تبييض محاضرة

Esophageal Atresia

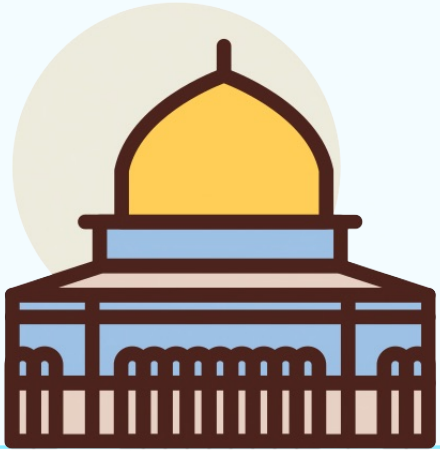
&

ET Fistula

د.أحمد عودة

Done by :

لجنة الطب والجراحة



Esophageal Atresia and Tracheo-Esophageal Fistula

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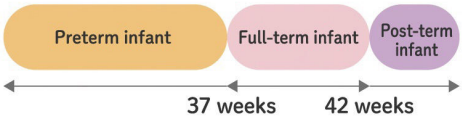
(case)

Child in ER with difficulty of feeding , excessive salivation , abdominal distention with vomiting , ……

History

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



- Neonatal history → 1. Gestational age ((Normal Gestational age (37-42) week))
  2. Mode of delivery
  3. Birth weight (2.5- 4.2) kg
  4. Apgar score (0-10) → The higher the score, the better The baby is doing after birth.

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Apgar score : standardised clinical assessment or test for newborn of 1-5 mins (soon) after delivery [Appearance (skin color), Pulse (heart rate) , Grimace (reflexes), Activity (muscle tone) , Respiration (breathing rate & effort)]

Apgar score

	Score 2	Score 1	Score 0
Appearance	Pink	Extremities blue	Pale or blue
Pulse	> 100 bpm	< 100 bpm	No pulse
Grimace	Cries and pulls away	Grimaces or weak cry	No response to stimulation
Activity	Active movement	Arms, legs flexed	No movement
Respiration	Strong cry	Slow, irregular	No breathing

→ A baby who score :

- 7 or above » good health
- lower score » need some medical care

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

Regurgitation & vomiting with feeding

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Vomiting is the ejection of contents of the stomach and upper intestine (digested) ; regurgitation is the ejection of contents of the esophagus (non-digested)

◆ The age of the patient is very important in paediatrics history.

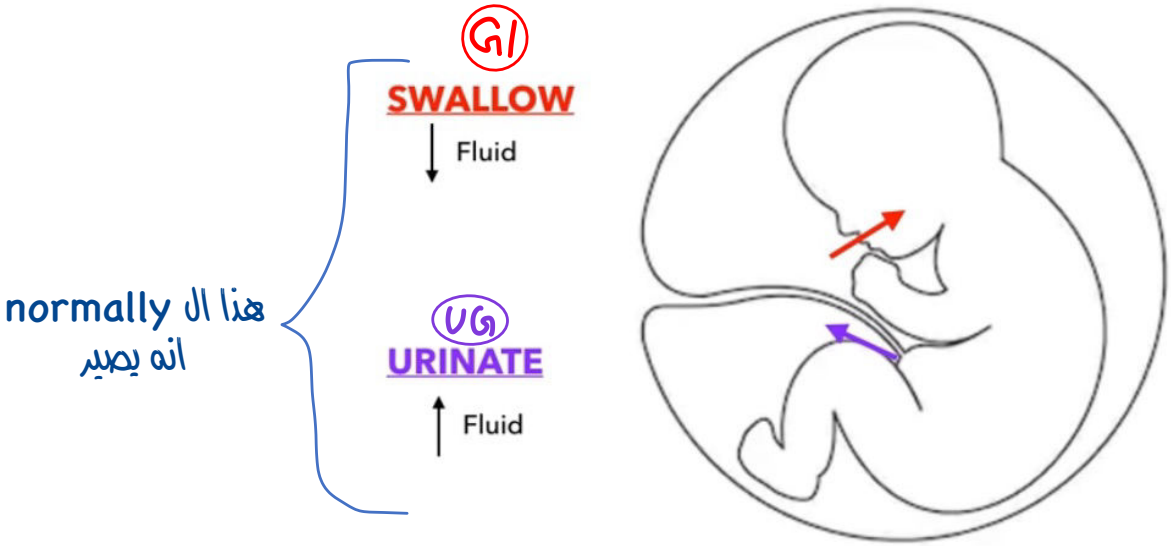
◆ Respiratory symptoms in neonates indicate GI abnormalities also any feeding difficulties should be taken seriously :

