

تبييض محاضرة

Neonatal intestinal obstruction

د. أحمد عودة

Done by :



→ From age 1day to 1month

Neonatal Intestinal Obstruction



*Ahmad Oudeh MD, FACS
Assistant Professor of Pediatric Surgery
School of Medicine, Mutah University*

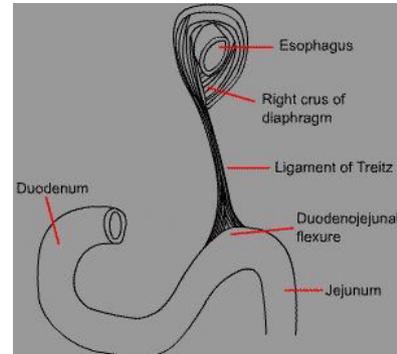


- 1 - hypertrophic pyloric stenosis
- 2- Duodenal and Intestinal Atresia
- 3- malrotation
- 4- meconium ileus
- 5- Hirschsprung's disease

Ligament of treitz : fix the duodenojejunal junction to the posterior abdominal wall
 ((it is not found in cases of malrotation))

Obstruction may be ::

- **upper IO** → proximal to ligament of treitz
- **lower IO** → proximal to ligament of treitz



* the most common symptoms are :

- delayed passage of meconium
- abdominal distention
- vomiting (**bilious** or non-bilious)

the obstruction is distal to the ampulla of vater , so not every upper IO is bilious

Hypertrophic Pyloric Stenosis (HPS)

→ Non-bilious vomiting

- Occurs in 1.5-4 per 1000 children.
- More common in boys, white, first-born.
- Peak occurrence 3-8 weeks of life.
- Pyloric muscle hypertrophy and hyperplasia results in gradual complete obstruction of the pyloric channel

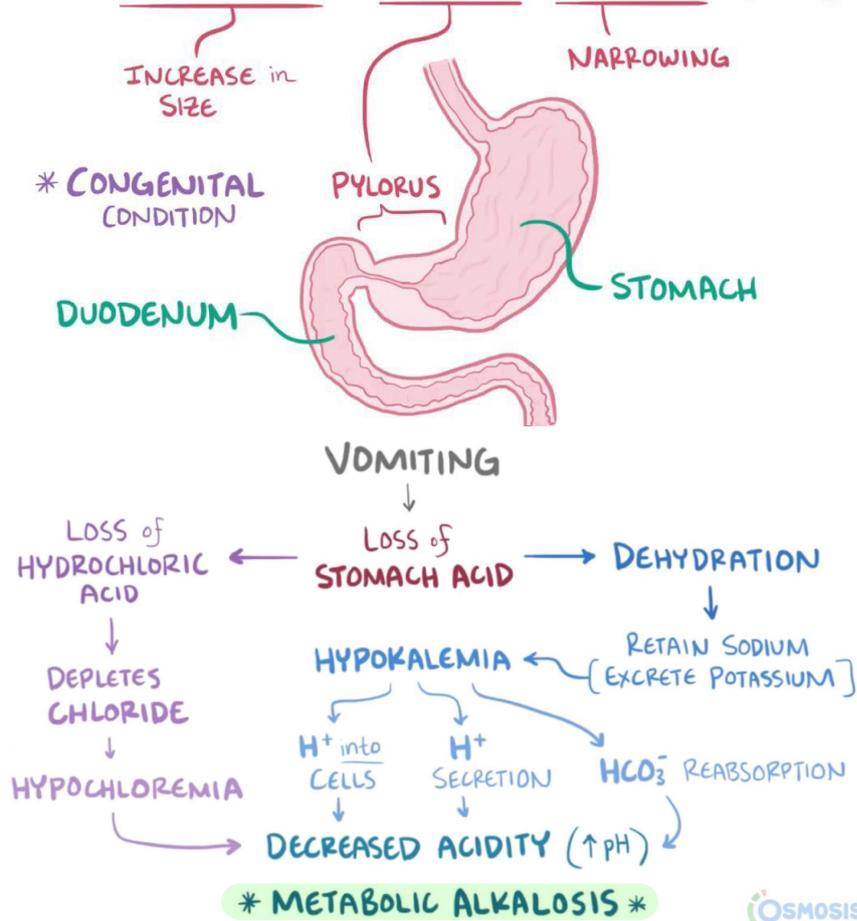
The process take 1 week

- Vomiting → loss of hydrochloric acid, Na^+ , and K^+
 - Hypochloremic hypokalemic metabolic alkalosis
 - Characterized by progressive projectile nonbilious vomiting without signs of infection
 - Progressive until all feed, each feed.

If it diagnosed early (Before complete obstruction) , is non-projectile

يعني بالأول يكون مش كل feed تسبب عنده vomiting
 بعدين بتصير مع كل feed

HYPERTROPHIC PYLORIC STENOSIS (HPS)



- On physical examination, the neonate usually appears well if the diagnosis is made early. However, depending on the **duration** of symptoms and **degree** of dehydration, the neonate may be lethargic.

Inspection

- Visible peristaltic waves may be present in the mid to left upper abdomen.

