



Esophageal Atresia and Tracheo-Esophageal Fistula



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History

- Newborn child, normal vaginal delivery
- Prenatal ultrasound unremarkable
- Now 3 hours old with difficulty of feeding

History Discussion

- **What other points of the history do you want to know?**

- **Characterization of symptoms:** spitting and coughing during attempted breastfeeding
- **Temporal sequence:** immediate with beginning of feeding
- **Alleviating / Exacerbating factors:** appears fine while not feeding; may have excessive secretions
- **Associated signs/symptoms:** otherwise normal appearing child
- **Pertinent PMH:** vaginal delivery
- **Perinatal:** mild polyhydramnios
- **Meds:** none
- **Relevant Family Hx:** none
- **Relevant Social Hx:** none

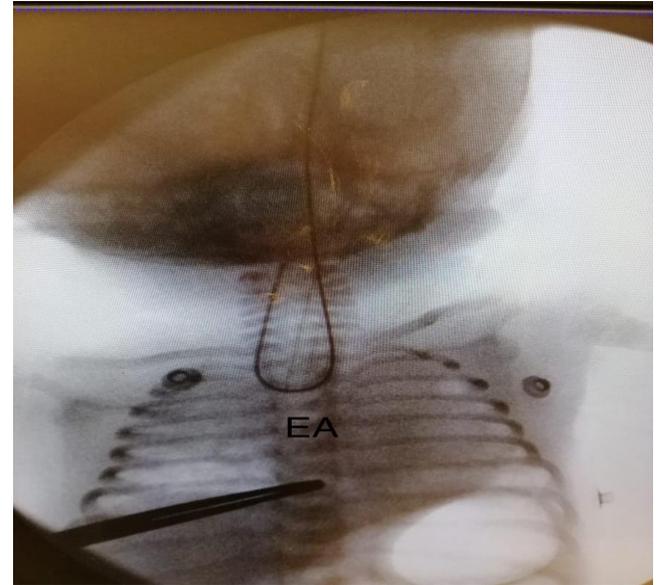
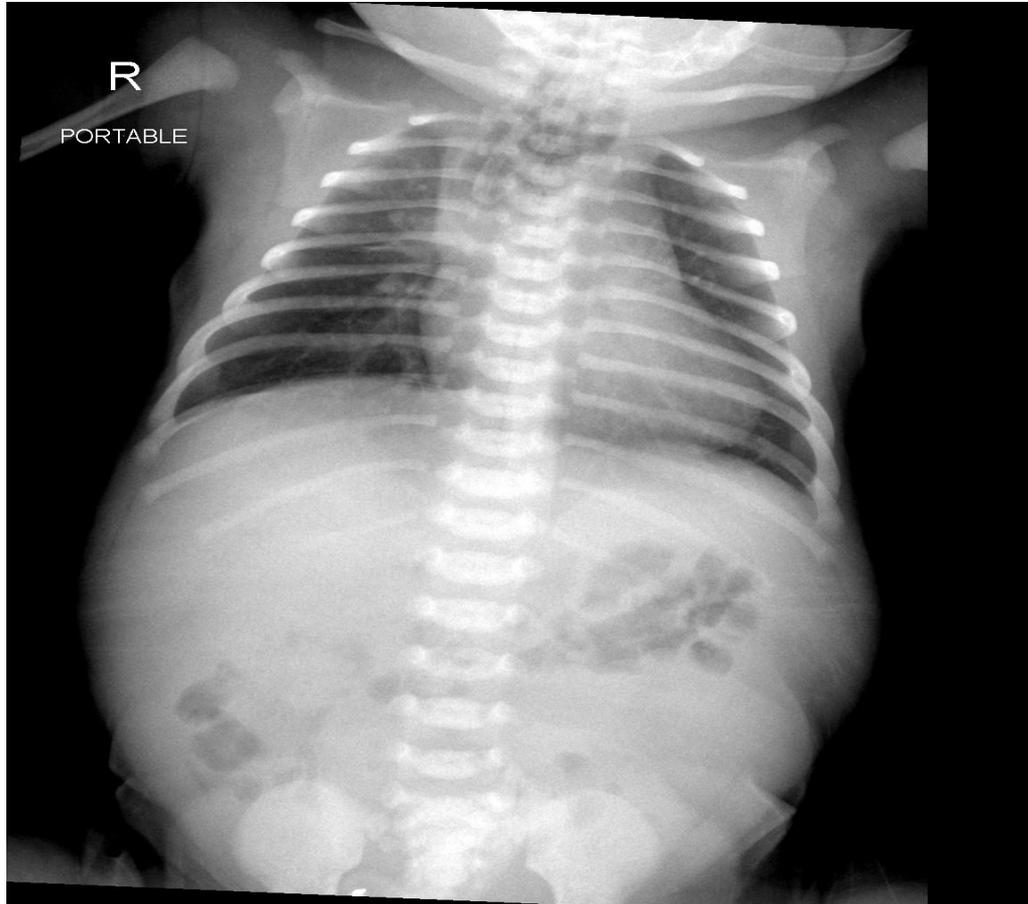
Physical Exam

