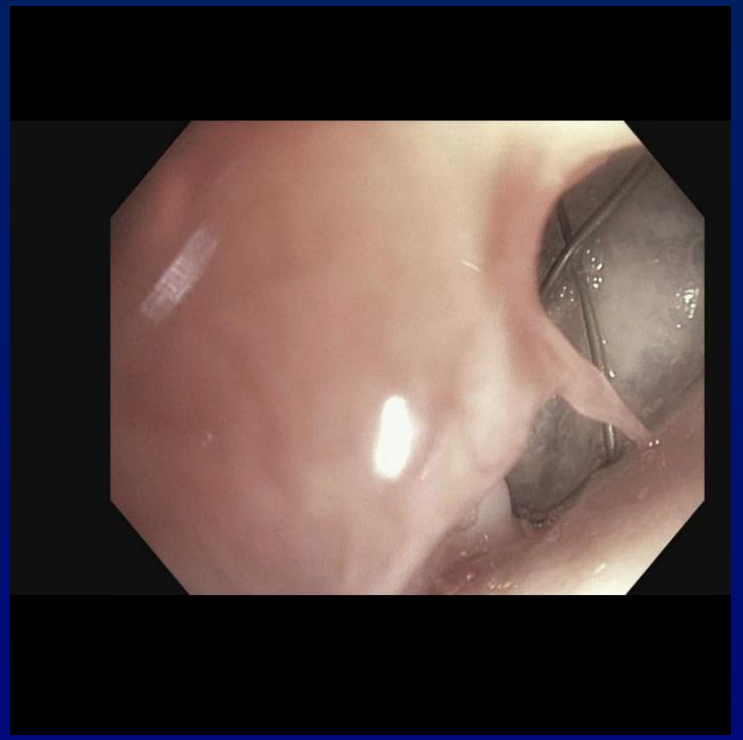
Tracheoesophageal Fistula
Pre-op Bronchoscopy





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Tracheoesophageal Fistula Peri-Operative Course

- V-V ECMO
- Stent removal
- Left Thoracotomy
- Distal esophagectomy
  - Transected just around the inferior pulmonary vein
- Left Cervical Esophagostomy
  - Transected just above the aortic arch
- ECMO maintained post-op with minimal vent settings
- Custom Airway stent

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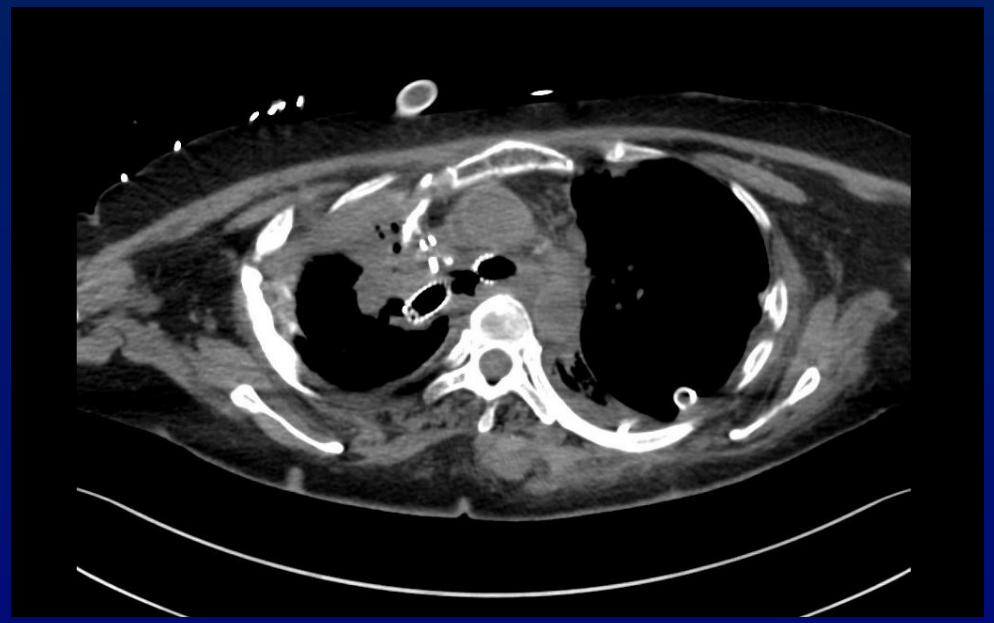