→ if it's spitting immediately after feeding indicates obstruction in pharynx ,

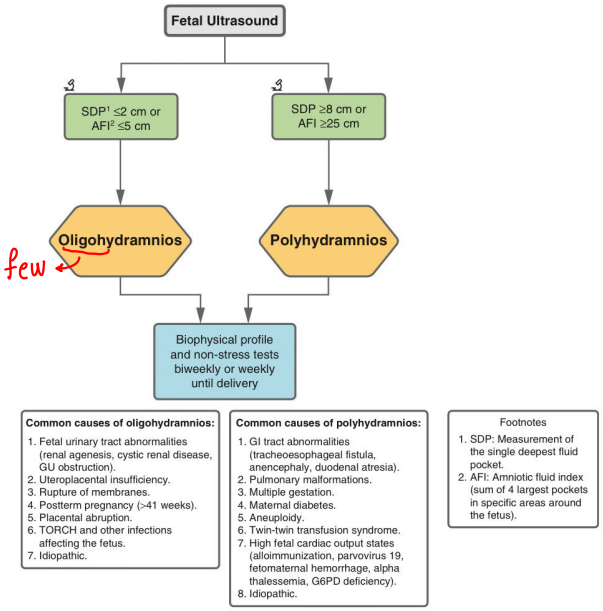
→ or abdominal distention with vomiting after 2 or 3 hours after feeding indicates spontaneous intra-abdominal perforation SIP .

→ Any excessive salivation goes with esophageal atresia

OLIGOHYDRAMNIOS VS. POLYHYDRAMNIOS



Amniotic Fluid Abnormalities



* oligohydraminos :

the problem is in the renal system → Etiologies include fetal urinary tract abnormalities <<which ↓ urination>> (renal agenesis, GU obstruction)

* polyhydraminos :

the problem is in the GIT → 40% idiopathic , Other etiologies include maternal DM <<which ↑ urination>> , pulmonary abnormalities (cystic lung malformations), fetal GI tract abnormalities <<which ↓ swallowing>> (duodenal atresia or pyloric atresia and it has two types : if atresia is incomplete → اخفpolyhadraminous ال رح يكون

If complete → obvious , ET fistula, anencephaly)

Physical Exam

- **What specifically would you look for?**
  - Vital Signs: HR 135bpm; RR 40/min; O_2Sat 97%sat on RA
    (Normal) (Normal in infants) (Normal)
  - Appearance: Well appearing
  - Relevant exam findings for a problem focused assessment:
    - oral secretions
    - mild upper abdominal distension

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Studies (Labs, Imaging)

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

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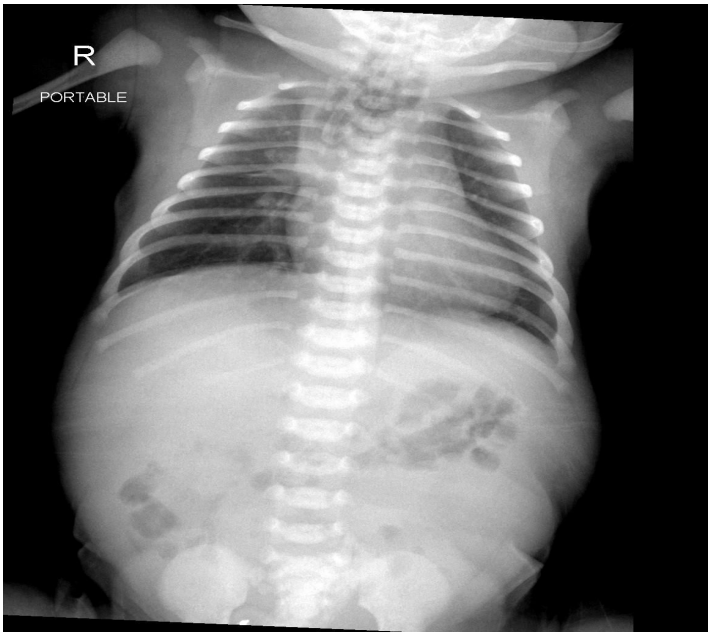
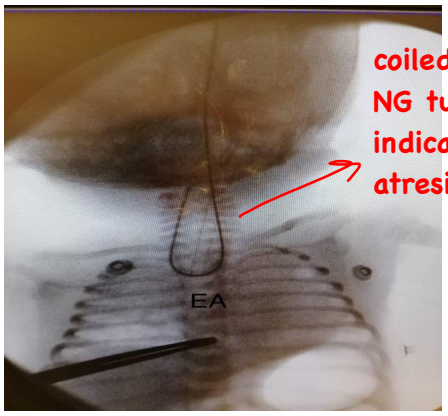
Study Results





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Gross's Anatomical Classification