- **What specifically would you look for?**
 - Vital Signs: HR 135bpm; RR 40/min; O₂Sat 97%sat on RA
 - Appearance: Well appearing
 - Relevant exam findings for a problem focused assessment:
 - oral secretions
 - mild upper abdominal distension

Studies (Labs, Imaging)

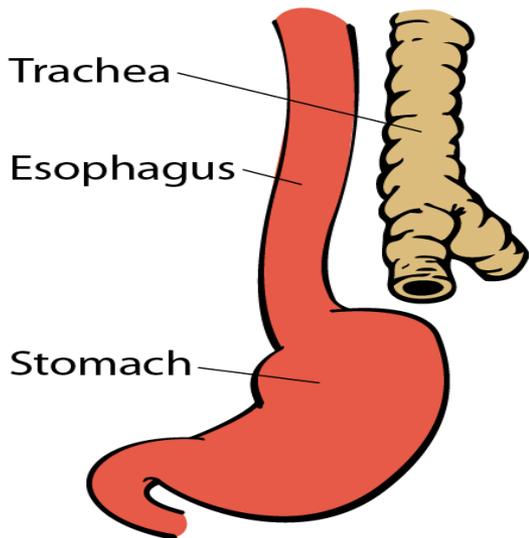
- **What labs are needed?**
 - Standard labs (CBC, X-match)
- **What imaging is needed?**
 - Chest and Abdominal Radiograph, after placement of NG tube

Study Results

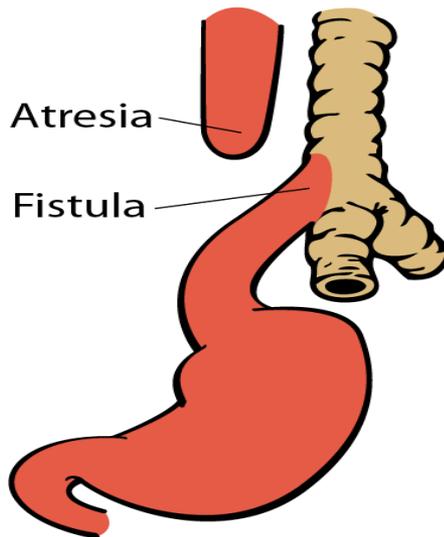


Gross's Anatomical Classification

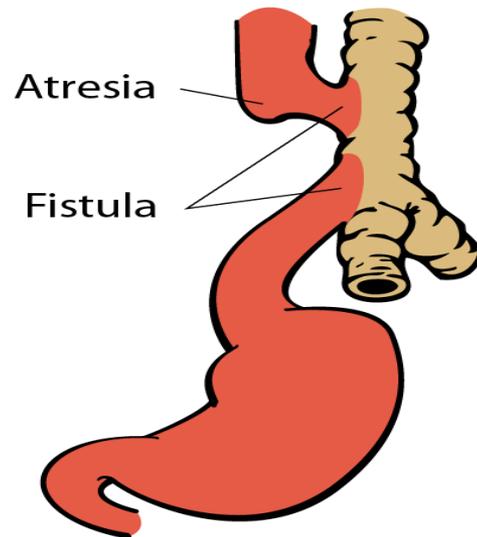
- **Type A:**
 - Esophageal atresia **without** tracheoesophageal fistula. **8%**
- **Type B:**
 - Esophageal atresia with **proximal** tracheoesophageal fistula. **<1%**
- **Type C:**
 - Esophageal atresia with **distal** tracheoesophageal fistula. **87%**
- **Type D:**
 - Esophageal atresia with **proximal and distal fistula**. **1%**
- **Type E:**
 - Tracheoesophageal **fistula without atresia**. **4%**
 - H-type fistula



