Neonatal intestinal obstruction

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Introduction

- Neonatal intestinal obstruction is one of the common pediatric emergencies.
- Incidence : 1 in 2000 live births.
- A wide range of congenital anomalies may result in neonatal bowel obstruction.

Causes of intestinal obstruction in the neonatal period

- Congenital atresia and stenosis constitute the majority of cases.
- Other causes include
  - Malrotation
  - Volvulus
  - Meconium ileus
  - Hirschsprung disease
  - Anorectal malformations

Causes of intestinal obstruction in the neonatal period

- Gastric
  - Early pyloric stenosis
  - Pyloric web or atresia
  - Epidermolysis bullosa pyloric atresia syndrome
- Duodenum
  - Stenosis
  - Atresia
  - Malrotation
  - Annular pancreas
- Jejunum-Ileum
  - Stenosis
  - Atresia
  - Malrotation
  - Meconium ileus
  - Vitello-intestinal duct remnant
  - Intussusception
  - Milk curd obstruction
- Colonic
  - Stenosis
  - Atresia
  - Imperforate anus
  - Poorly developed colon e.g.
  - megacystis microcolon intestinal
  - hypoperistalsis syndrome
- Global
  - Duplication anomalies
  - Internal hernia or inguinal hernia
  - Volvulus with or without (e.g. about a
  - Meckel's band) malrotation
  - Neoplasm

Etiology
113 etiologies in 106 patients

CAUSE	NO.	%
Anorectal malformation (ARM)	39	34.5%
Hirschprung's disease	24	21.1%
Atresias SI	12	10.5%
Malrotation	12	10.6%
Duodenal atresia	9	8%
Inguinal hernia	4	3.6%
Pyloric stenosis	4	3.6%
Necrotizing enterocolitis (NEC)	3	2.7%
Colon atresia	2	1.8%
Duplication cyst	2	1.8%
Meconium ileus	2	1.8%
TOTAL	113	100%

Presentation

- “A neonate with bilious vomiting or aspirate is considered to have intestinal obstruction until proved otherwise.”
- The presenting symptoms could be any combination of the following:
  - Bilious vomiting
  - Abdominal distension
  - Delayed passage of meconium
  - Sepsis

Bilious vomiting

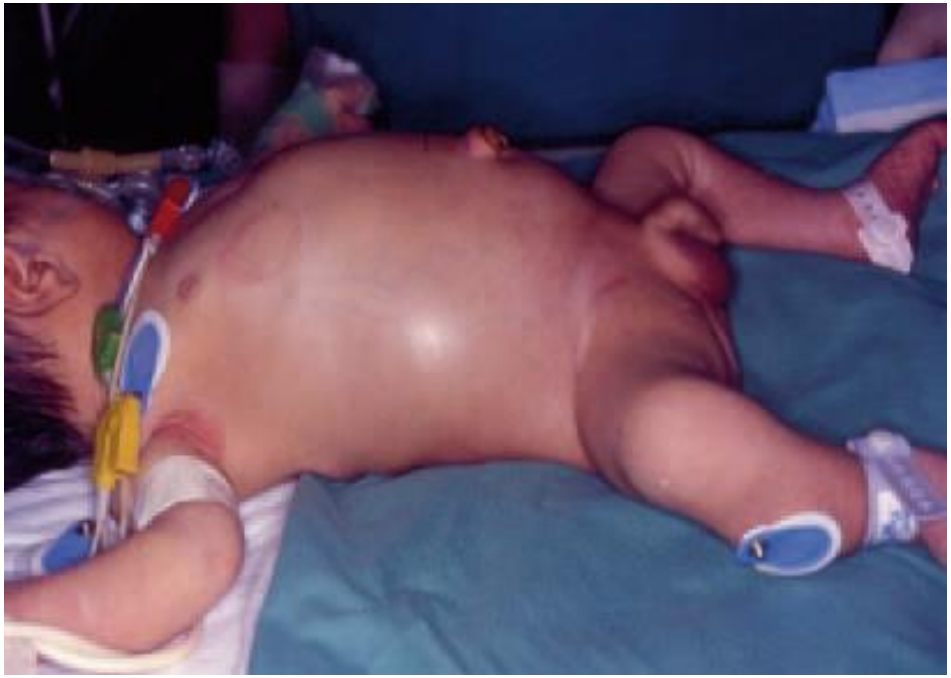
- Bilious vomiting is synonymous with intestinal obstruction, be it functional or mechanical.

Examination

- dehydration
- abdominal distension
- Visible and palpable bowel loops
- Erythema and tenderness of abdominal wall
- The presence of a normal anus
- Associated anomaly

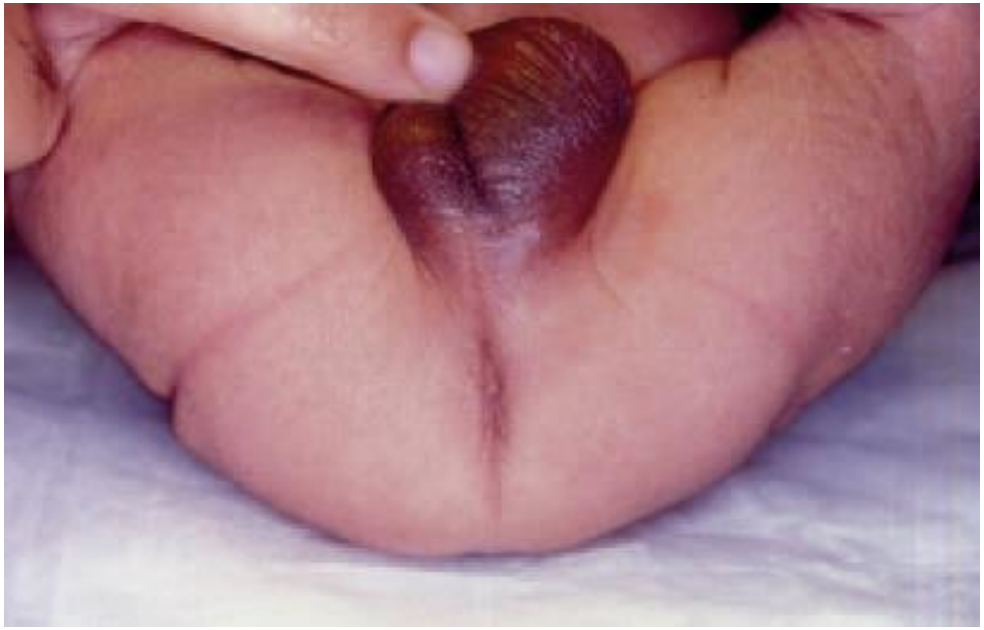
A newborn with marked abdominal distension

- suggesting
  - distal obstruction
  - necrotizing enterocolitis
  - sepsis
- The more marked the abdominal distension, the more distal is the obstruction



Perineal Examination

- Absent anus
- Rectal stimulation



Vomiting

- Vomiting :
  - Non-bilious vomiting: Colorless or milky if a feed has been taken.
  - Bilious vomit:
- Neonatal bilious vomiting should be considered to be a surgical emergency until proved otherwise.