Palpation

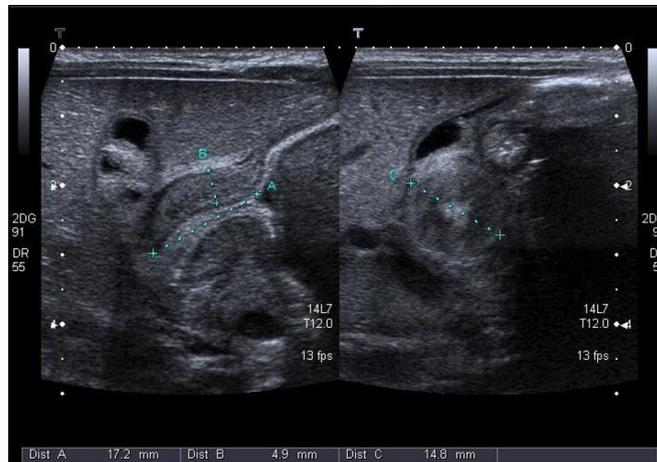
- The pylorus is palpable in 70–90% of patients. To palpate the pyloric mass (i.e., “olive”), the neonate must be relaxed. → If absent, this will **not** rule out HPS

• Diagnosis:

- **US** has become the standard technique for diagnosing HPS.
- The diagnostic criteria for pyloric stenosis is a muscle thickness of ≥ 4 mm and a pyloric length of ≥ 16 mm., **Diameter of pylorus > 12 mm**
- If the US findings are equivocal, then an upper gastrointestinal series can be helpful in confirming the diagnosis (**String Sign**). **Or double railroad track sign**
Indicates narrowing/ not complete obstruction ←

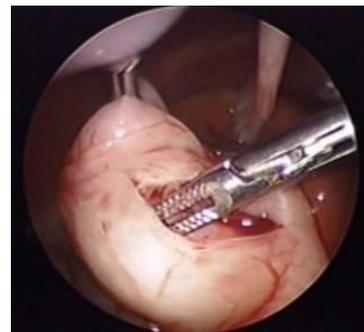
US ::

Black : tissue / fluid



Management

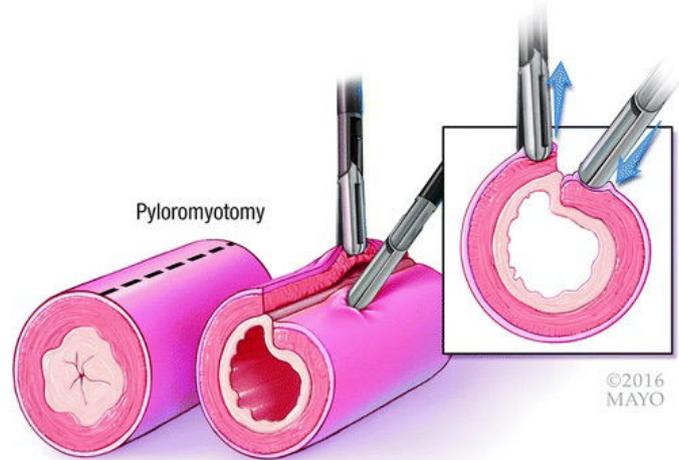
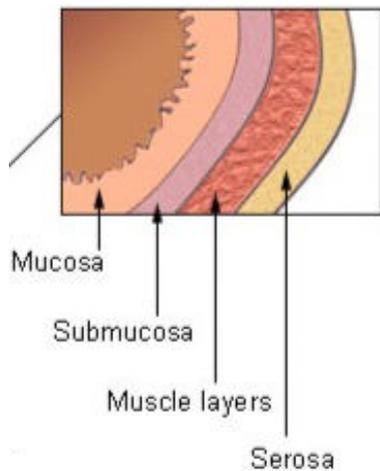
- **Pre-op**
 - NPO, IV fluids, avoid NG tube ↗ Because it will worsen electrolyte disturbance
 - Correction of metabolic alkalosis required for safe anesthesia.
- **Surgery:**
- Pyloromyotomy (Open or Laparoscopic)
 - ↖ ↗ Upper midline



why we correct metabolic alkalosis ... ??

- when there's decrease in K → there is muscle weakness → So with anesthesia , muscles can not act perfectly → affect respiration

* in pyloromyotomy → release the **serosa & musculosa** (the **mucosa** is patent) ,, division of circular muscle fibers without entering the lumen/mucosa.



specific complication :

1- injury to mucosa ((perforation)).

← شو الحل ???

- close the mucosa, and do the pyloromyotomy on the opposite side

2- injury to duodenum ((very bad)) → causes biliary peritonitis

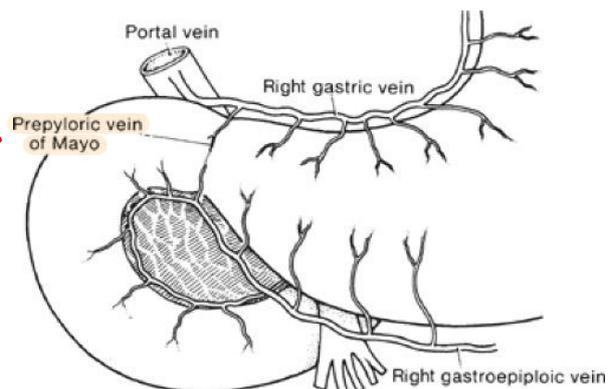
3- bleeding.

4- wound infection.

5- aspiration pneumonia.