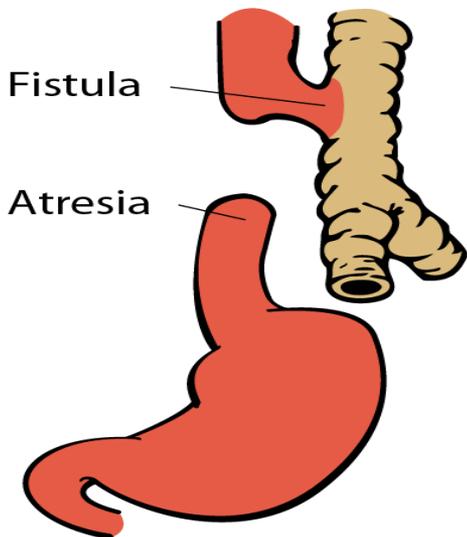
Normal Anatomy



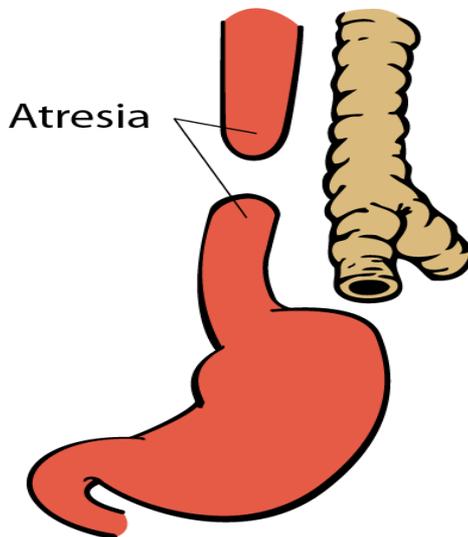
Atresia with distal Fistula



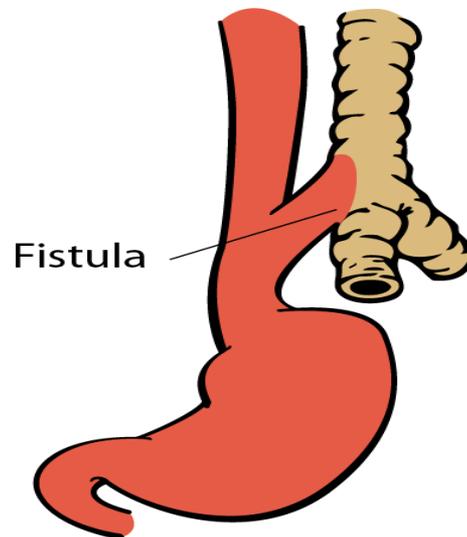
Atresia with double Fistula



Atresia with proximal Fistula

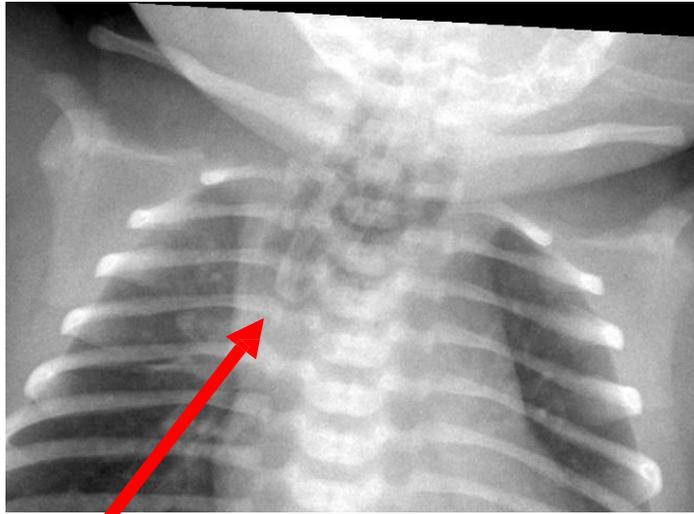


Atresia

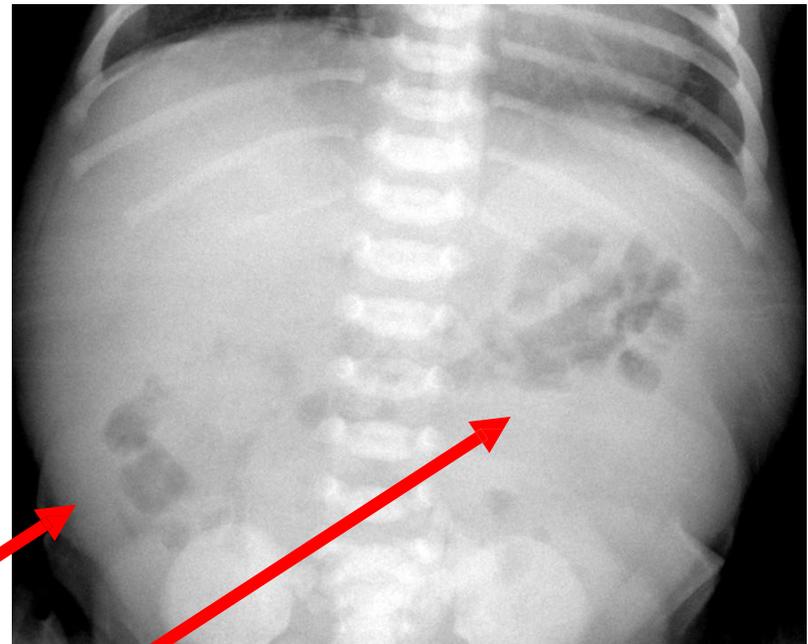


Fistula

Study Results



Coiled NG tube
= esophageal atresia



Air in GI tract =
tracheoesophageal fistula

Case Discussion

- **Diagnosis**

- Esophageal atresia with tracheo-esophageal fistula

- **Plans**

- VACTERL work-up

- Consent: Rigid bronchoscopy and right thoracotomy, EA/TEF repair

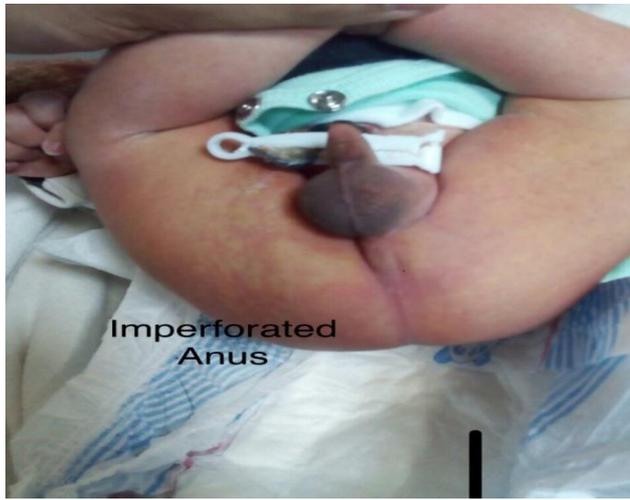
- Operative: 1: bronchoscopy

- 2: ligation and division of TE Fistula

- 3: esophageal anastomosis

VACTERL Complex of Associated Anomalies

- **V**ertebral (tethered spinal cord, bony anomalies)
 - Sacral X-ray, spine ultrasound
- **A**norectal (imperforate anus)
 - Physical exam
- **C**ardiac (ASD, VSD, other structural anomalies)
 - Echo + Position of the aortic arch
- **T**racheo **E**sophageal Fistula