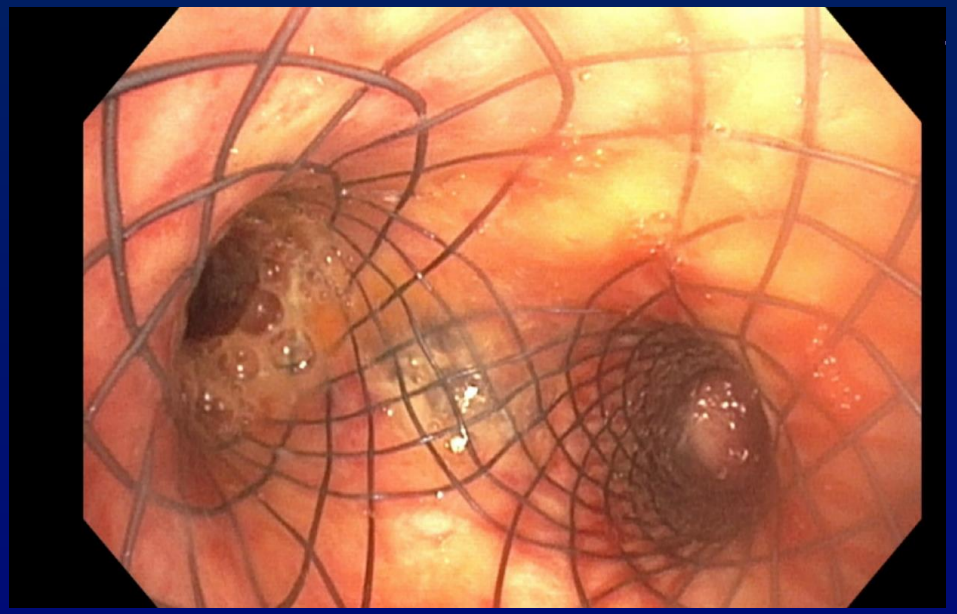

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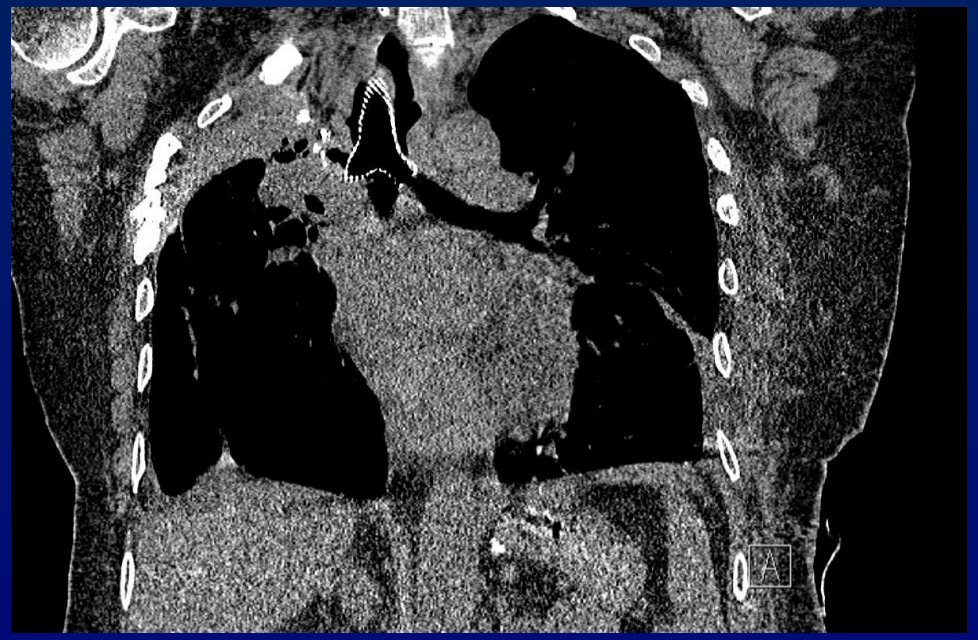

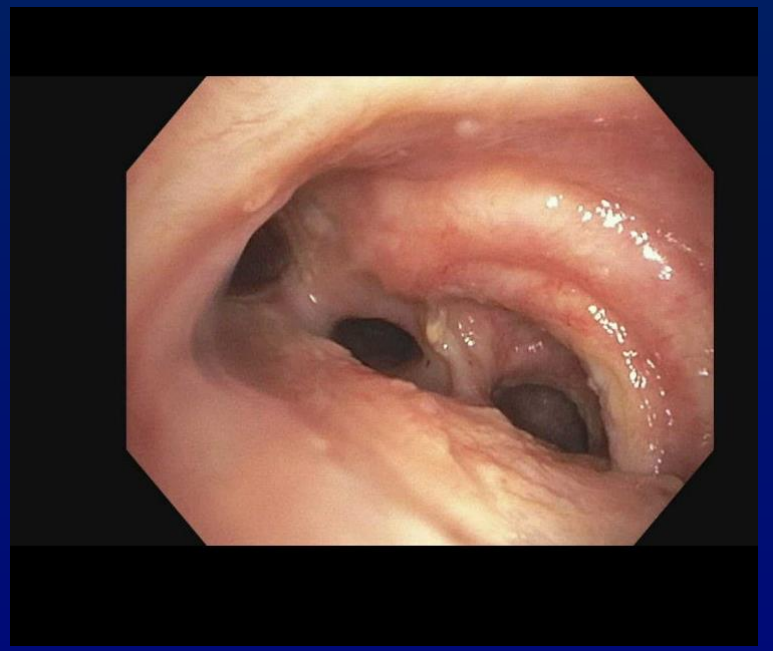

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Case 3 special considerations