- open at the length of the stenosis guided by **US** , or use **Land mark** : vein of Mayo

Vein cross the pylorus ←

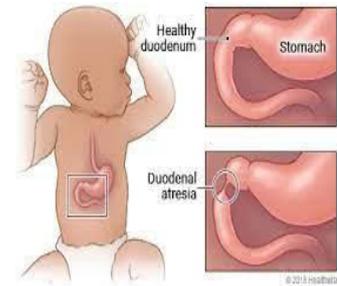


Found early during pregnancy

Duodenal and Intestinal Atresia

Non-bilious Vomiting doesn't rule out duodenal atresia

- **Duodenal atresia (DA)** is due to failure of recanalization.
- Occurs in 1 per 5000–10,000 live births, affecting boys more commonly than girls.
- Associated anomalies have been reported in 45–65% of cases. Most commonly, trisomy 21 is found in almost half the cases.
- The classic presentation is that of bilious emesis within the first hours of life. In about 15% of cases, however, the atresia is preampullary and the emesis is nonbilious. ((in the first part of duodenum))
- Upper abdominal distention may or may not be present.
- Rather, the abdomen usually is scaphoid.



Diagnosis and Management

- Pre-natal ultrasound with polyhydramnios and double bubble
- Post-natal abdominal X-Ray with double bubble sign.
- Surgical repair is duodenoduodenostomy.

One bubble for stomach, the other for duodenum

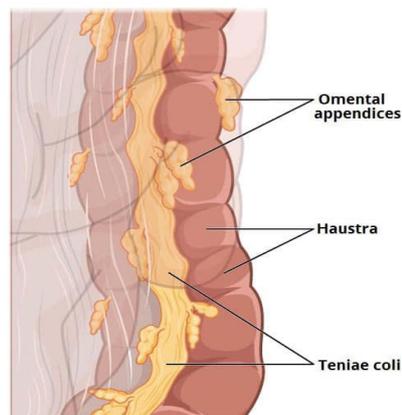
As the atresia more proximal, it is more obvious



- **Intestinal Atresia** is due to late isolated mesenteric vascular insults and interference with the segmental blood supply to the small intestine. → which causes necrosis to the affected area
- Occurs in approximately 1 in 5000 live births. It occurs equally in males and females.
- Premature infants more common than full term.
- Jejunum more common than Ileum.
- Associated anomalies are rare, unlike DA.
- Bilious emesis is always present, abdominal distention, failure to pass meconium. jejunal atresia, AXR show triple bubble. (stomach ,
- **Diagnosis:** duodenum , small bowel)
 - Prenatal: Polyhydramnios
 - Postnatal: AXR shows dilated bowel loops on AXR
Contrast enema study (The standard choice)

Intestinal atresia → found late during pregnancy

- (ilium , jejunum)
- we can't distinguish large and small bowel on X-ray in children, due to absence of haustra



→ If extra-luminal, the bowel is intact.

* types of small bowel atresia:

Type 1: intra-luminal web, normal bowel length

Type 2: fibrous cord, normal bowel length

→ Between proximal & distal loop, (mesentery is intact)

Type 3A: complete atresia with mesenteric defect

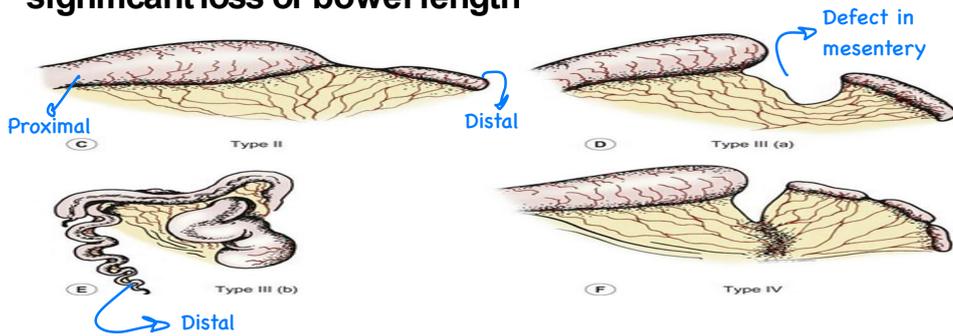
Type 3B (Apple peel or Christmas tree deformity):

complete atresia with mesenteric defect and distal small bowel in helix configuration around ileocolic pedicle, significant loss of bowel length **The worst**

Type 4 (String of sausages deformity): multiple atresias, significant loss of bowel length

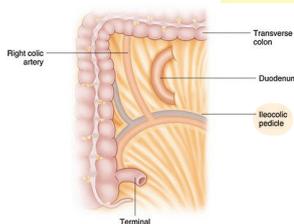
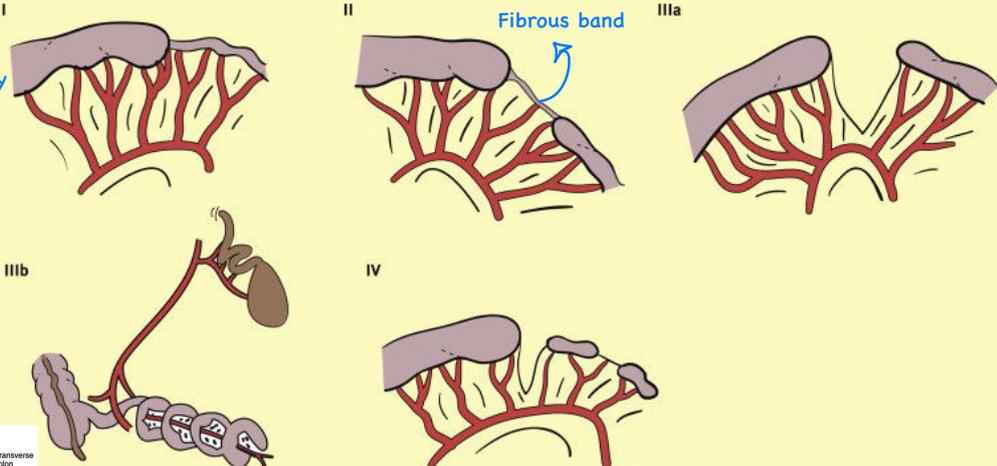