- **R**enal (hydronephrosis, duplicate/absent kidneys)
 - Renal ultrasound
- **L**imb Anomalies (radial anomalies)
 - Physical exam

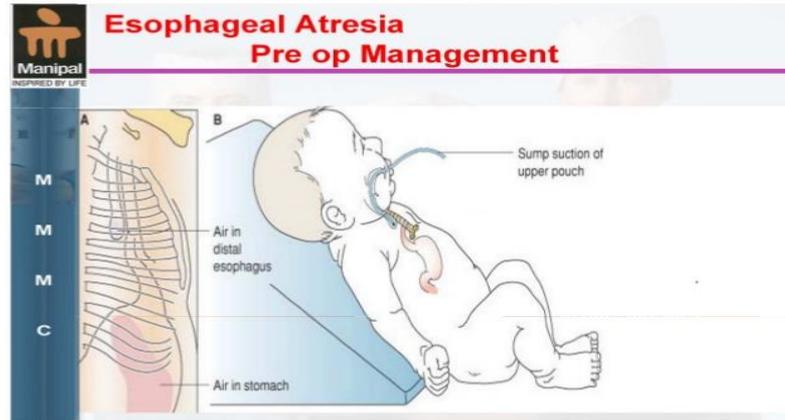


Incidence of Associated Anomalies	
Cardiovascular	≈24%
Genitourinary	≈21%
Gastrointestinal	≈21%
Musculoskeletal	≈14%
Central nervous system	≈7%
VACTERL association	≈20%
Overall incidence	50%-70%

- Anomalies are most common in cases of EA without TEF
- Least common in cases of H-type TEF

Interval steps before surgery

- **Head-up position to minimize aspiration with NE tube to suction in upper pouch**
- **Timing of surgery can be quite emergent, as every inspiration may be diverted into the stomach**
 - **Can lead to severe abdominal distension and respiratory compromise** (decreased ventilation and reduced diaphragmatic excursion)
 - **Keep infant breathing spontaneously to reduce ventilation of fistula**



Routine ETT should be avoided because of the risk for gastric perforation and worsening respiratory distress as the abdomen becomes distended from ventilation through the TEF.