Constipation

- A term neonate should pass meconium within 24 h of life.
- Delayed passage of meconium: beyond 48 hours

Passage of meconium

- is absent in complete duodenal and small intestinal obstruction or in anorectal malformations
- meconium passage may be:
  - present in malrotation
  - delayed in Hirschsprung's disease
  - Occurs by an abnormal route (by a fistula)

Abdominal Radiology

- The simplest and most informative radiological procedure is the plain abdominal X-ray.
- confirmation of bowel obstruction with some information about the level of the obstruction.

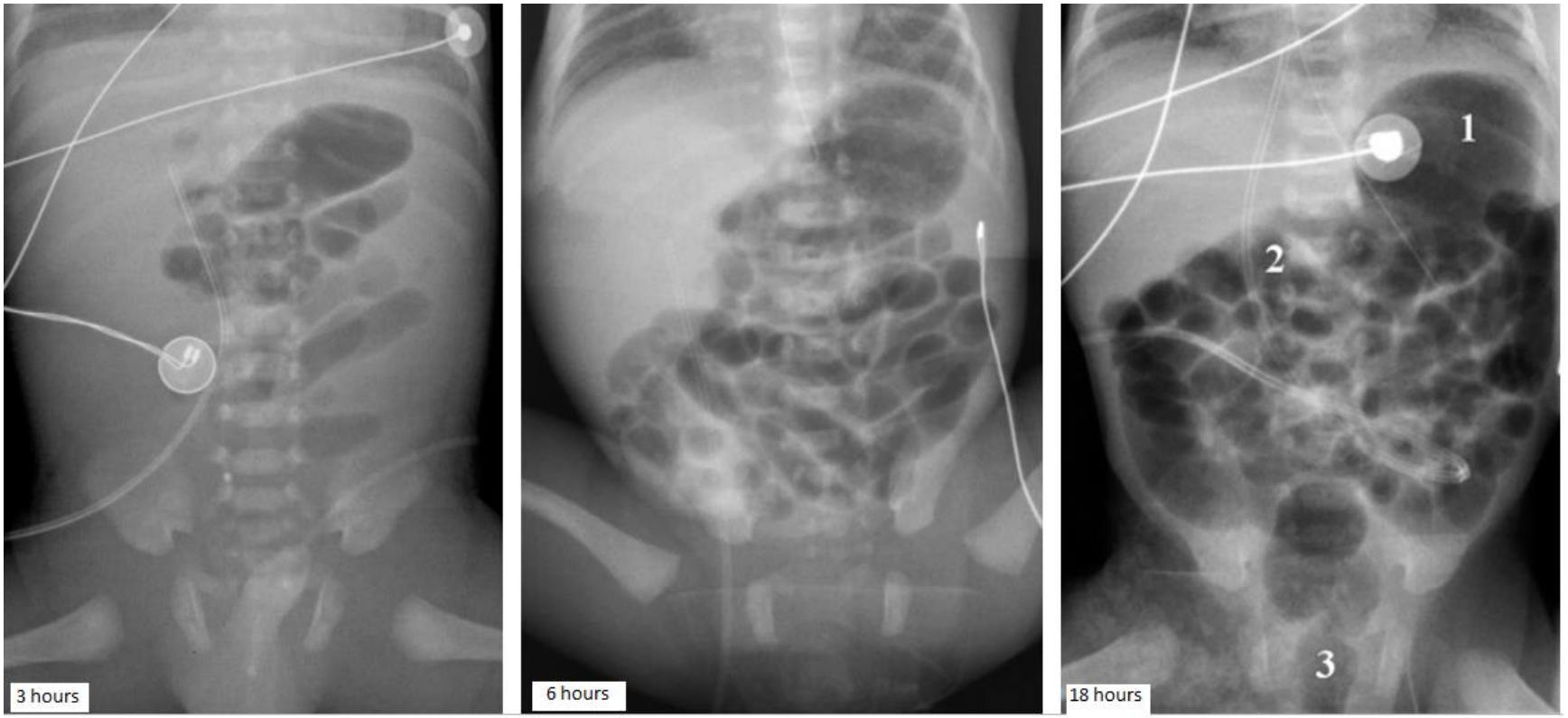
Imaging Studies

- Plain x-ray abdomen:
  - supine film
  - lateral decubitus
  - Invertogram or prone cross-table lateral film for anorectal malformations

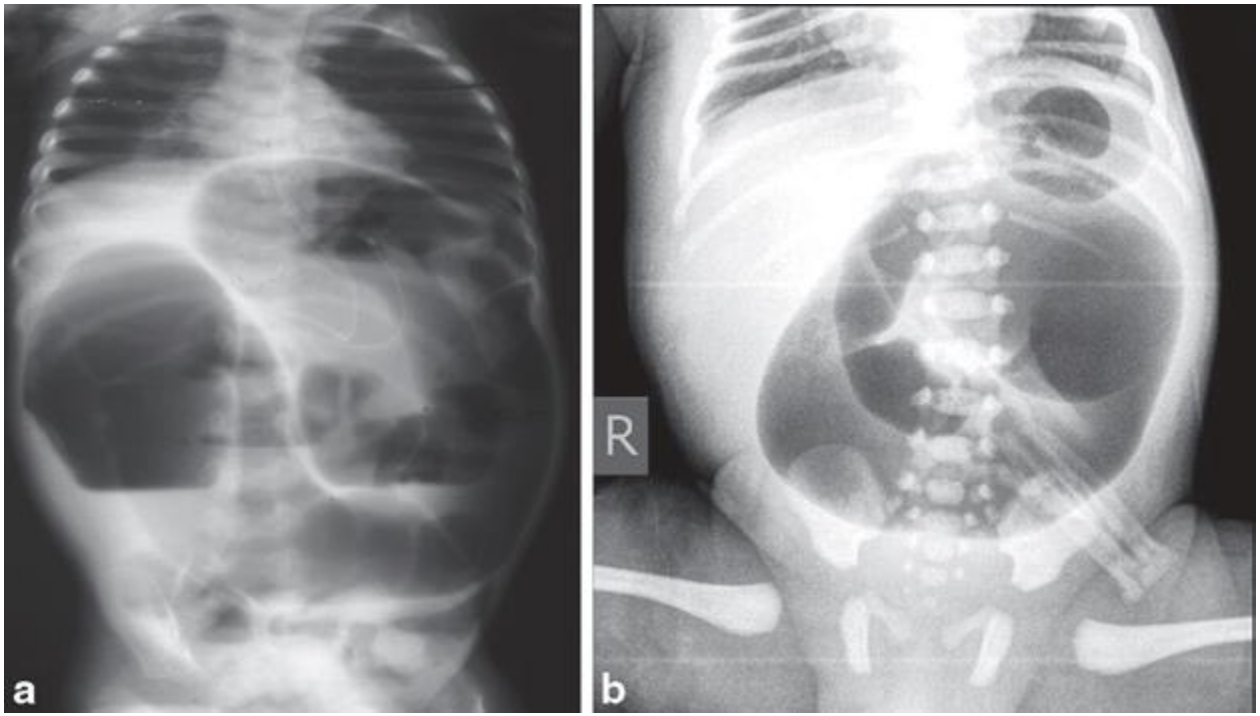
Plain abdominal X-ray

- The extent and position of bowel gas
- Presence or absence of gas in the rectum
- Degree and level of distended loops
- Air fluid levels
- Evidence of free gas would confirm perforation.
  - “Football sign”,
  - The **rigler sign**, also known as the double wall sign

