

Fistula or Not? Maintaining Spontaneous Ventilation During a TEF Repair on a Newborn

with an Anatomical Variant: A Case Report

Conor Bennett DO, Justin Lui BA, Hunter Dean BS, Joseph Resti MD

Department of Anesthesiology, SUNY Upstate Medical University, Syracuse, NY



Background

- Most commonly accepted etiology is a defect in the lateral septation of the foregut into the trachea and esophagus resulting in tracheoesophageal fistula (TEF) or Esophageal Atresia (EA).
- Both develop from a common primitive foregut at 4 weeks of gestation. GI and respiratory tracts are separated by epithelial ridges. There is a ventral respiratory tract and dorsal esophageal tract from a foregut division and the fistula is believed to derive from an embryonic lung bud that fails to branch.
- Typical presentation: Immediately after birth to weeks to months. respiratory distress, feeding difficulties, choking, increased risk of aspiration. Commonly associated with other abnormalities including cardiac defects and esophageal atresia.
- Epidemiology: No significant genetic factor in the development of TEF except for trisomy 18 and trisomy 21 and DiGeorge syndrome.
- Pathophysiology: Occurs from abnormal septation of the caudal foregut during the 4th and 5th weeks of development.
- History and Physical: Most commonly associated with heart diseases and abnormalities, vertebral abnormalities and EA. Polyhydramnios is common in ⅔ of pregnancies associated with TEF. Gastric distension and aspiration are common.
- Evaluation: Prenatal diagnosis→ is suspected from maternal polyhydramnios and absence of fetal stomach bubble. Commonly associated with VACTERL sequence, CHARGE syndrome, trisomy 18, trisomy 21, DiGeorge syndrome.