So A & B absent gastric bubble

- Type A: → scaphoid abdomen (no air enter), most common anomalies occur there
  - Esophageal atresia without tracheoesophageal fistula. 8%
- Type B: → scaphoid abdomen, Res. symptoms
  - Esophageal atresia with proximal tracheoesophageal fistula. <1%
- Type C: → (distended abdomen), in cases of stomach juice regurgitation → aspiration pneumonia will occur.
  - Esophageal atresia with distal tracheoesophageal fistula. 87%
- Type D: → double fistula
  - Esophageal atresia with proximal and distal fistula. 1%
- Type E: → most commonly with Res. symptoms
  - Tracheoesophageal fistula without atresia. 4%
  - H-type fistula → or N type

most common

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Fistula : opening between two epithelial tissue

Clinical features :

- During pregnancy, the mother may develop polyhydramnios .
- Early after birth there are the followings :

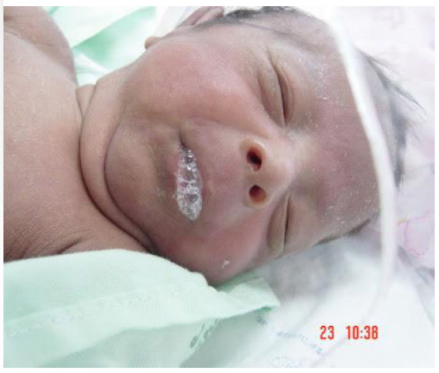
1- regurgitation of milk

2- Pseudo-excessive frothy salivation , Inhalation of saliva → choking , attacks of cough and cyanosis , hypoxia

3- respiratory symptoms

4- Infants with trachea-oesophageal fistula with distal esophageal pouch resulting in :

- Reflux of acidic gastric contents into trachea-bronchial tree → acid pneumonia .
- Excess air passes to the stomach and bowel which can be detected clinically by abdominal distension and resonant on percussion in types [3 (C) ,4 (D) ,5 (E or H)]



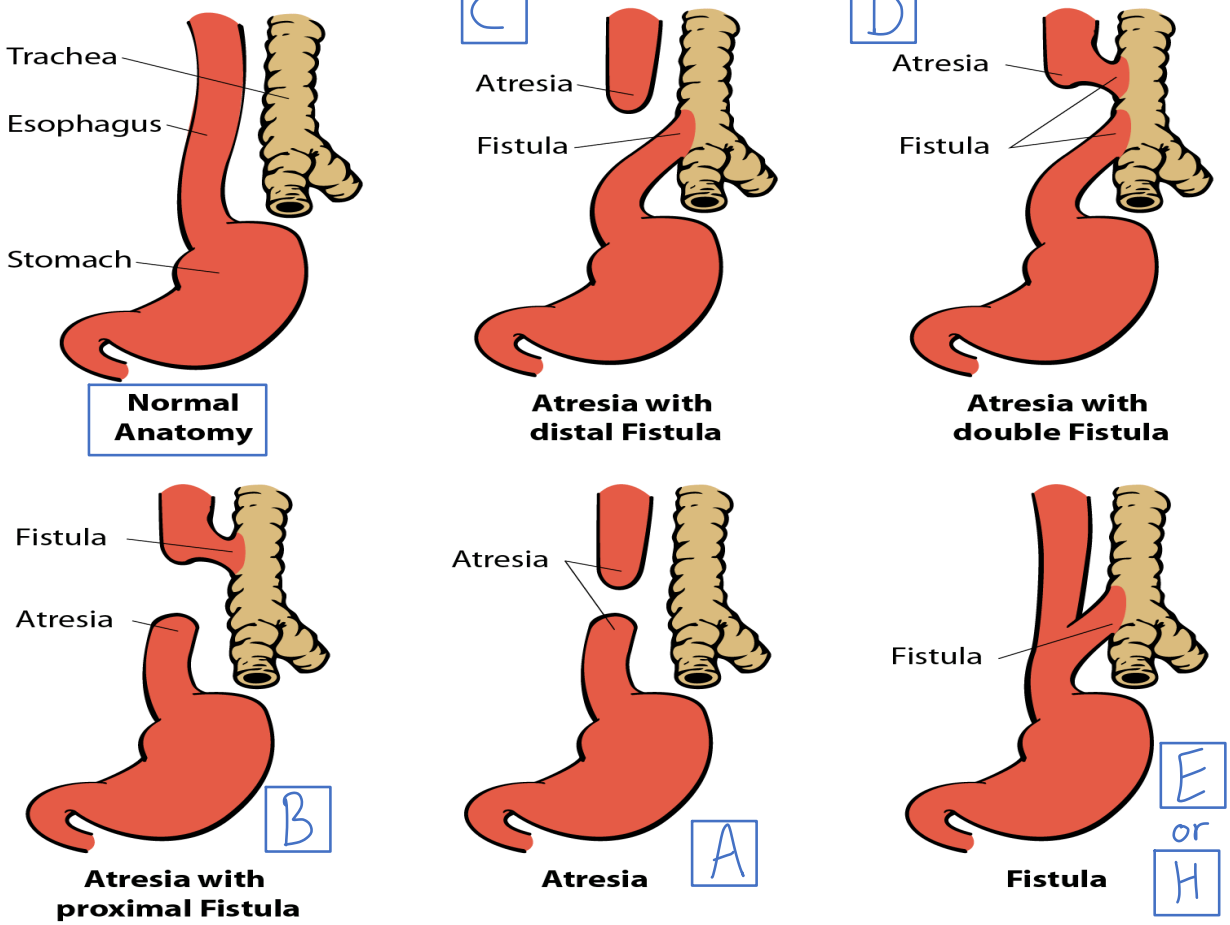
→ How to confirm diagnosis ?