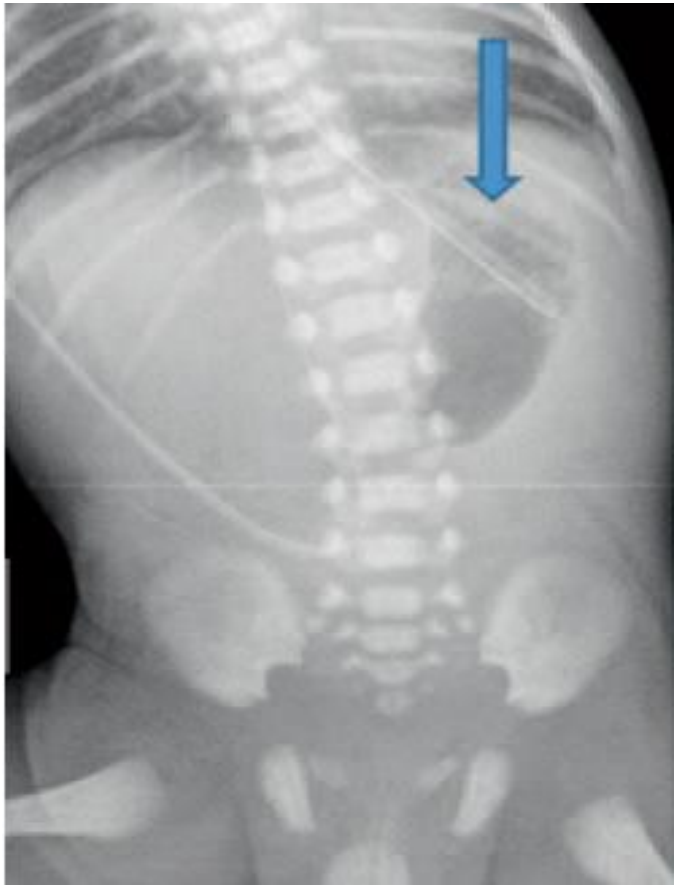
Intestinal air progression



Abdominal x-ray showing dilatation of bowel loops with air–fluid level

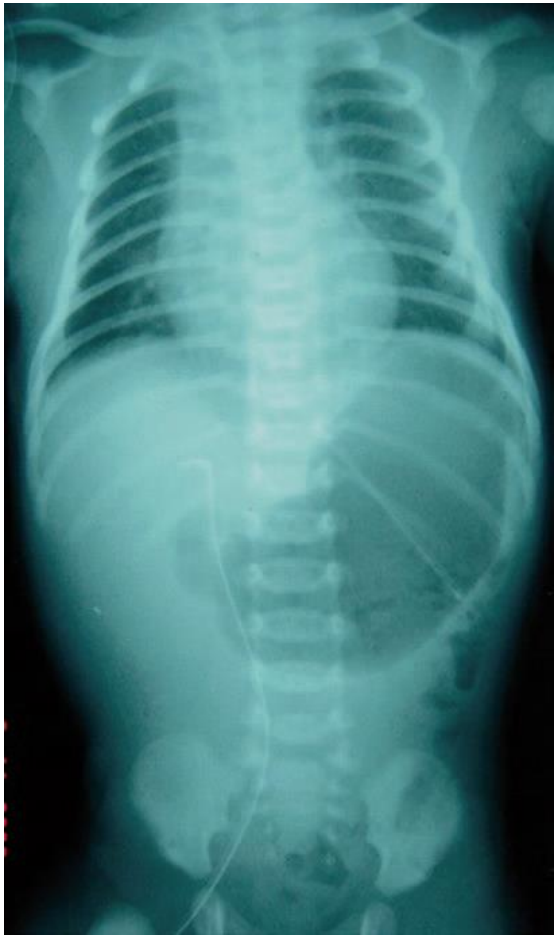


single air bubble

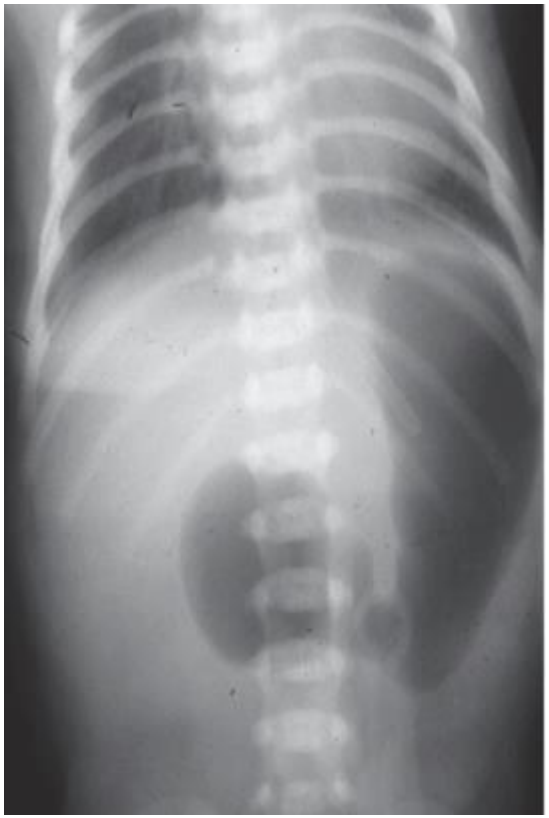


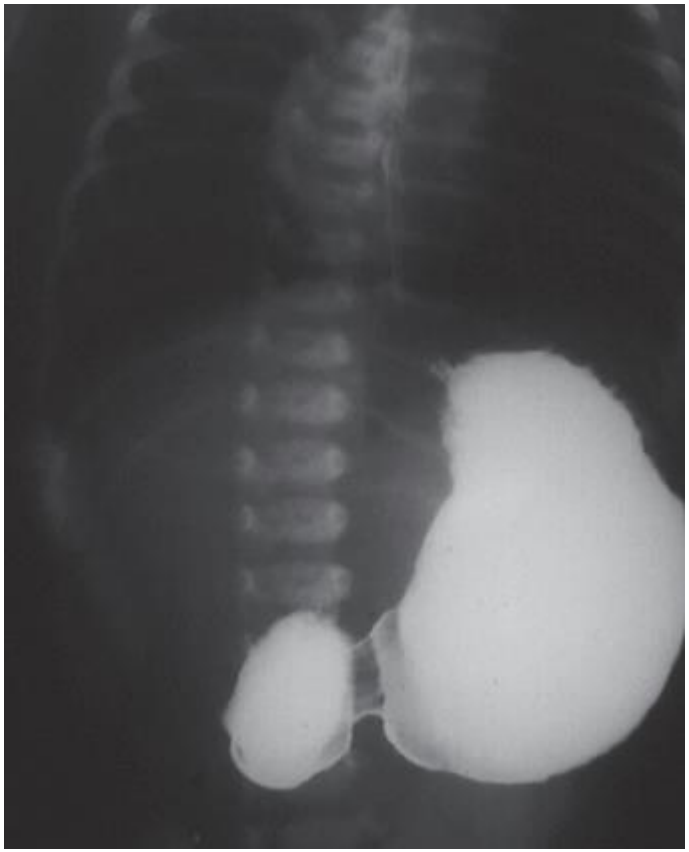
Plain abdominal x-ray

- Dilated stomach with air distally suggesting partial duodenal obstruction