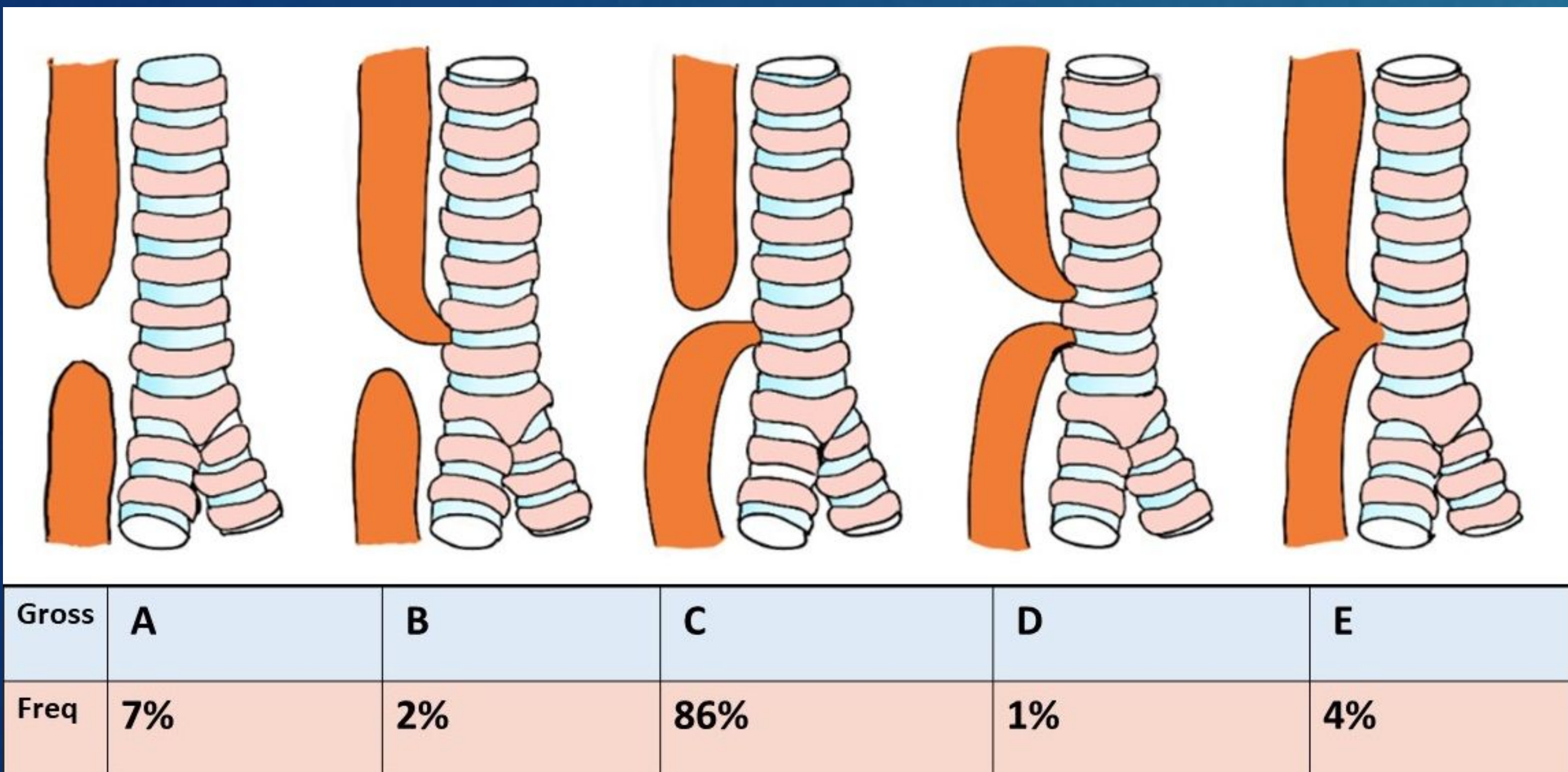


Figure 1: EA and TEF Types with frequency

- A) EA only, no fistula
B) EA with Proximal TEF
C) EA with Distal TEF (most common)
D) EA with Proximal and Distal TEFs (rarest)
E) TEF without EA. (Also called H-type)

Case Overview

Our case surrounds a 2-day-old Female with Esophageal Atresia and Tracheoesophageal Fistula (TEF) who underwent TEF repair via open thoracotomy. Mask induction was performed with high-flow sevoflurane and the patient was kept spontaneously breathing while exploratory bronchoscopy was performed. Rigid bronchoscopy confirmed the TEF to be proximal to the carina and an additional orifice, believed to be a right tracheal bronchus, was discovered. The exploratory phase of this surgery lasted two hours and presented the challenge of keeping the patient normoxic while spontaneously breathing during which secondary challenges of moving the patient, decreased EtCO₂, and hypotension presented themselves and were managed accordingly.

