

# Abrupt Changes In Ventilation During Tracheoesophageal Fistula Repair: The Presence of a Second Fistula

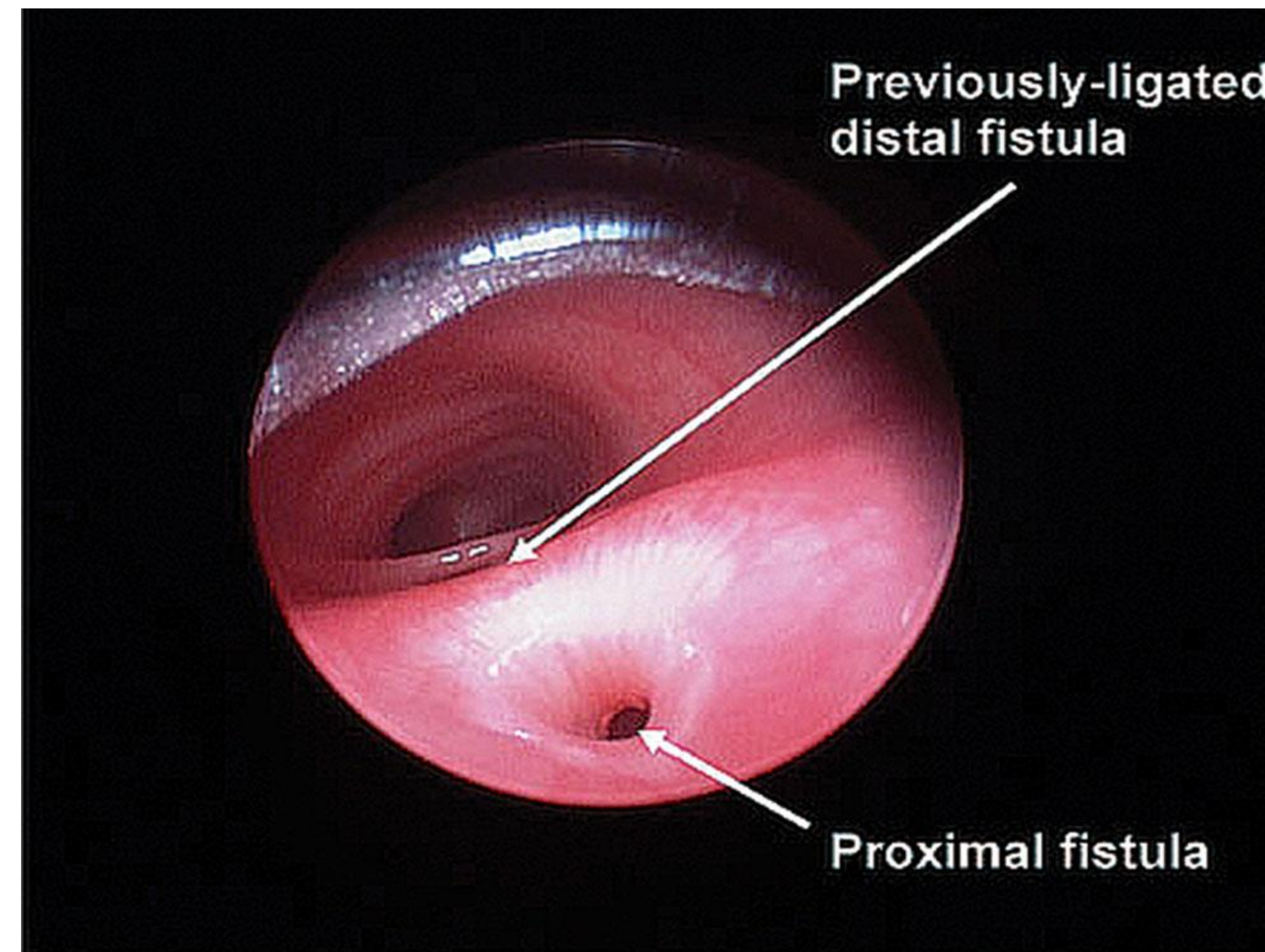
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## Introduction

- Esophageal atresia (EA) with Tracheoesophageal fistula (TEF) has reported incidence of 1 in 3500 births
- Isolated or part of VACTERL association
- Anesthetic challenges can include difficulty with tracheal intubation, oxygenation, and ventilation secondary to patient age, size, comorbidities, and the presence of the TEF itself
- Type C is the most common type of TEF

## Case Presentation

- 2 day old term male presented with EA for TEF repair.
- No known prenatal anomalies
- Further postnatal workup showed thoracic vertebral anomalies, rib abnormalities, and cardiomegaly with dextroposition most consistent with VACTERL Association.
- Anesthetic/Case management:
  - Sevoflurane induction with maintained spontaneous ventilation
  - Intubated without difficulty
  - After fistula ligation, paralytic was administered and positive pressure ventilation commenced
  - Shortly after, tidal volume (TV) became unmeasurable and end tidal carbon dioxide (ETCO<sub>2</sub>) abruptly dropped
  - Immediate communication to surgeon about change in ventilation while evaluating patient and machine to rule out problems with ETT and machine function
  - Presence of an audible air leak within chest identified the presence of a second TEF
  - After surgical control of second TEF, ventilator mechanics returned to baseline