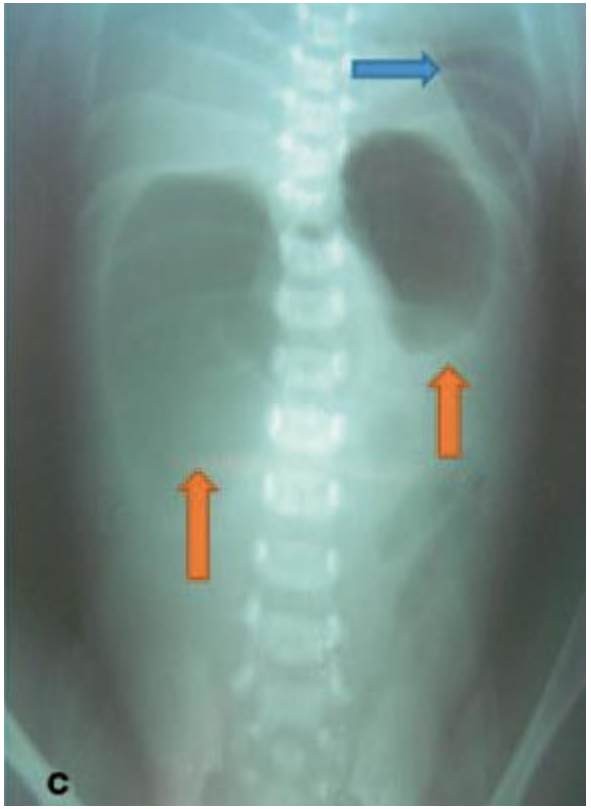


Complete duodenal obstruction





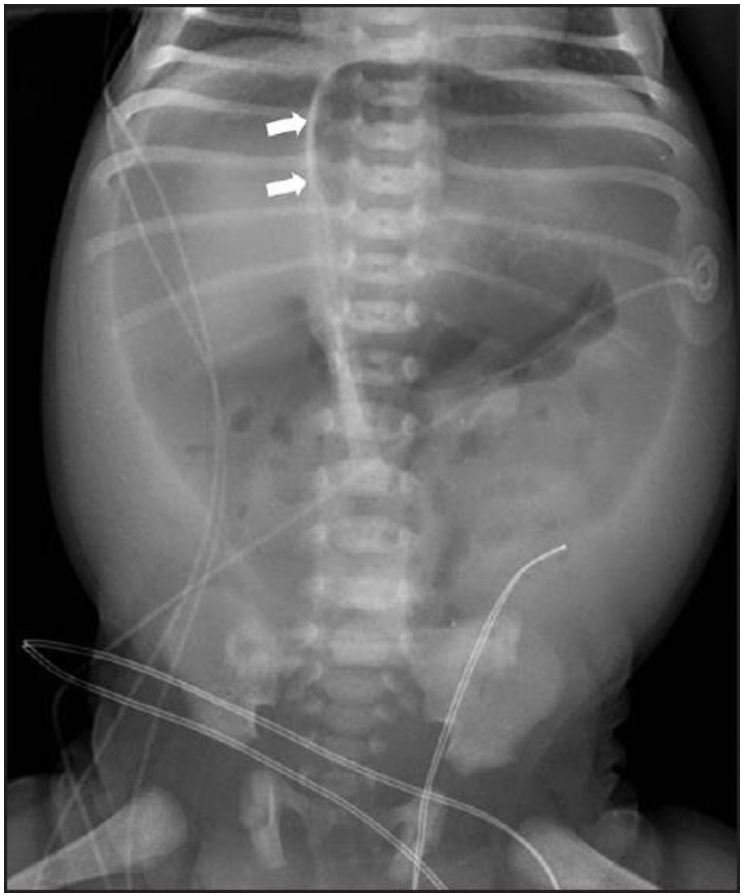
Triple bubbles



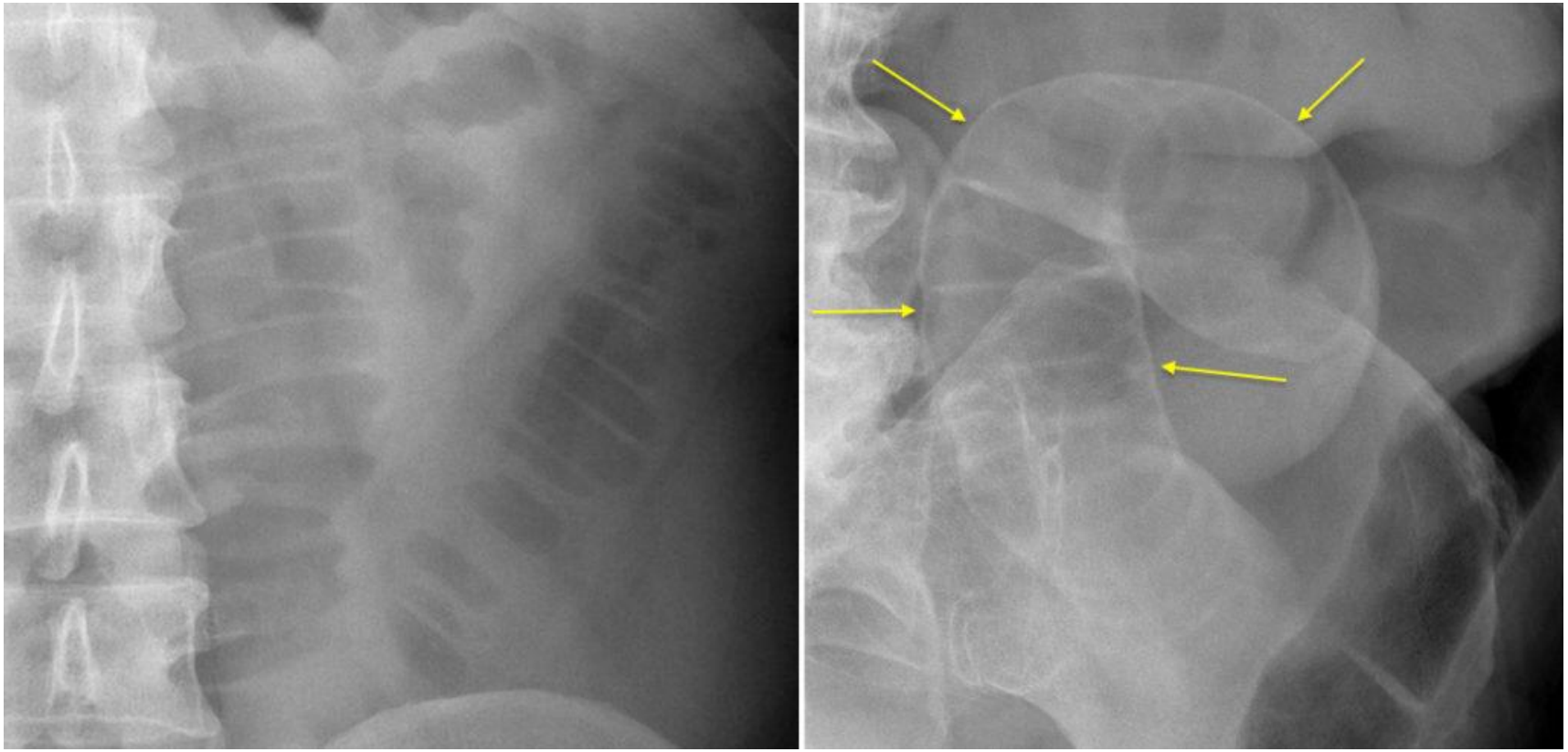
Pneumo-peritoneum

- Free air due to perforation from any cause is suspected on supine film when
  - “football sign” : a large pocket of air overlying liver and the ligamentum teres
  - Rigler sign: the bowel wall is sharply delineated (pencil lining).