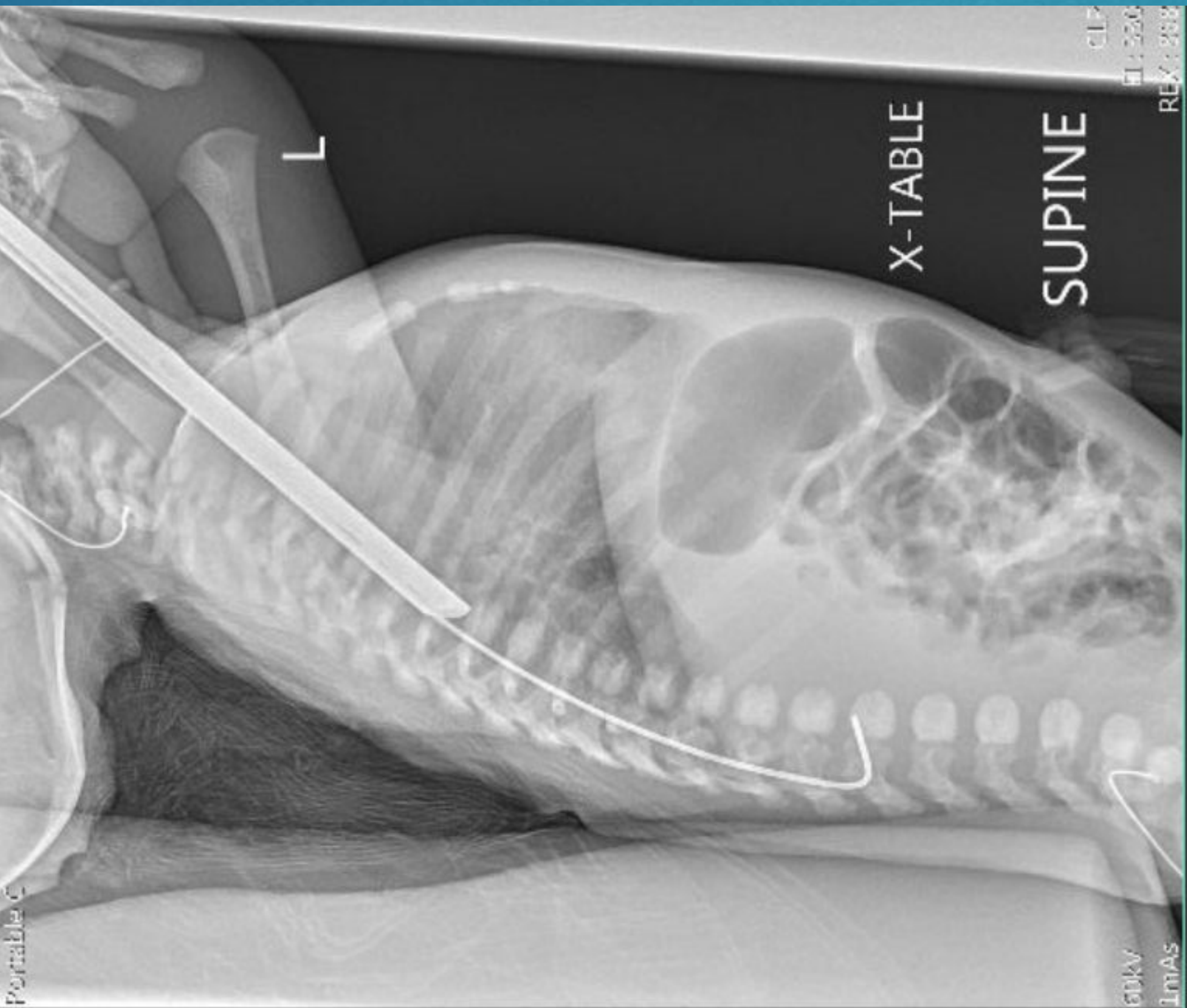


Figure 2: Lateral CXR while Supine

Rigid Bronchoscope with a guidewire into the distal tracheal orifice, which likely entered a tracheal bronchus, however, it likely also passed through the lung parenchyma, pleural cavity, and diaphragm into the retroperitoneal space.

Patient Background

- 2-day-old female presenting for TEF repair.
- Born 35 weeks 6 days via C-Section 2/2 Fetal Decelerations s/p Trial of Labor s/p Spontaneous Rupture of Membranes.
- Maternal Hx: Gestational HTN, Hypothyroidism, Anxiety
- Weight: 2210g
- Pt Saturated well on RA immediately after birth.
- Access: 24g IV in L foot. Received TPN.
- Imaging: R renal agenesis. No cardiac abnormalities.
- Patient's first anesthetic. No family history of anesthetic issues or complications.
- Preop Labs: Hgb 15.4, otherwise within normal limits