Triple bubble



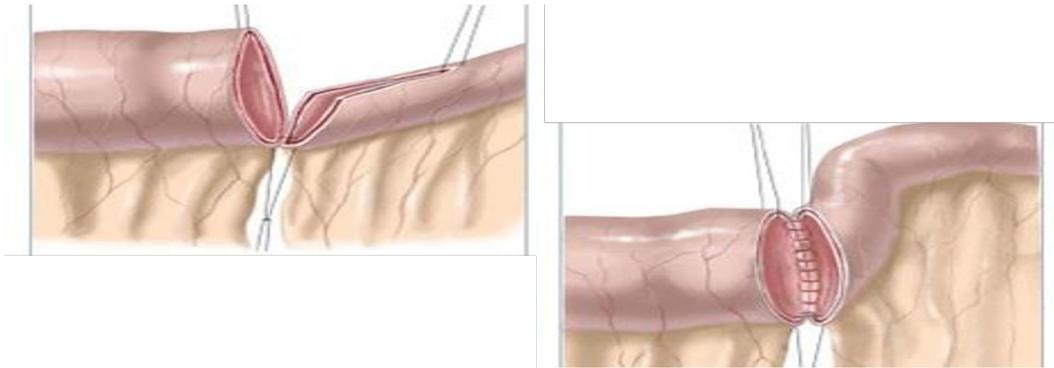
Types of small intestinal atresia

Intra luminal web :
Proximal and distal loops are in continuity
→ management: enterotomy



Management

- **Abdominal exploration with resection of proximal, dilated bowel with primary end-to-end anastomosis.**



Malrotation

- 1/6000 live birth incidence.
- 90% present within first year of life (75% within 1 month of life)
- Disease of abnormal rotation or non-rotation of intestines **Failure of normal 270° counterclockwise bowel rotation**
- Presentation varies but most severe type is with **midgut volvulus** which is due to twisting of the abnormally fixated small bowel around a narrow-based mesentery and SMA
- **Bilious emesis in newborn is malrotation until proven otherwise**
- UGI is diagnostic test of choice
 - ↳ Contrast study , showing cutoff in duodenum.

- * NoT every malrotation is volvulus
- * Every volvulus is malrotation
- if malrotation does not cause volvulus , patient can tolerate it and live normally along his life.

at the 3rd week of Gestation , midgut migrate to yolk-sac
→ anti clockwise

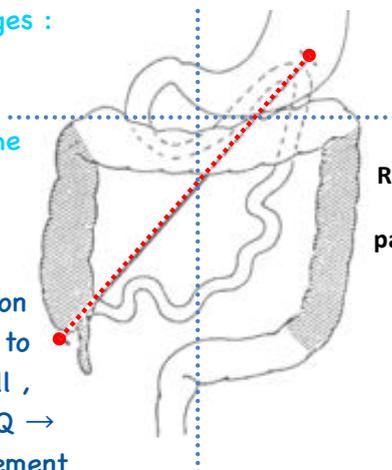
rotation at 3 stages :

1. 270°
2. 90°

then return to the abdomen

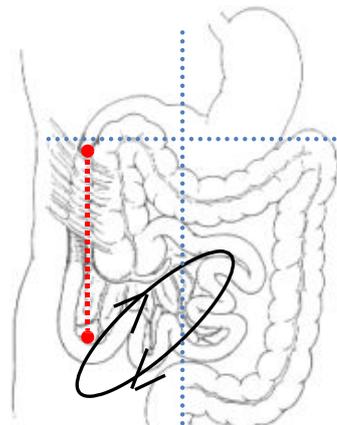
The aim of rotation is to fix the DJJ to the posterior wall , cecum at the RLQ → prevent any movement of SR

Normal



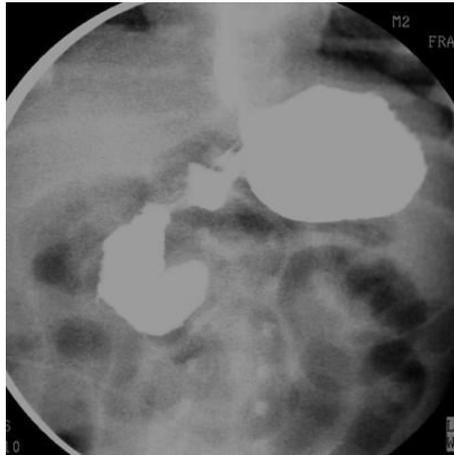
Red dotted lines represent the path of SMA and its branches

Malrotation



Black circle demonstrates the clockwise torsion of the midgut on the straightened SMA

DJJ is at the RUQ
cecum at the RUQ



DJ junction lies right to spine → indicates

matrotation

- if there's complete absence of the passage of contrast beyond the junction → volvulus

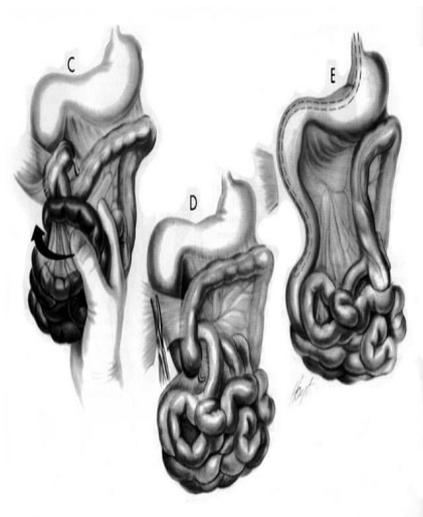
Operation

→ Transverse incision

• Open Ladd's Procedure

- RUQ transverse incision or midline laparotomy
- Eviscerate intestinal contents
- Detorse counter-clockwise if volvulus is present
 - Resect grossly necrotic bowel
- Release Ladd's cecal bands
- Broaden the small intestine mesentery
- Incidental appendectomy
- Place small bowel on right and colon on left