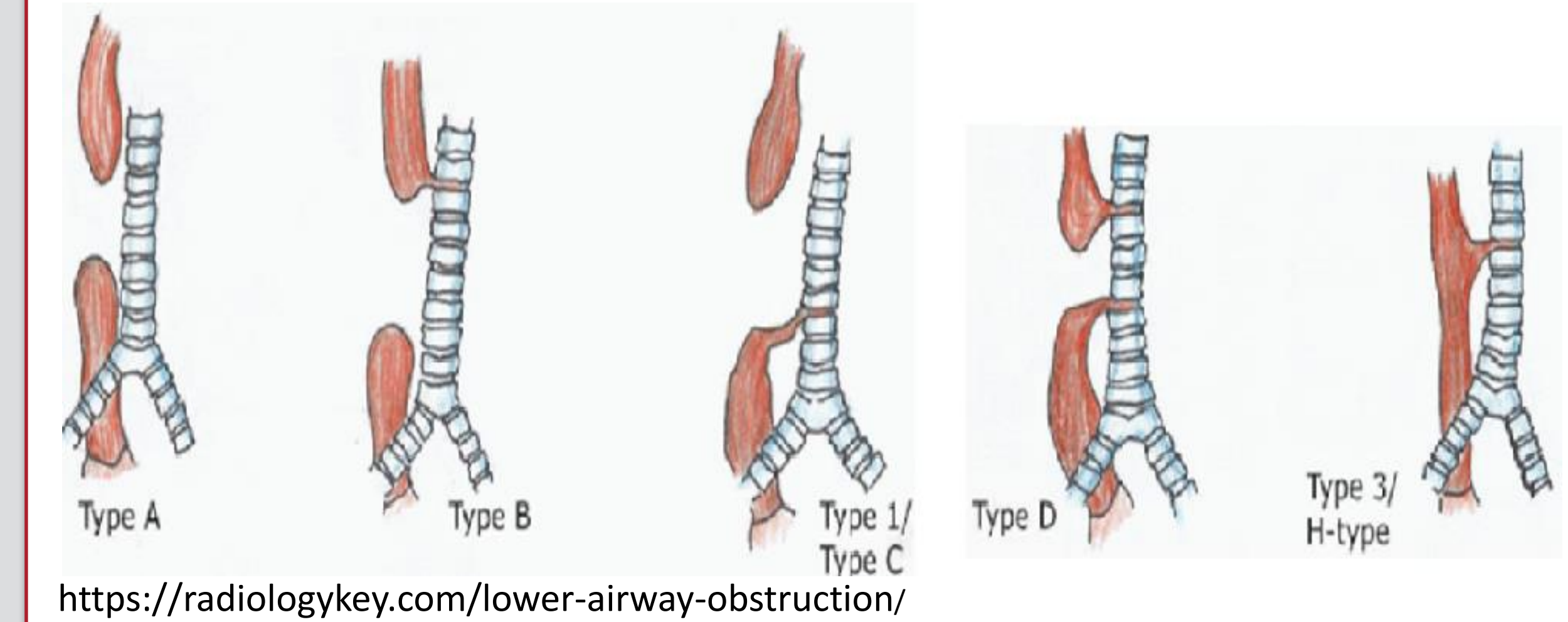


This is an example of a second proximal fistula demonstrated on bronchoscopy. The use of pre-operative bronchoscopy by the surgeon or the anesthesiologist either through an LMA or an ETT can demonstrate not only the location of the fistula (help facilitate ETT placement) but can also reveal a second fistula if present.

<http://anesthesiology.pubs.asahq.org/article.aspx?articleid=1918595>

## Discussion

- Differential diagnosis for rapid decrease in ETCO<sub>2</sub> and/or TV includes:
  - ETT migration into right main stem bronchus or fistula pouch
  - Leak in ventilator system,
  - Pulmonary embolus,
  - Mucus plug/blood clot/kinked ETT
  - Inadvertent extubation
- Rapid communication with surgical team led to our patient maintaining appropriate oxygenation while the second fistula was identified and repaired
- Double fistulas in EA with distal TEF are a known but rare anomaly
  - Missing this diagnosis can lead to significant morbidity & mortality
- Bronchoscopy is helpful to identify fistula location & other airway abnormalities - including second fistula.
- Anesthesiologist can perform flexible bronchoscopy during or after intubation



## Keys to TEF Anesthetic Management

- Careful pre-operative evaluation for potential associated conditions specifically vertebral anomalies or congenital cardiac defects
- Premedication including glycopyrrolate to reduce copious secretions
- Adequate pre-oxygenation
- Airway equipment to assist in proper placement of ETT past fistula
- Maintaining spontaneous ventilation during intubation and until fistula ligation
- Once fistula identified and controlled, positive pressure ventilation and paralytics can be used allowing for improvement of ventilatory mechanics

## References

- Yuvesh Passi, M.D., Venkata Sampathi, M.D., Ile Pierre, M.D., Michael Caty, M.D., Jerrold Lerman, M.D., F.R.C.P.C., F.A.N.Z.C.A.; Esophageal Atresia with Double Tracheoesophageal Fistula. *Anesthes* 2013;118(5):1207.
- Nitin Sharma, M. Srinivas, Laryngotracheobronchoscopy prior to esophageal atresia and tracheoesophageal fistula repair—its use and importance, In *Journal of Pediatric Surgery*, Volume 49, Issue 2, 2014, Pages 367-369, ISSN 0022-3468
- Coté, Charles J., et al. *Coté and Lerman's a Practice of Anesthesia for Infants and Children*. 5th ed., Elsevier, Saunders, 2013