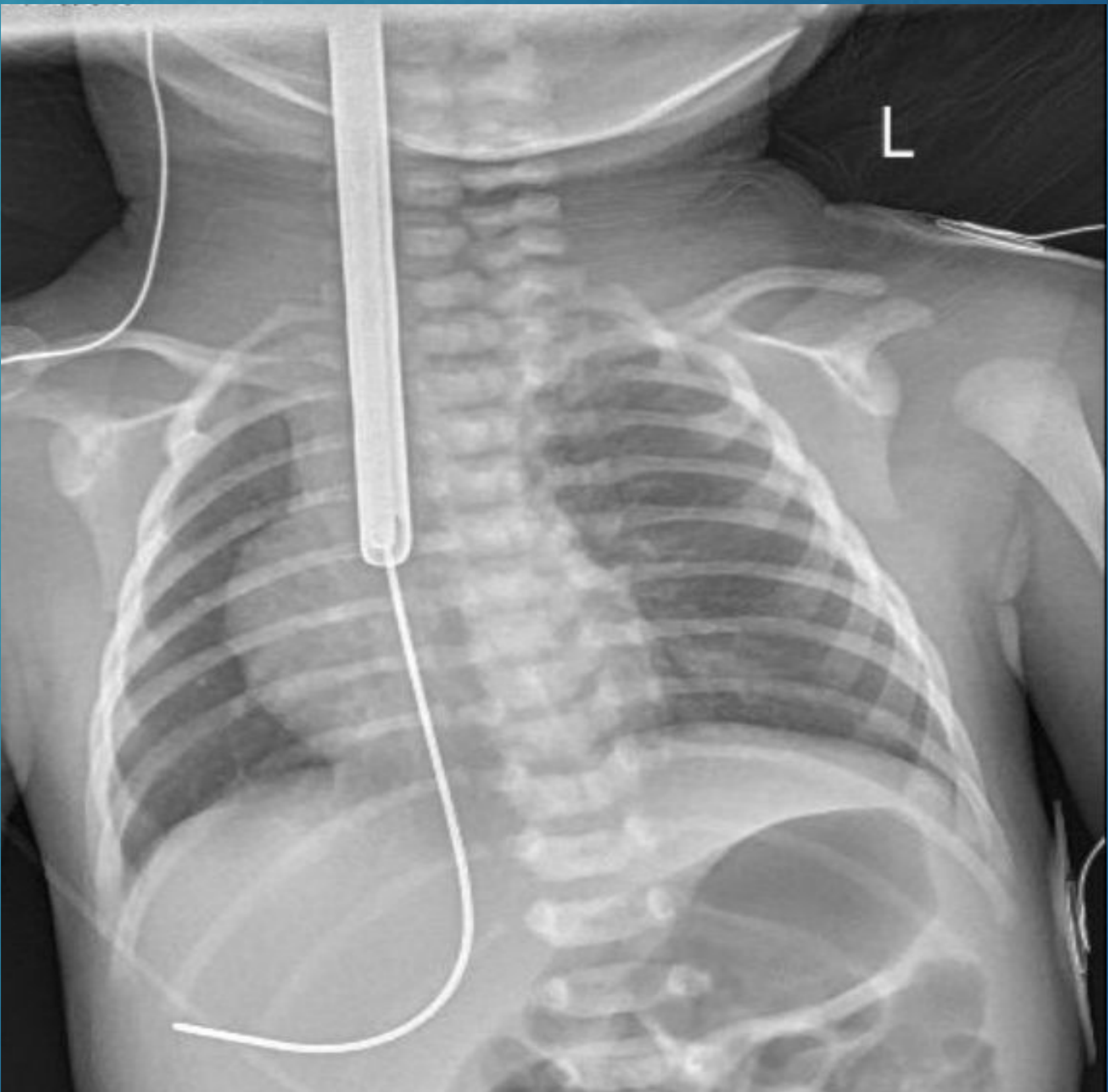


Figure 3: A/P CXR while Supine

Same Rigid Bronchoscope with guidewire as in Figure 2, but with an anterior-posterior view. Again, showing the guidewire likely passed through inferior to the diaphragm.

Discussion

After an uneventful mask induction, our surgical colleagues performed a rigid bronchoscopy and discovered two adjacent tracheal orifices. Repeated bronchoscopic intubations were performed by our surgical colleagues to delineate which orifice was the true fistula. These repeated intubations necessitated the administration of intravenous analgesia however this had to be balanced with the maintenance of spontaneous ventilation and acceptable hemodynamics. We administered ketamine to our patient to accomplish these goals. Traditionally, opioid-based analgesia is usually a clinician's first choice for treating intraoperative pain. In our case, however, the fistula was still patent and required spontaneous ventilation. We found that intravenous ketamine was a viable option for our patient: it allowed us to reduce the dose of our inhaled anesthetic while also maintaining hemodynamics. Once the fistula was identified and ligated, the patient did well, and the rest of the procedure was completed uneventfully.