* Note



* **Note** : After detorsion, **look for the bowel (wait 5 min)**

1. If it return to it's normal color (revascularized)

→ **No Resection**

2. if there's necrosis, gangrene, not return to normal

→ **do Resection**

***why appendectomy is done?**

- with Fixation of bowel, the appendix is on the Left side ,so if appendicitis occur , it will not be expected, so Incidentally Removed.

• **preoperative management:**

-NPO

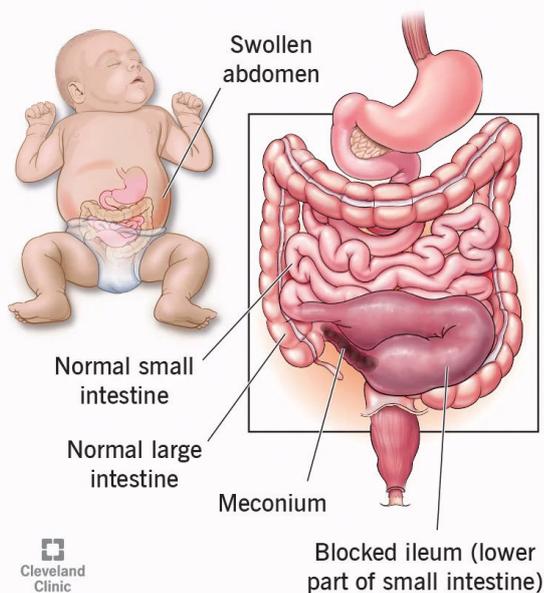
-IV fluid

-NG tube.

Meconium ileus (MI)

- **Definition:** obstruction of an intact distal small intestine due to inspissated meconium in the ileum and sometimes colon
 - Present at birth: failure to pass meconium and abdominal distention
 - **Simple** (50% of cases): obstruction with intact intestine
 - **Complicated:** perforation, peritonitis, ascites
- **Incidence:** 1/3500 live births
 - Occurs in 10-20% of patients with **cystic fibrosis (CF)** (earliest manifestation)
- CF is autosomal recessive genetic disorder, mutation in the CF transmembrane regulator (CFTR) gene on 7q31 locus.
- Altered CFTR gene causes abnormal chloride transport.
- Meconium thickened due to pancreatic and intestinal glandular insufficiency, thickened secretions.  **With CF , pancreatic enzymes is deficient.**
- **Treatment:** Contrast enema if simple, resection if complicated, treat underlying CF disease if present.  **Diagnostic & therapeutic**

Meconium Ileus



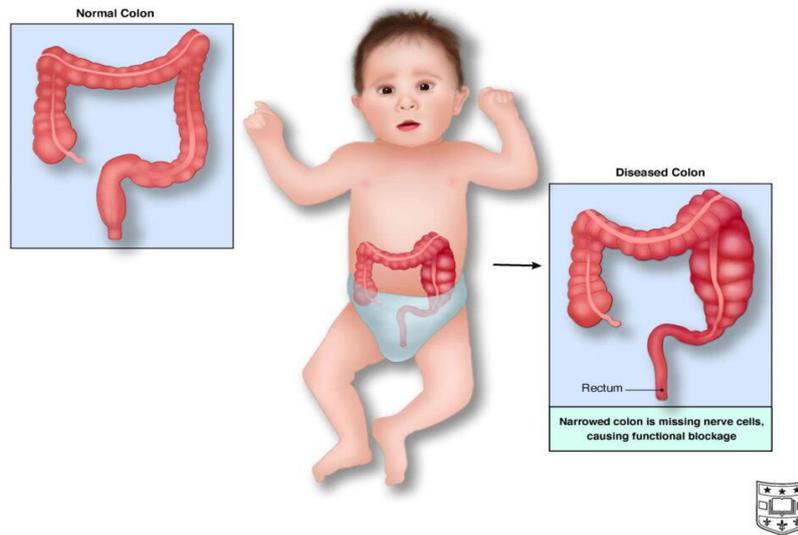
abnormal chloride transport : So, Na^+ is still intracellular , Cl^- is Intraluminal \rightarrow water is low in intraluminal space \rightarrow meconium thickened.

Normally, the CFTR protein pumps chloride ions out into the thick mucus of the digestive and respiratory tracts, which helps pull water into the mucus to make it less viscous. When the CFTR protein isn't working properly, chloride becomes trapped inside the cell, preventing water from thinning out the body's secretions. As a result, the mucus secreted by these cells is unusually thick and sticky. This mucus builds up and obstructs the organs where it is secreted. In newborns with CF, the meconium can become so thick that it becomes stuck in the final part of the small intestine , also known as the terminal ileum, causing a blockage in the GI.