Football sign



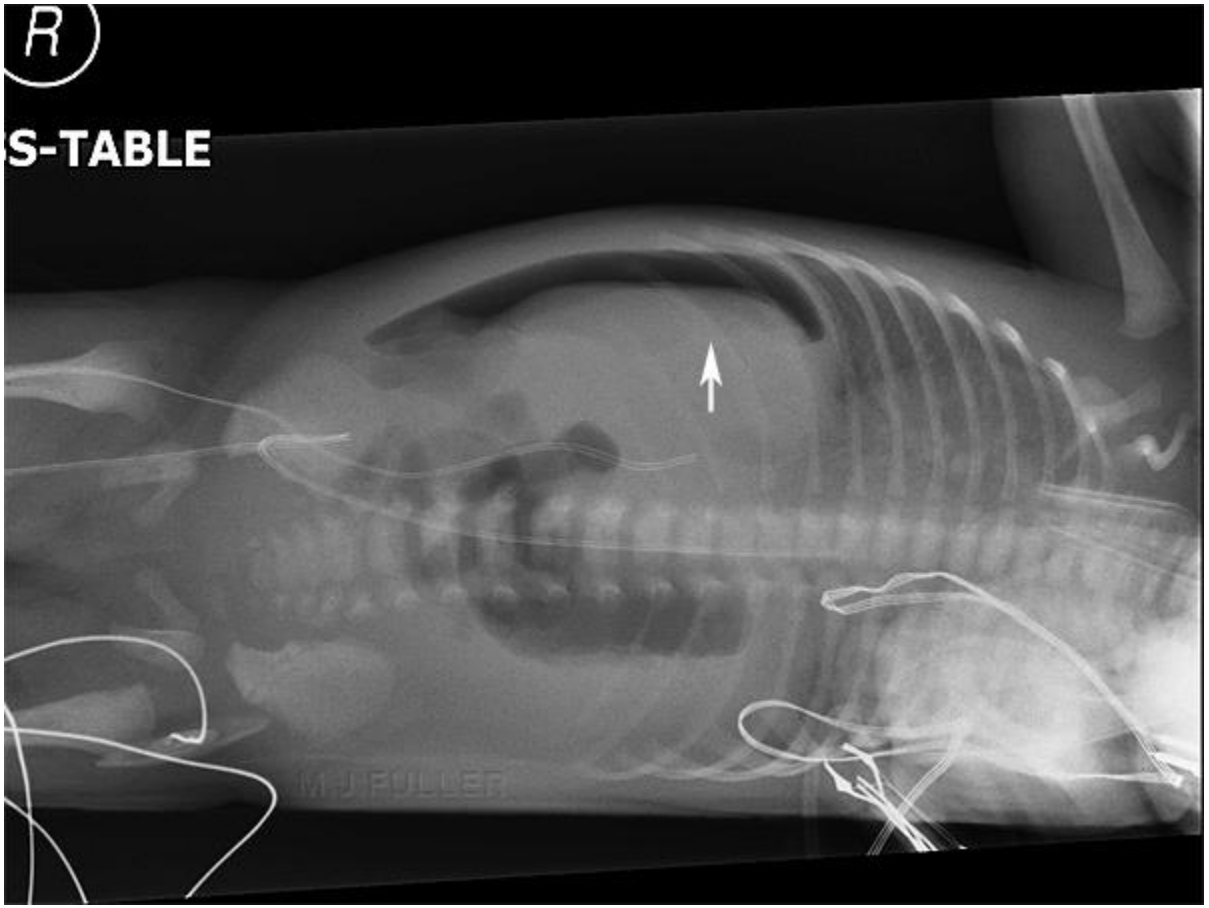
Rigler sign

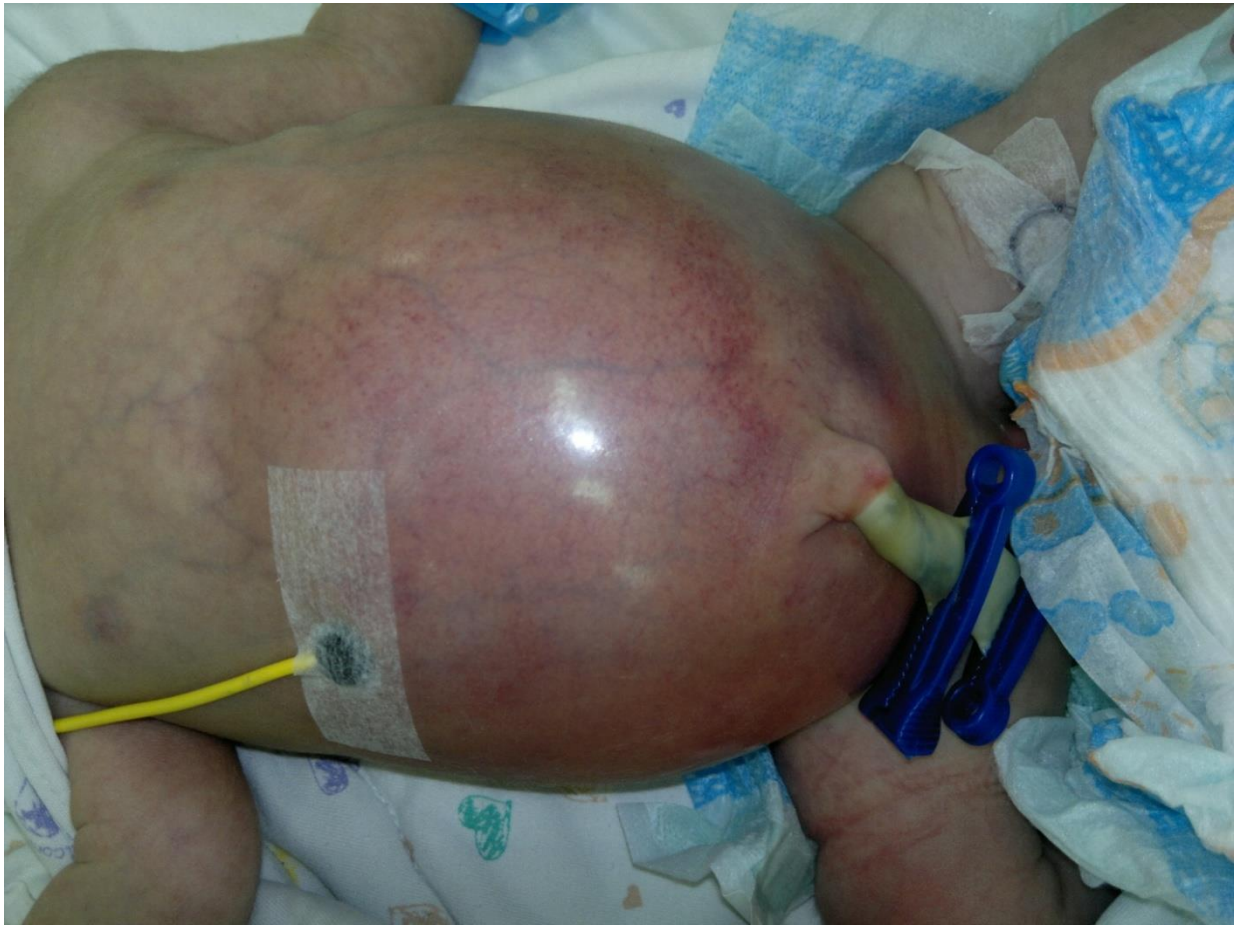


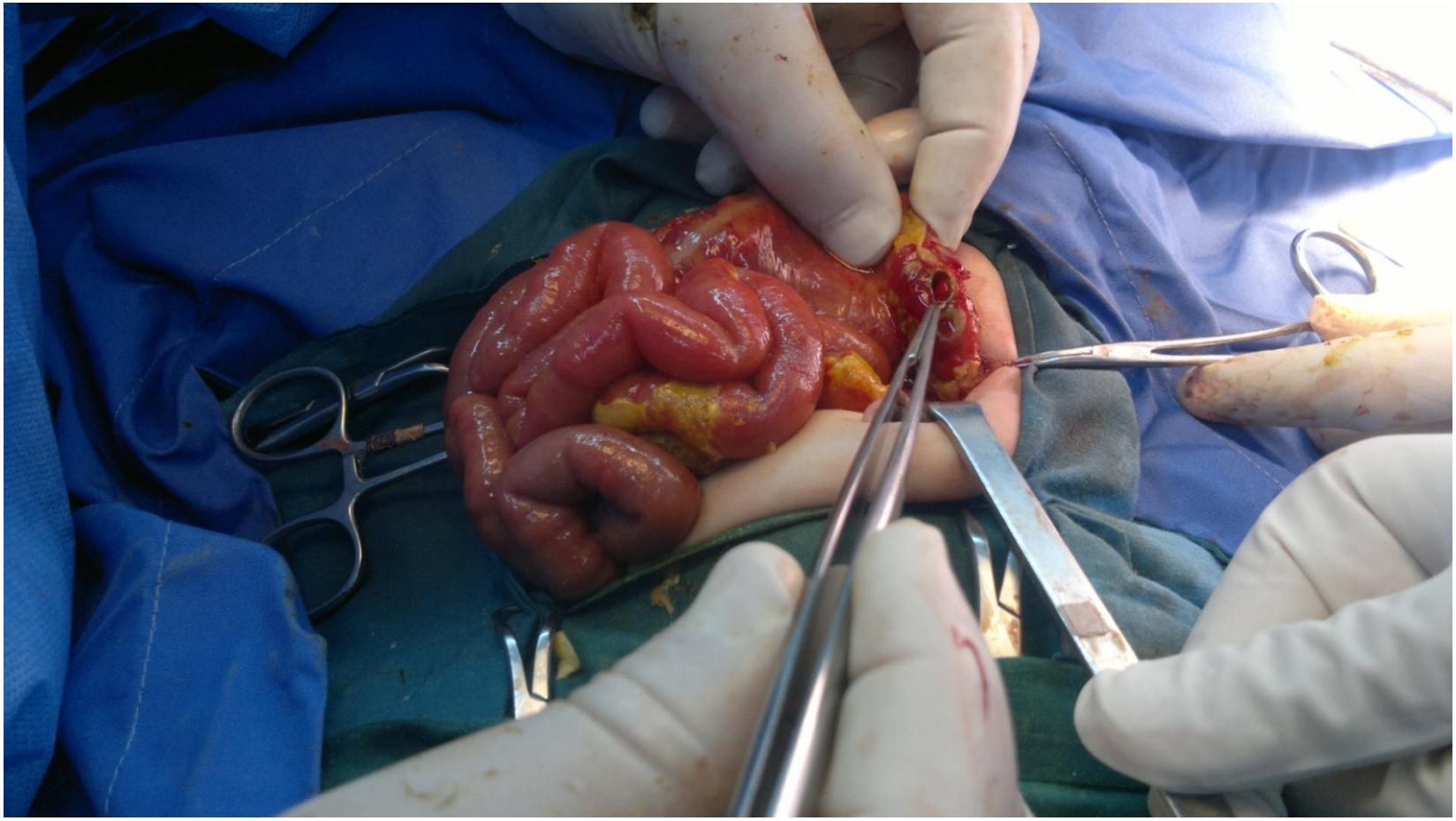
Lateral decubitus

- Lateral decubitus film with the right side uppermost should be used to see air above the liver.