NG tube , x-ray sometimes present with polyhydroamnios (specific diameter)

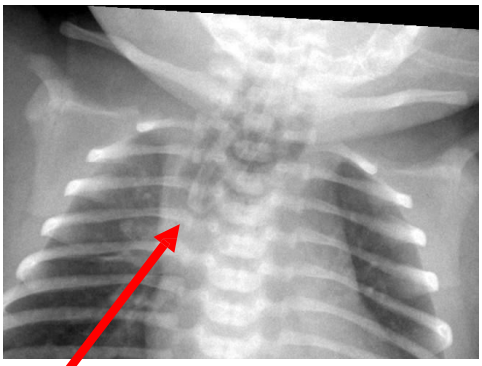
So if there's coiling of NG tube with abdominal distension indicates type C,D,E

but if it's coiling of NG tube with absent gas it indicates type A&B

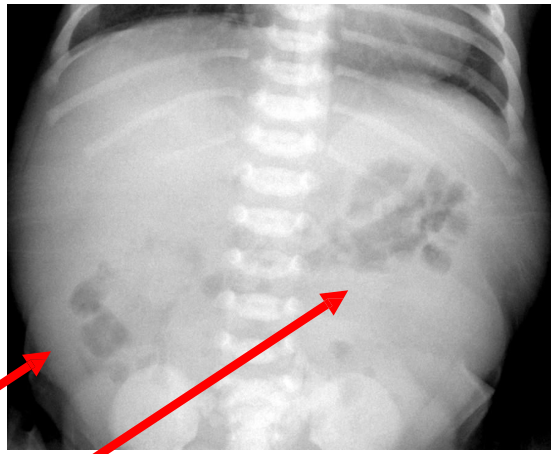
- If there's gas in the Stomach → either type C , D , E
- If there's No gas → A , B



Study Results



Coiled NG tube
= esophageal atresia



Air in GI tract =
tracheoesophageal fistula

(C , D , E)

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Case Discussion

- **Diagnosis**
  - Esophageal atresia with tracheo-esophageal fistula
- **Plans**
  - VACTERL work-up → To rule out any other associated anomalies
  - Consent: Rigid bronchoscopy and right thoracotomy, EA/TEF repair
  - Operative: 1: bronchoscopy
    2: ligation and division of TE Fistula
    3: esophageal anastomosis

Normal position of aortic arch is on the left so we open in the right side

to diagnose and don't miss the proximal Fistula cuz it's easily missed such in type B&D (2&4)

tiny & high in neck

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Patient usually have : 1.Paralysis , 2.Neurogenic bladder , 3.chronic constipation

VACTERL Complex of Associated Anomalies

Mesodermal defects

- **V**ertebral (tethered spinal cord, bony anomalies)
  - Sacral X-ray, spine ultrasound

Or butterfly anomaly

Anal cord is attached to Tissue around the spine. (Commonly at Level of L1)

- **A**norectal (imperforate anus)
  - Physical exam

(most common in males ? Recto-urethral bulbar fistula , most common in females ? Recto-vestibular)

- **C**ardiac (ASD, VSD, other structural anomalies)
  - Echo + Position of the aortic arch ((Normally is on the left side))
- **T**racheo **E**sophageal Fistula
- **R**enal (hydronephrosis, duplicate/absent kidneys)
  - Renal ultrasound
- **L**imb Anomalies (radial anomalies)
  - Physical exam