Hirschsprung Disease (HD)

- Also known as “congenital aganglionic megacolon”.
- Characterized by the absence of parasympathetic ganglion cells in the myenteric and submucosal plexuses of the intestine due to failure to migrate to distal bowel (craino-caudal migration).
come from neural crest ectoderm
- Distal bowel fails to relax. *((Collapsed)) , proximal is dilated*
Inadequate relaxation & peristalsis
- Leads to **functional, distal bowel obstruction.**
- 1 in 5000 live births
- 4:1 male-to-female ratio

Hirschsprung Disease



Distribution of Disease

- All patients with Hirschsprung Disease have absence of ganglia in rectum. In all five types, rectum is involved.
- Proximal distribution of aganglionosis varies:
 1. Short-segment (rectum only)
 2. Rectosigmoid (~75% of all patients)
 3. Long-segment (distal to mid transverse colon)
 4. Total colonic HD (mostly associated with trisomy 21)
 5. All of colon and some or all of small bowel (rare)

Presentation

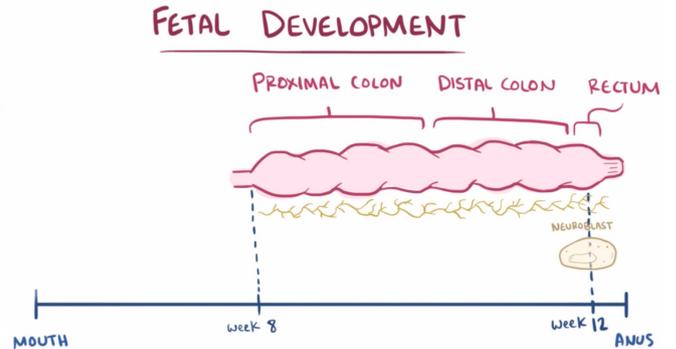
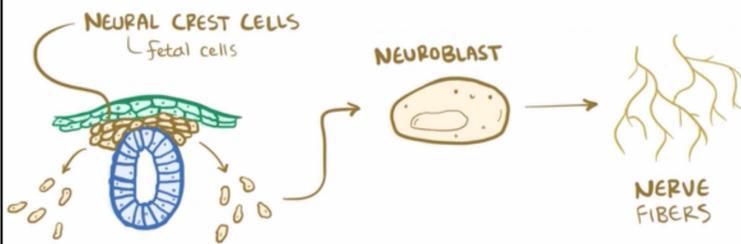
- Most patients present during the neonatal period with neonatal distal intestinal obstruction. (DIOS)
 - Some patients may present in toddler years or older with failure to thrive, chronic constipation, and/or enterocolitis (HAEC)  Grow
-  Hirschsprung associated enterocolitis

Neonatal Presentation

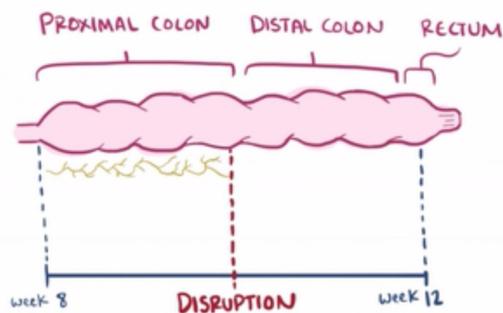
- **Delayed passage of meconium** (>24 hours)
- Abdominal distension
- Poor feeding
- Poor weight gain  Due to stasis
- Enterocolitis (explosive, foul-smelling stools): Fever and tachycardia
- May or may not develop bilious vomiting

* Internal sphincter is hypertonic, stool accumulate in the rectum, sigmoid (stasis) → translocation of Bacteria → enterocolitis.

FETAL DEVELOPMENT



FETAL DEVELOPMENT



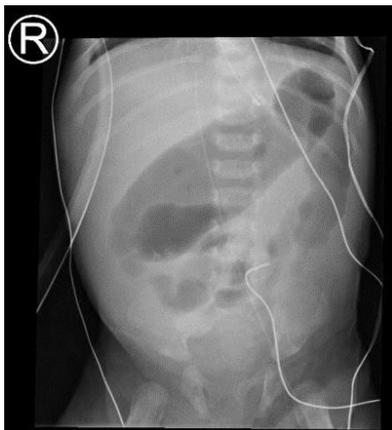
Diagnostic Studies

- Abdominal x-ray (Dilated bowel loops)
 - Centrally
 - Peripherally
- Contrast enema (not “barium enema”)
- Rectal biopsy presence of ganglion cells in the rectum rules out hirschsprung disease.
- +/- Anorectal manometry

→ to assess the sphincters pressure.

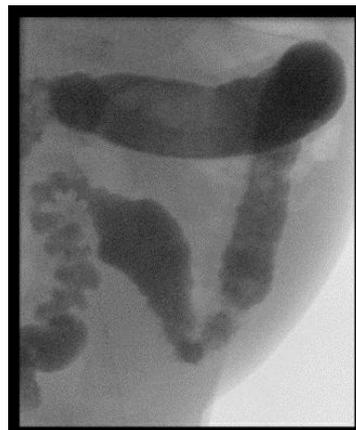
- or if you enters foley's catheter.
- if you do DRE, when you pass the internal sphincter, gush of stool & Gas is characterestic to HD. (the most reliable sign)

يعني اول ما يدخل الاصبع في الdre يصير gush يعني بطلع الstool كله ونحس في غاز يطلع من الجسم



- Dilated bowel loops
- No air in rectum

X-Ray



- Reversal of recto-sigmoid ratio (rectum smaller than sigmoid)
- Transitionzone (Funnel shape) Enema

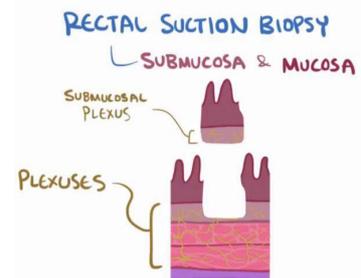
Rectal biopsy

Full thickness
Section biopsy

Pre-ganglionic

- Look for absence of ganglia + nerve hypertrophy
- Stained for Acetylcholinesterase historically (positive in hypertrophic nerves) and more commonly, Calretinin (negative in aganglionosis) Neurotransmitter