- Is it OK to leave a blind esophageal pouch?
- Will the positive pressure in the airway cause staple line dehiscence?
- When to come off ECMO?
- What about the mucus from the esophagus?
- When to remove the stent?
- When to reconnect?

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Case 3: Post-operative course

- Cryo ablation in the OR for pain control
- Tracheostomy on POD 5 for delirium and mucus plugging
- ECMO weaned off on POD 7 to trach collar
- Stent removed after 6 weeks
- APC ablation of the esophageal mucosa 3 months post-op
- Cough resolved and patient discharged from rehab to home
- Substernal gastric pull up planned for Fall 2024.

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Endoscopic Repair of Recurrent Tracheoesophageal Fistula With an Atrial Septal Occluder Device

Alessandro Vivacqua, MD, Dhananjay Malankar, MD, Jay J. Idrees, MD, Thomas W. Rice, MD, Daniel P. Raymond, MD, and Eric E. Roselli, MD

Departments of Thoracic and Cardiovascular Surgery, Cleveland Clinic, Cleveland, Ohio

Ann Thorac Surg 2016;102:e485–7

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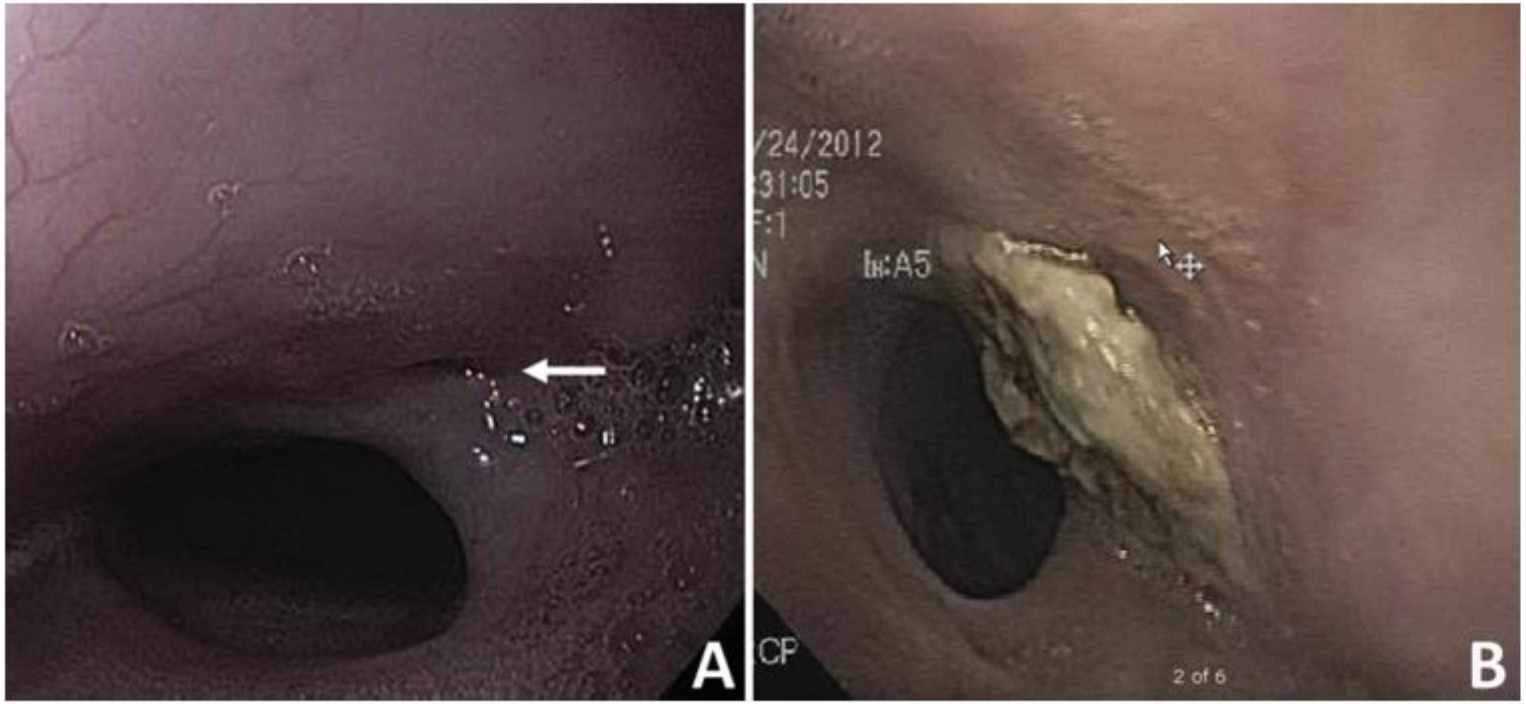