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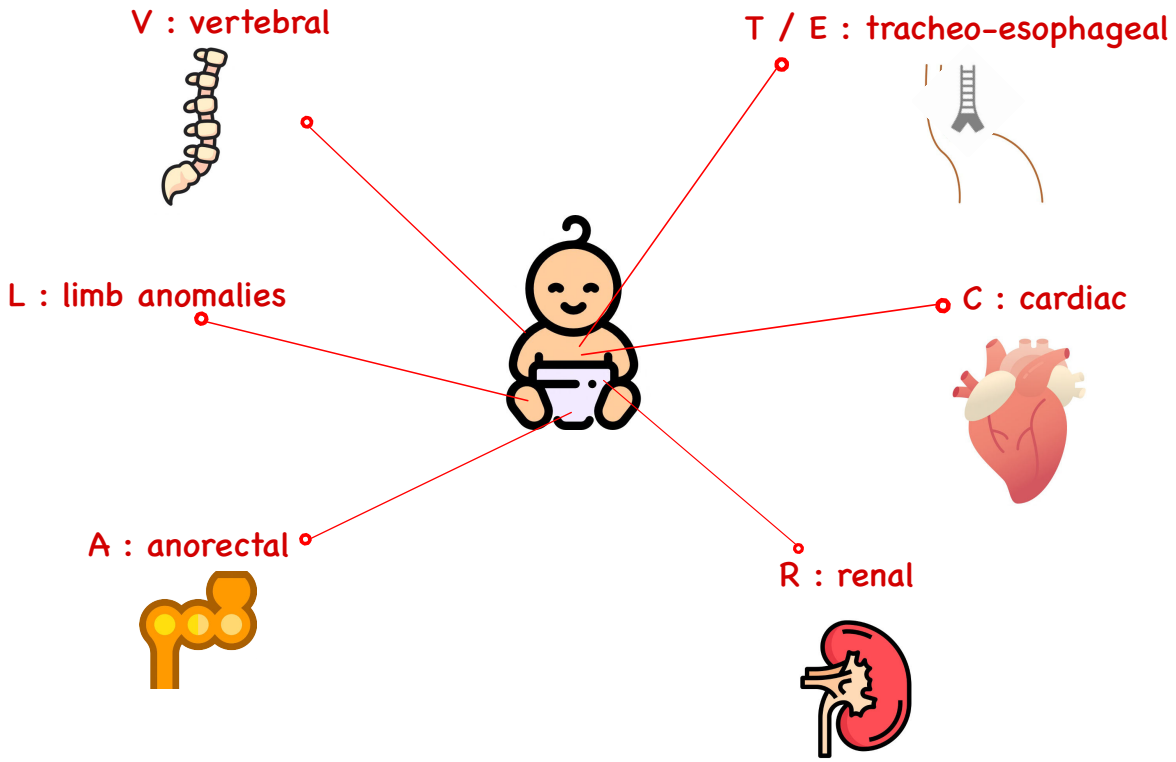
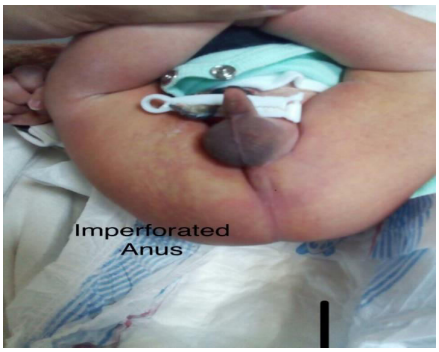


Vactrels syndrom : should contain more than 3 anomalies to call it vactrel

Imporforated anus usually occur with Fistula between rectum & urethra/ bladder
particularly the bulbar part or fistula between rectum & vaginal vestibula in female



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 (Type A)
- Least common in cases of H-type TEF

usually is delayed presentation , because Respiratory symptoms are treated as infection, least common associated with anomalies

Interval steps before surgery

4 fatal conditions in Neonate:
1- Gastric Distention
2- hyperthermia
3- acidosis
4- bradycardia

- **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**

fatal

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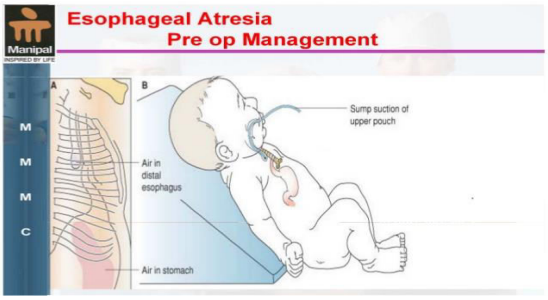
O2 saturation is acceptable until 92% in neonate
If below it is consider hypoxia , but if it's >96% still considered normal

Head-up position



endotracheal tube

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.**

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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

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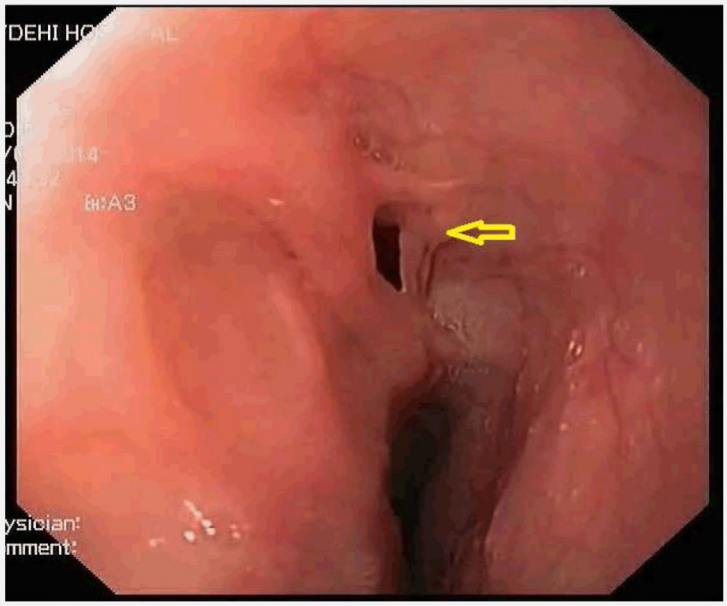