(NORMAL BIOPSY → MUCOSA)



Management

- NPO ←
- IVF ←
- IV antibiotics with anaerobic coverage ←
- Rectal irrigation (Evacuation)
- Pull through procedure is the definitive treatment, usually after age of 3 months. Why? → Less complications on the patient
- If rectal irrigation is not working at any time, or diagnosis was made at old age, leveling colostomy is the better choice before pull through procedure (at level of ganglionic cells) → aganglionic لو عملتها على
Resection of aganglionic segment مش راح تشتغل

+relieve the obstruction :

1- NG tube

2- Stool evacuation

- Rectal irrigation is done through foley's catheter is put through the rectum let the pass (evacuation) .
Not more than 2 times daily

تقریباً

- leveling colostomy : performed for HD at the level of normally innervated ganglion cells as ascertained on frozen section intra operatively



23-15 Neonatal Emesis

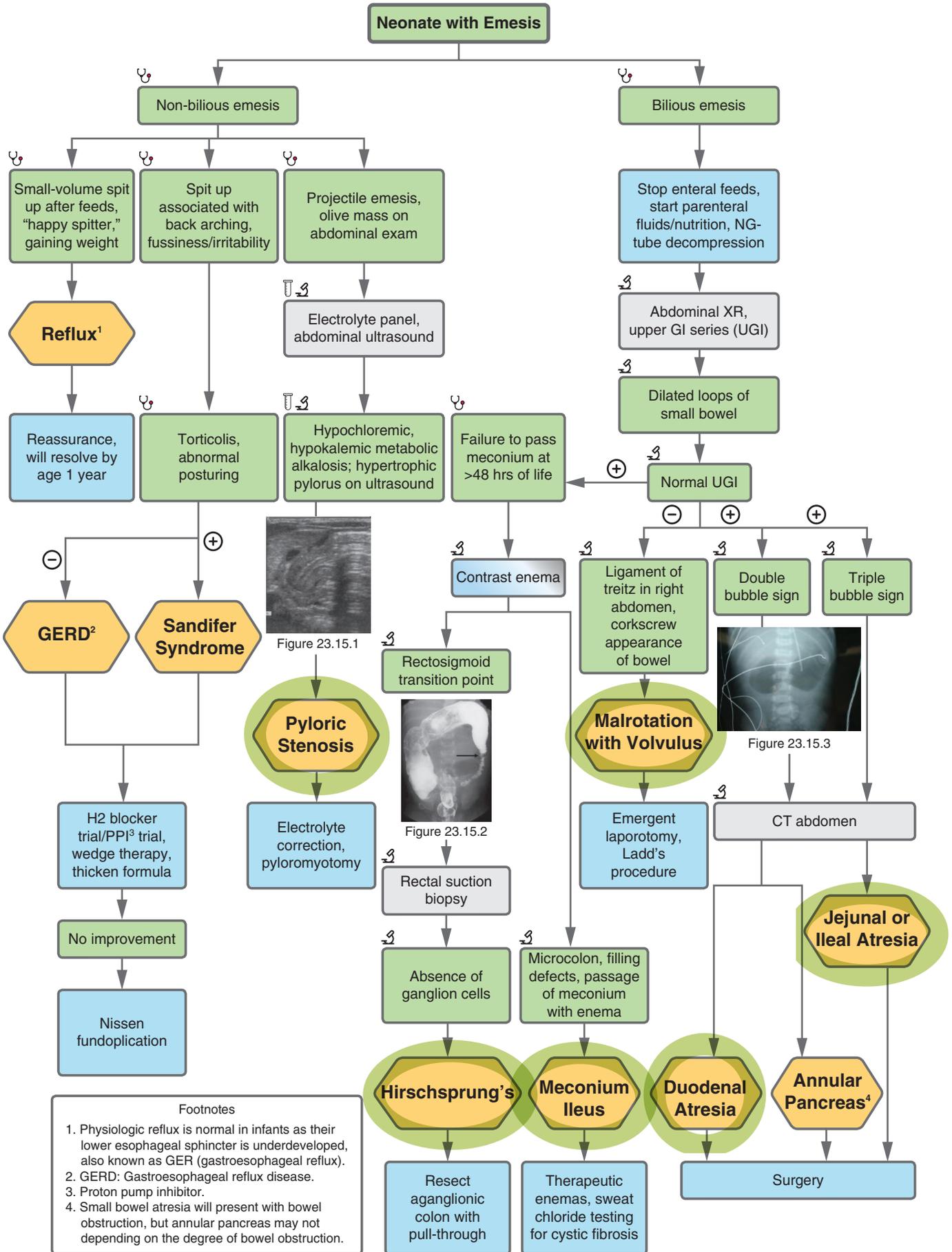


FIGURE 23.15

Archive

* In infants with duodenal atresia, all of the following are true except: Select one:

- a. There is increased incidence of Down syndrome
- b. It can be detected by prenatal ultrasound examination
- c. It may occur in infants with situs inversus, malrotation, annular pancreas and anterior portal vein.
- d. It is best treated by gastroenterostomy
- e. There is high incidence of associated cardiac defects

* A 3 days old baby has bile stained vomiting since birth, What is the most likely diagnosis.