Fig 3. (A) Preoperative esophageal view of the fistula (arrow). (B) Postoperative endoscopic view of the atrial septal occluder device partially epithelized at 3 months.

Ann Thorac Surg 2016;102:e485–7

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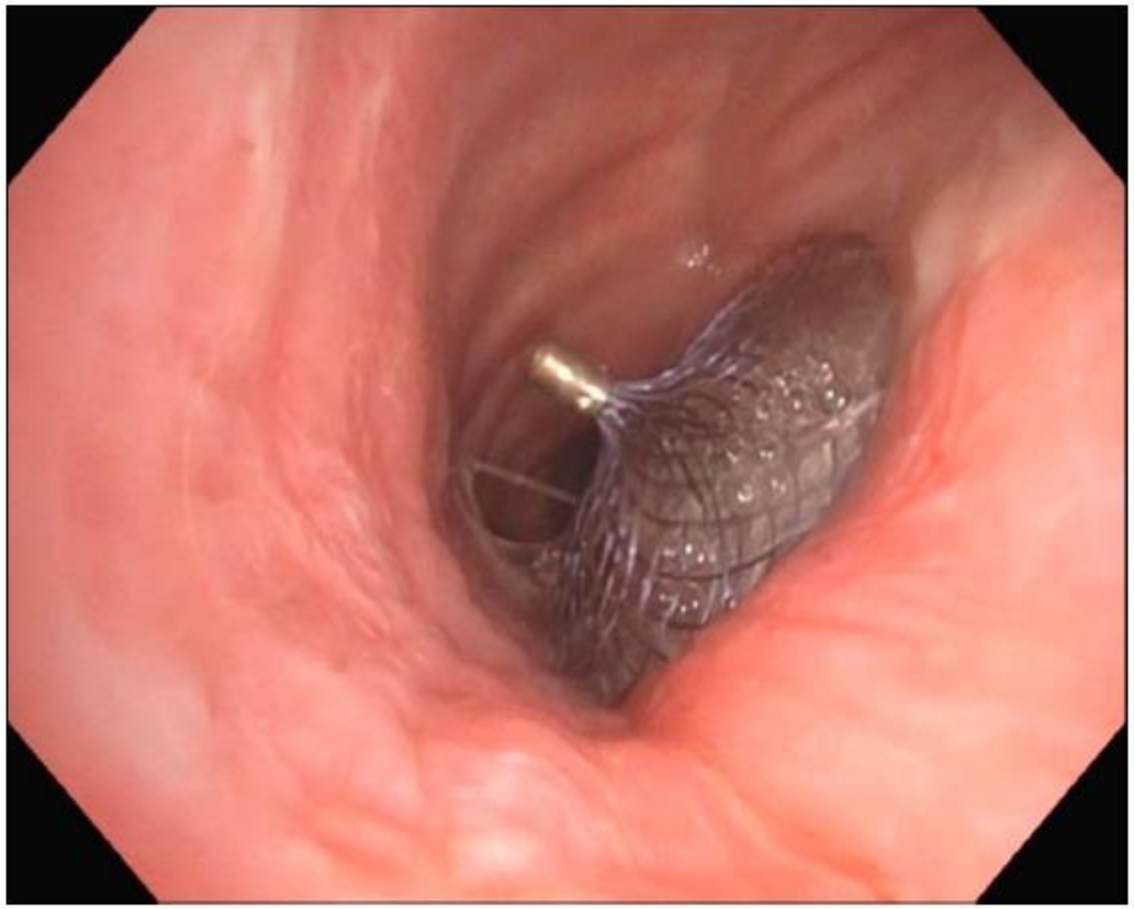

Figure 1. AD deployed with successful TEF closure. AD, Amplatzer device; TEF, tracheoesophageal fistula.

ACG Case Rep J 2022;9:e00888

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Summary

- TEF repair on patients who are NOT vent dependent can be quite successful
- Stents are often just temporizing measures
- Creative Solutions are often needed for complex TEF

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