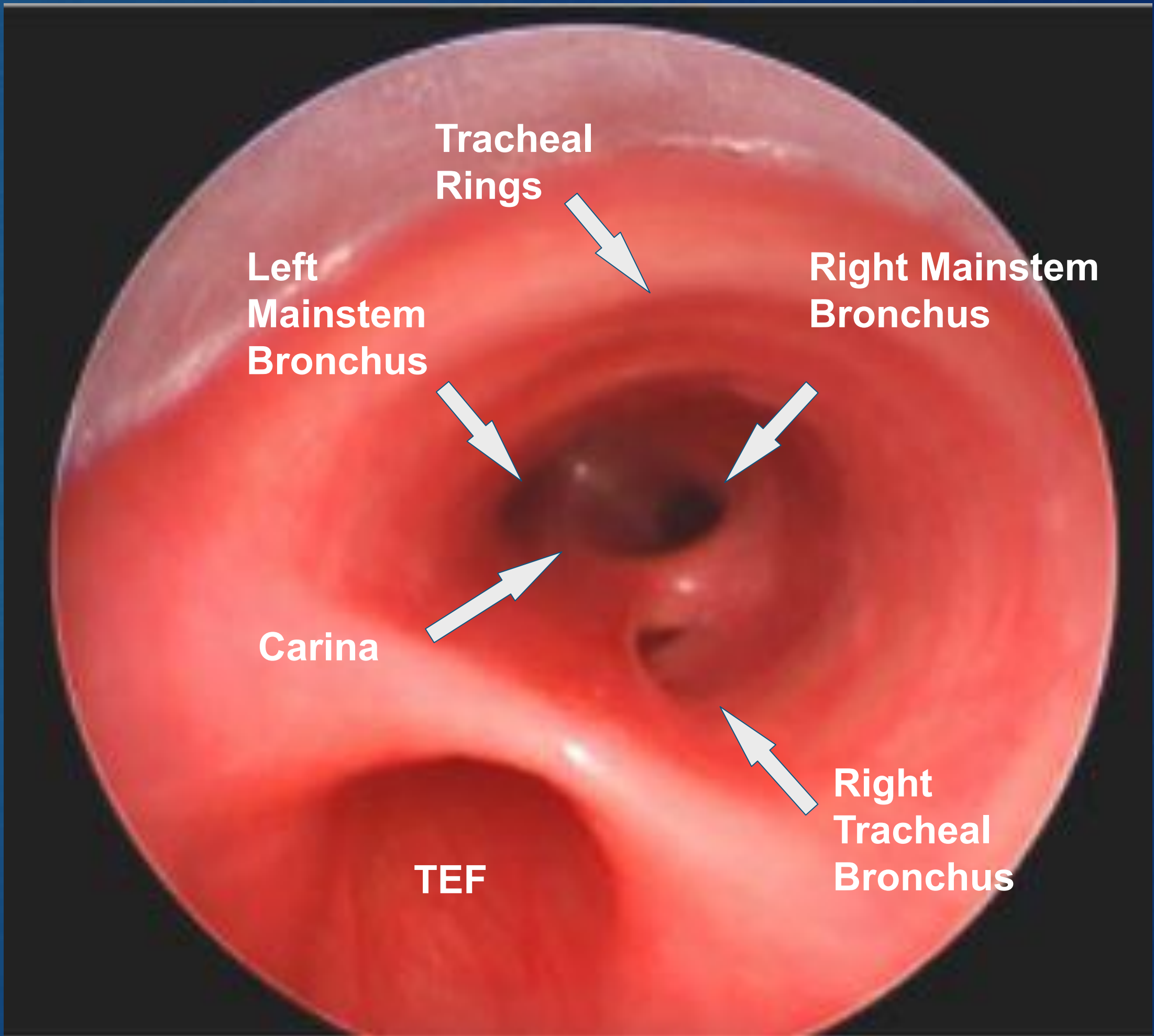


Figure 4: Bronchoscopy Screen Capture

- Rigid Bronchoscope showing:
- Tracheal Rings
 - Carina
 - Left and Right Mainstem Bronchi
 - Right Tracheal Bronchus
 - TEF

References

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