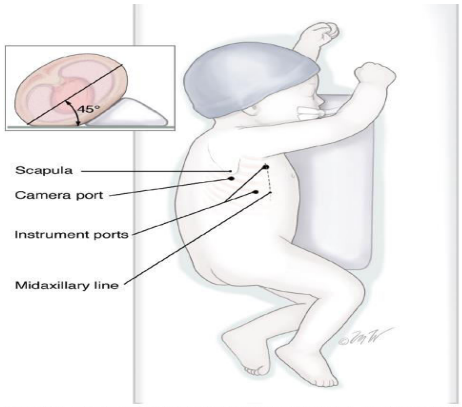
Tracheoesophageal fistula

If aortic arch on right : do left thoractomy

- Right posterolateral thoracotomy

except ٪٧

- 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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First two days = NPO , IV fluid with no glucose.

< 92% = mechanic ventilation. Nasal cannula or simple mask but not preferred it increase the abdominal distension & worsen the respiratory symptoms.

Also tube from mouth to trachea For nutrition; internal or parenteral (IV access) nutrition.

Rule out other atresia like small bowel atresia because if it's present we can't do internal nutrition to the patient.

Major sites for cannula = subclavian , femoral , jugular also called PICC (peripherally inserted central catheter) , but there's risk of thrombus , infection & irritation also concentration of glucose in small blood vessels should be very low so it doesn't cause irritation After stabilising the patient make sure there's no shunt so it can be simple posterior mediastinum thorcotomy TE repair.

Identify any leaks aspiration & make sure the chest tube is intact.

can be predicted pre-op by VACTREL
then check it by X-RAY

Complications

Short gab < 2 vertabrea fistula resection and anastomosis

- **Intra-operative:** Long gap atresia, (more than 3 vertebral bodies)

suspect in down syndrom

upper & lower parts of esophages are away from each other
> 5cm or >3 vertebrae considered large gap → depends on doctors skills

- 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) if non of these is possible close the abdomen & wait for 8 - 12 weeks so the bowel gets longer , chest او بقرب المعدة ع ال

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.
ممكن

→ procedure that encourages natural growth of esophagus

- Alternative operations: "Foker" technique/Gastric Pull up/Esophageal replacement (Using segment from the small bowel)