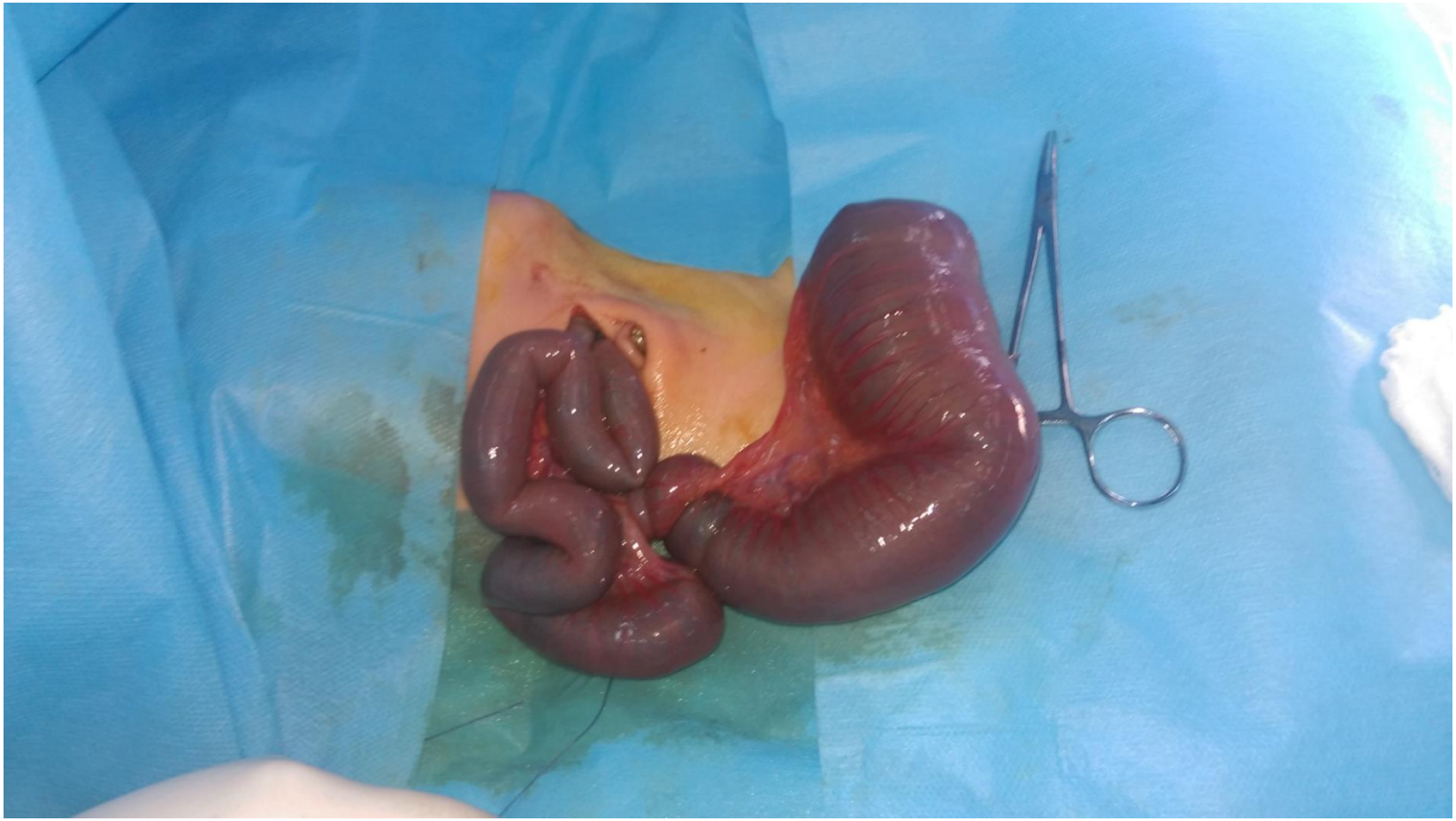
Free air above the liver







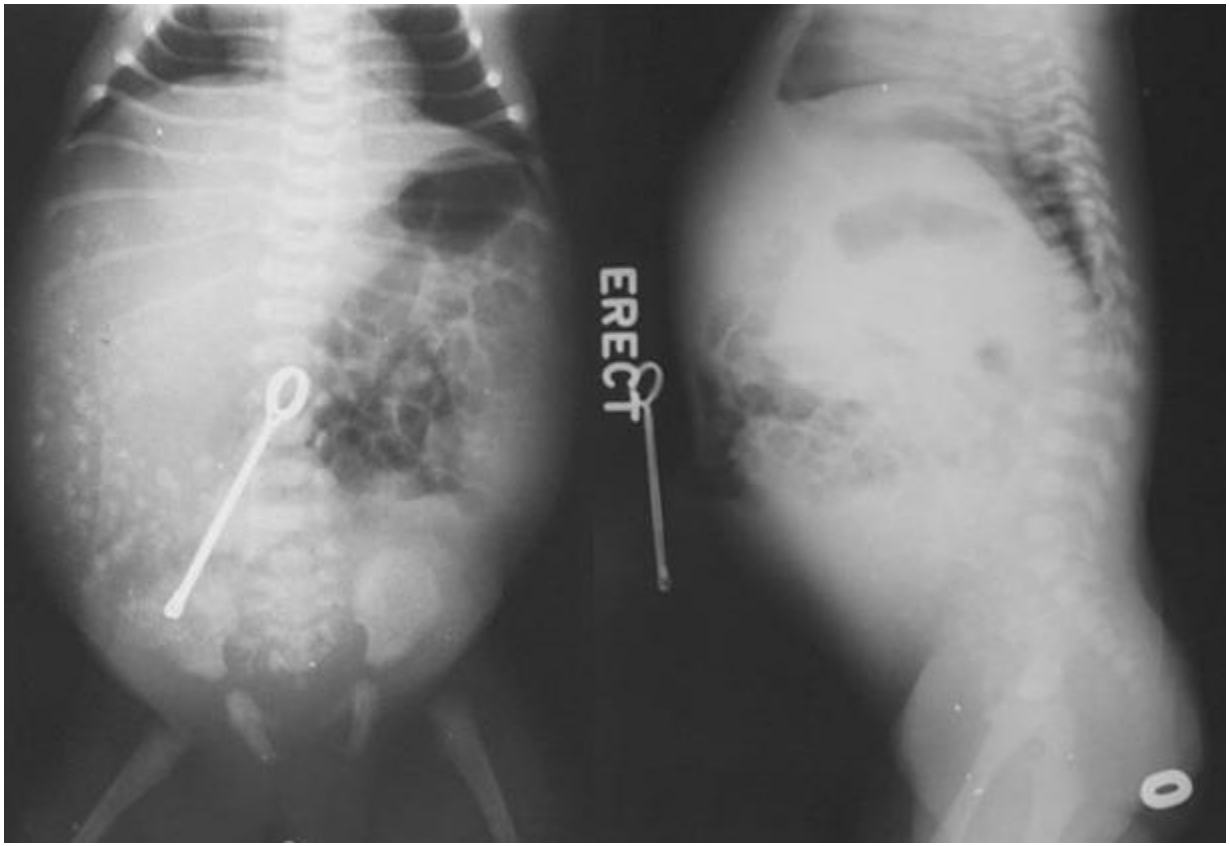
Ileal atresia with volvulus



Calcification

- Calcification of meconium implies long-standing stasis and may be identifiable outside of the bowel loops, which would suggest previous perforation.