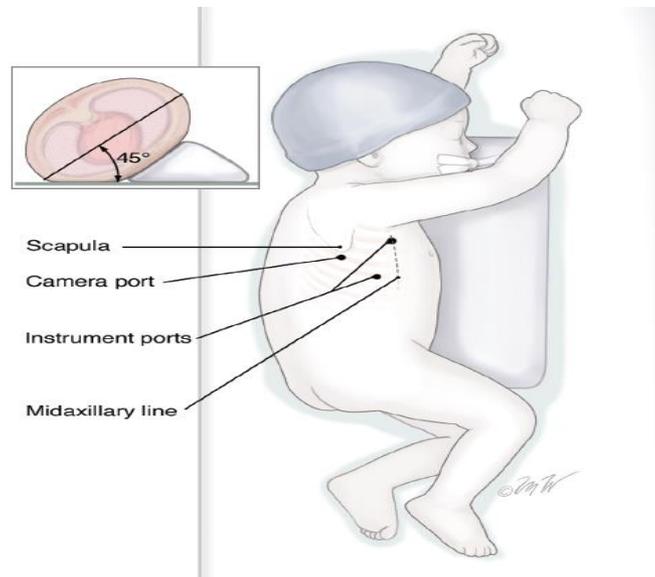
Operation

- Confirmation of diagnosis via bronchoscopy, opportunity to localize fistula and possibly occlude with balloon catheter
- Right thoracotomy to close/divide fistula
- Mobilization of proximal/distal esophagus and create tension free anastomosis
- Same can be done thoracoscopically



-Right posterolateral thoracotomy

- If a right-sided aortic arch a left-sided thoracotomy



Source: D. J. Sugarbaker, R. Bueno, Y. L. Colson, M. T. Jaklitsch, M. J. Krasna, S. J. Mentzer, M. Williams, A. Adams: *Adult Chest Surgery*, 2nd Edition: www.accesssurgery.com
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Complications

- **Intra-operative:** Long gap atresia, (more than 3 vertebral bodies)
- Can try to mobilize upper and lower pouches to reduce tension on anastomosis
- Operative placement of a gastrostomy tube and delayed primary repair (8-12 weeks)

The gap between the two ends of the esophagus tends to lessen because of spontaneous growth, possibly related in part to reflux of bolus gastric feedings into the lower esophagus, which makes primary repair more feasible.

- Alternative operations: “Foker” technique/Gastric Pull up/Esophageal replacement

Complications

- **Peri-operative:**
 - Air leak at tracheal repair site
 - Anastomotic leak of esophagus
- **Long Term**
 - Anastomotic stricture of esophagus
 - Gastroesophageal reflux w/wo stricture formation
 - Tracheomalacia

Post-operative Management

- **Routine milestones for post op care**
 - Assessment of patency of esophagus with esophagram (post-op day 5-7)
 - Oral feeds
 - Gastroesophageal reflux prophylaxis

Questions

- **Newborn with flat abdomen, and gasless appearance on abdominal X-ray.**

Which type of atresia?

- A
- B
- C
- D
- E

Questions

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Answer: A or B

Questions

Postoperative day 30 at home, patient after type C EA/TEF repair starts to take very long time to finish her bottle. Why?

- A delayed presentation of mediastinitis
- B undiagnosed cardiac anomaly
- C anastomotic stricture of esophagus
- D recurrent tracheo-esophageal fistula

Questions

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- D recurrent tracheo-esophageal fistula

Questions

Which type of esophageal atresia or tracheo-esophageal fistula is most difficult to diagnose/presents the latest??

- A
- B
- C
- D
- E

Questions

Which type of esophageal atresia or tracheo-esophageal fistula is most difficult to diagnose/presents the latest??

- A
- B
- C
- D
- **E (H-type fistula without atresia)**

Final Discussion/Review

- 1:3-4000 births, no risk factors
- distal TE fistula (Type C) is most common
 - 87% proximal atresia with distal fistula
- Respiratory distress can create emergency
- Often associated with tracheomalacia
 - Seal like barking cough
- VACTERL associated anomalies