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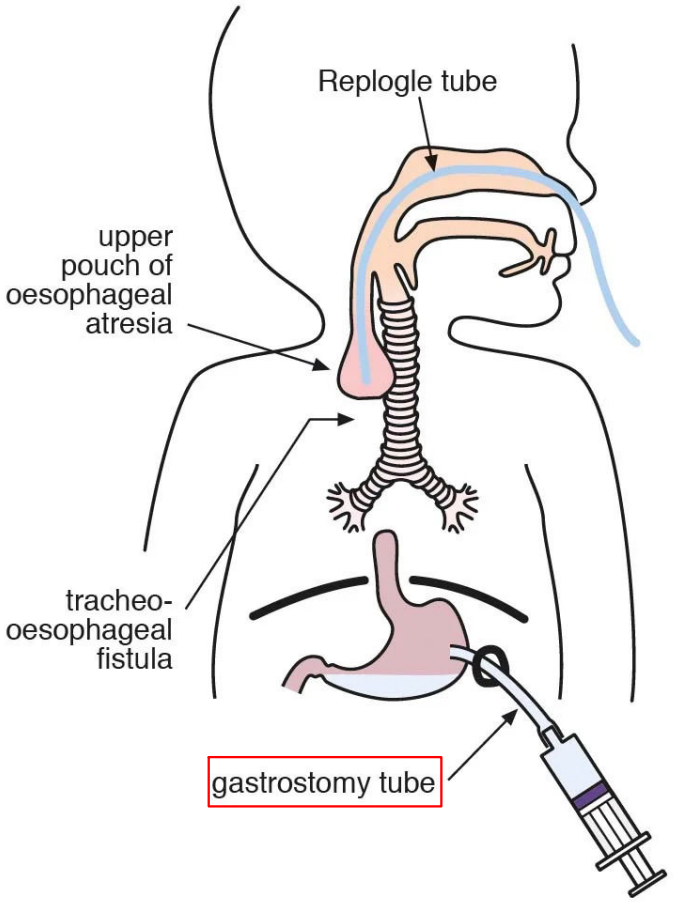
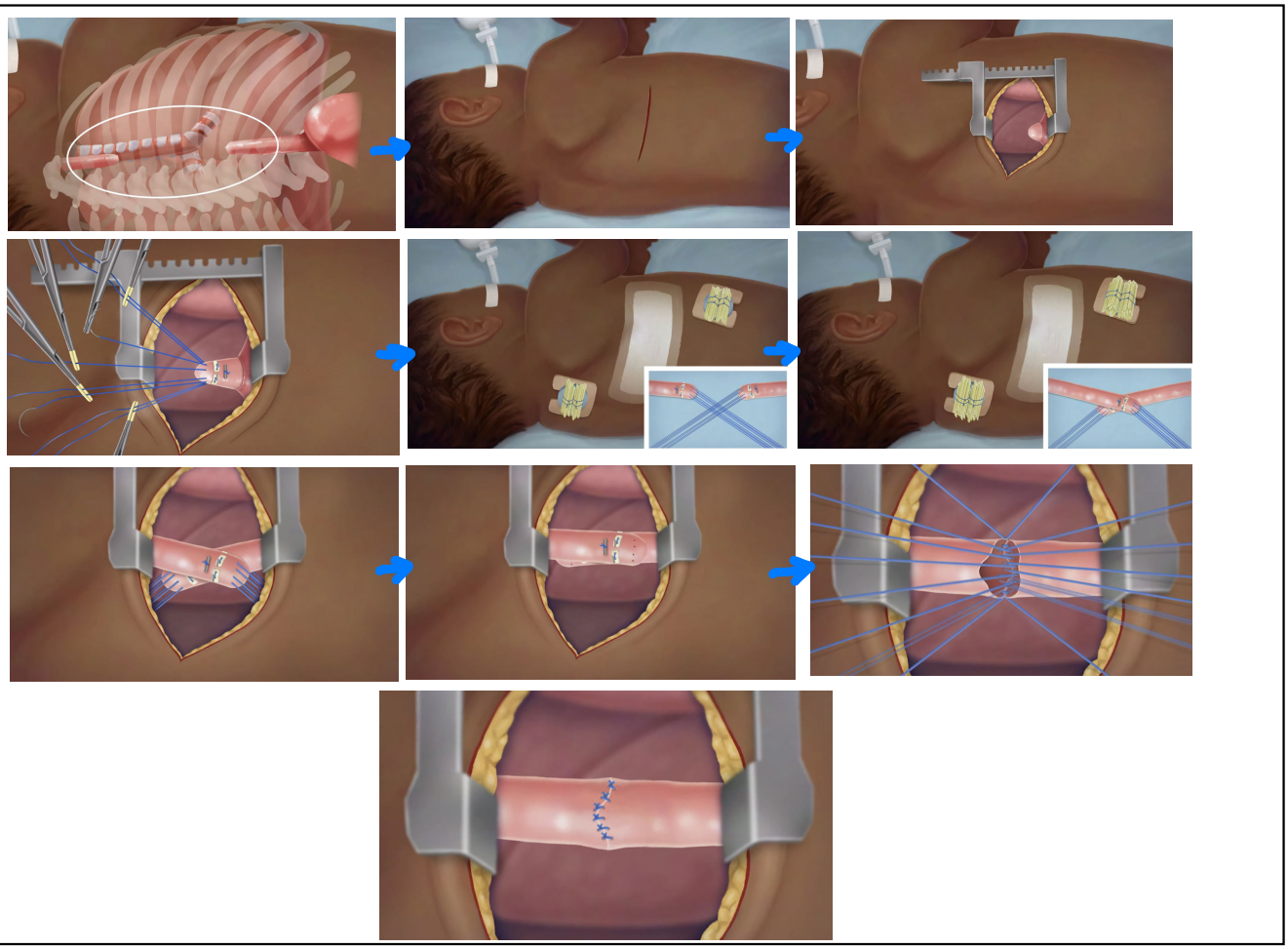
more than 5 vertabrae we dont do thoractomy but gastrostomy :: after 8_12 week the gab will decrease : we do anastomosis

→ prevent apirstion by regular suction or esophagestomy Then replacment





Complications

- **Peri-operative:** (Post operative)
  - Air leak at tracheal repair site
  - Anastomotic leak of esophagus

with chest tube

May cause :
- Pneumothorax
- pneumo-mediastinum
- subcutaneous-emphysema

May causes sepsis

- **Long Term**

-Anastomotic (↑ upper) stricture of esophagus

Presented with vomiting / aspiration

Narrowing at the join site (anastomosis site)

-Gastroesophageal reflux w/wo stricture formation

Lower part of esophagus

- Tracheomalacia

structural abnormality of the tracheal cartilage allowing collapse of its walls and airway obstruction.