- a. Congenital pyloric web.
- b. Congenital hypertrophic pyloric stenosis.
- c. Duodenal atresia.
- d. Esophageal atresia.
- e. Sliding type hiatus hernia.

* billous vomiting at 3-4 weeks children dx:

malrotation (other choices were pyloric hypertrophy , duodenal atresia , hirschsprung disease)

* A newly born presented with persistent bile stained vomiting. Straight, erect abdominal radiograph showed “double bubble” appearance in the upper abdomen. This infant has:

- A. Meconium ileus
- B. Duodenal atresia
- C. Imperforated anus
- D. Hypertrophic pyloric stenosis
- E. Congenital intussusception

* The following statements are true except.

- a. Duodenal atresia is treated by duodeno-duodenostomy.
- b. Duodenal atresia is commonly associated with Downs syndrome.
- c. Meconium ileus occurs in approximately 50% of children with cystic fibrosis.
- d. Neonatal intestinal obstruction is characterized by bilious vomiting, abdominal distension and failure to pass meconium.
- e. Ano- rectal atresia is more common in boys than girls.

* Regarding Infantile hypertrophy pyloric stenosis all are true, Except:-

- a. None bile stain vomiting.
- b. Visible Peristalsis waves.
- c. palpable olive like mass at the epigastric area.
- d. Pyloroplasty is the operation of choice.
- e. The ultra sound is the diagnostic means

* Concerning hypertrophic pyloric stenosis of infants all of the following are CORRECT, EXCEPT:

- A. Manifestations starts usually 3-4 weeks after birth
- B. Bile stained projectile vomiting is the presenting symptom in all cases
- C. A visible peristalsis after feeding may be seen passing from the left to right across the upper abdomen
- D. Constipation and loss of weight are usually present
- E. Surgery is the treatment of choice

* Which one is true from the following statement.

- a. Infantile hypertrophic pyloric stenosis is the commonest cause Of non- bilious vomiting in infants.
- b. In equivocal cases of infantile hpertrophic pyloric stenosis, Where a pyloric tumor is not palpable, a barium meal is the only Investigation of choice.
- c. Infantile hypertrophic pyloric stenosis should be treated by immediate Emergency laparotomy.
- d. Intussusception occurs most frequently in the (2-3) year age group.
- e. Ileo-ileal is the most frequent type of intussusception.

* Concerning hypertrophic pyloric stenosis of infants all of the following are CORRECT, EXCEPT:

- A. Bile free projectile vomiting is the presenting symptom in all cases
- B. Following feeding a peristaltic wave may be seen passing from left to right across the upper abdomen
- C. The hypertrophied pylorus can be felt under the liver like an olive
- D. Loss of weight and constipation are usually present
- E. These manifestations start to appear one or two days after birth

* 1 month old infant bilous vomiting :

midgut malrotation

* Hirschsprung disease true except :

Decrease cholinesterase

* **All the statements about the Hirschsprung's disease are true except :-**

- a. There are no ganglion cells in the myenteric plexus.
- b. **The dilated proximal bowel has no ganglion cells.**
- c. The enterocolitis is an important potential cause of mortality.
- d. It may involve the small intestine.
- e. Contrast enema identifies the transition zone

* **Which of the following statements about Hirschsprung's disease is true?**

- a. It is a congenital aganglionosis of the myenteric plexus.
- b. **Meconium passage is typical of the disease.**
- c. It leads to lack of relaxation of the non-innervated bowel.
- d. The last 10 cm of the bowel proximal to the dentate line normally lacks plexuses.
- e. Ultrashort disease is usually detected at birth.

* **29. The following are causes of intestinal obstruction in the neonates except:-**

- a. Meconium ileus.
- b. Hirschsprung's disease.
- c. Duodenal atresia.
- d. **Intussusception.**
- e. Colonic atresia

* **hirschsprung disease: wrong about it**

- A. Emptying of barium after 24 hours
- B. **not occur in small intestine**
- C. Transition zone on barium enema
- D. Proximal dilated part is ganglionic
- E. Septic colitis is a cause of death

* **hirschsprung disease wrong ...**

dilated segment aganglionic

* **All the statements related to uncomplicated Meconium ileus are true except:-**

- a. Usually this is due to hyper viscous meconium.
- b. Soap-bubble appearance with few if any fluid levels.
- c. The diagnosis of cystic fibrosis should be confirmed.
- d. **Urgent Bishop-koop enterostomy operation.**
- e. Intravenous hydration with water soluble contrast enemas

* A plain abdominal radiograph may be pathognomonic for meconium ileus when disparate bowel loops are associated with , Select one:

- Small bowie air-fluid levels with absence of gas in the rectum
- Portal venous gas and free intra-abdominal air
- Soap-bubbly appearance in the right lower quadrant and absence of small bowel air-fluid levels
- Left upper quadrant speckled calcifications and distension of the stomach and duodenum
- Dilated colon and intrascrotal calcifications

*.For a patient with uncomplicated meconium ileus all of the following are true except:

Urgent enterotomy

Iv rehydration with gastrographin enema

Mottling of meconium on AXR

Enterocolitis is a major complication

اللهم انصر اهل غزّة وثبت اقدارهم.
اللهم احرس اهل غزّة بعينك التي لا تنام.
اللهم كن لاهل غزّة عوناً ونصيراً، وبدّل خوفهم أمناً وأماناً.

اللهم اجبر كسرهم، واشفِ مرضاهم، وتقبل شهداءهم برحمتك.
اللهم سخر لهم ملائكة السماء وجنود الأرض...
اللهم انصرهم على من عاداهم وافتح لهم فتحة قريباً.