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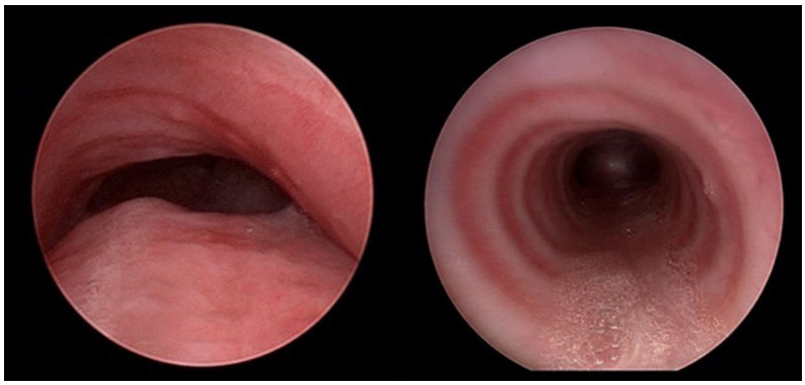
Post.op = chest tube bubbles , subcutaneous emphysema, pneumothorax which indicates for air leak

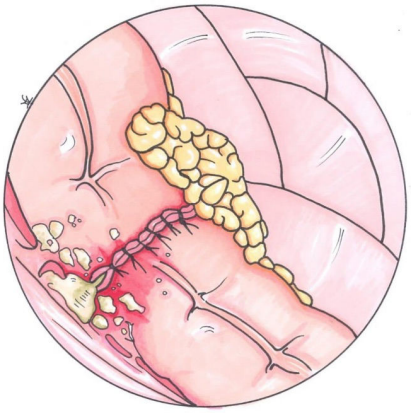
Salivation + milk in the chest tube = anastomosis leak can develop to sepsis so re-do the surgery

On long term suspect :

1. stricture = do upper GI contrast study
2. Tracheomalacia = collapse. (SOB & stridor)

Tracheomalacia





Anastomotic leak

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

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Questions

- **Newborn with flat abdomen, and gasless appearance on abdominal X-ray. Which type of atresia?**
  - A
  - B
  - C
  - D
  - E

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Questions

- **Newborn with flat abdomen, and gasless appearance on abdominal X-ray. Which type of atresia?**
  - A
  - B
  - C
  - D
  - E

Answer: A or B

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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

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Questions

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Questions

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

- A
- B
- C
- D
- E

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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)**

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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

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Archive

*** Polyhydramnios is frequently observed in all of the following conditions except:**
Select one:
a. Esophageal atresia
b. Duodenal atresia
c. Pyloric stenosis
d. Hirshsprung's disease
e. Congenital diaphragmatic hernia

*** Concerning esophageal atresia, all true except.**
a. The most freguent type is a proximal oesophageal atresia with a distal Tracheo-oesophageal fistula.
b. There is a high incidence of associated anomalies.
c. It may be associated with maternal polyhydromnios.
d. Treated involves a right thoracotomy and anastomosis of oesophagus.
e. It effects 1/100 live birth.

*** Esophageal atresia without fistula , which is wrong ?** Gas in intestine

*** Which of the following is most common after primary repair of esophageal atresia with distal trachea-esophageal fistula?**
a. Anastomosis leak.
b. Esophageal stricture.
c. Recurrent trachea-esophageal fistula.
d. Gastroesophageal reflux.
e. Tracheomalacia requiring aortopexy.

*** The statement regarding tracheo-oesphageal atresia with out Fistula are true except:-**
a. Excessive salivation.
b. Rattling respiration.
c. Abdominal distention.
d. Choking and cyanosis during feeding.
e. Abdominal x-ray shows no air in the stomach.

*** most common type of eosophagial atresia >**

distal fistula with proximal atresia

*** The newly born regurgitates its entire first and every feed, pours saliva almost continuously. There are manifestation of:**

A. Imperforated anus
B. Congenital diaphragmatic hernia
C. Atresia of duodenum
D. Atresia of the esophagus
E. Meckel's diverticulum

*** A child with confirmed esophageal atresia with no distal tracheoesophagealfistual, select the correct** answer: AXR will show gaseless abdomen.

*** All of the following are features of isolated esophageal atresia, EXCEPT:**

A. Excessive salivation
B. Inability to pass nasogastrial tube
C. Distended abdomen
D. Pneumonia
E. Cyanotic attacks after feeding

اللهُمَّ انصُر أهل غَزَّة وثبِّت أقدامهم.
اللهُمَّ احرُس أهل غَزَّة بِعينك التي لاتَنام.
اللهُمَّ كُن لأهل غَزَّة عوناً ونصيراً، وبدِّل خوفهم أمناً وأماناً.

اللهُمَّ اجبُر كسرهم، واشفِ مَرضاهم، وتقبَّل شُهداءَهم بِرحمتكَ.
اللهم سخر لهُم ملائكة السماءِ وجُنودَ الأرض...
اللهم انصرهم على من عاداهم وافتح لهم فتحًا قريبًا.