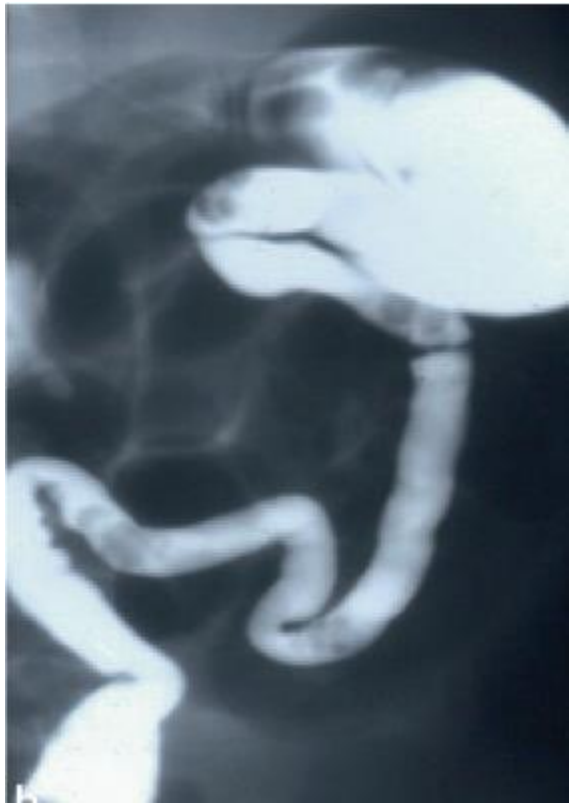
Diffuse calcifications



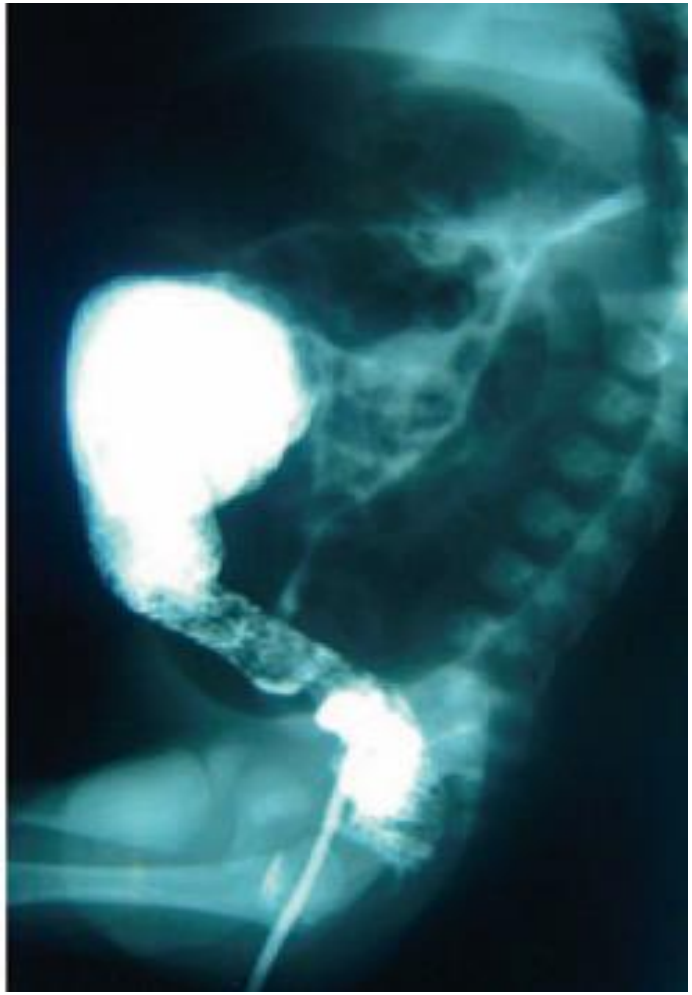
Contrast Studies

- The first enema a neonate receives should be a contrast enema.
- The contrast enema acts not just a diagnostic tool but works as a therapeutic measure in cases of:
  - meconium plug
  - meconium ileus
  - Hirschsprung's disease

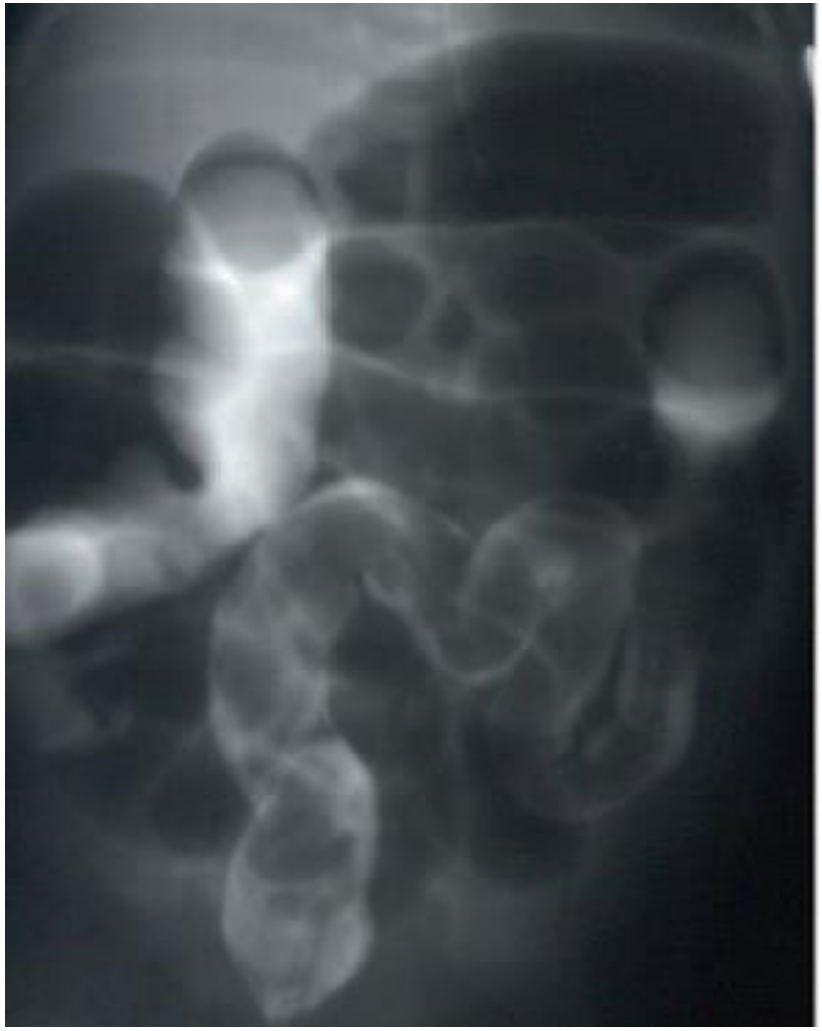
Lower contrast study showing small left colon syndrome



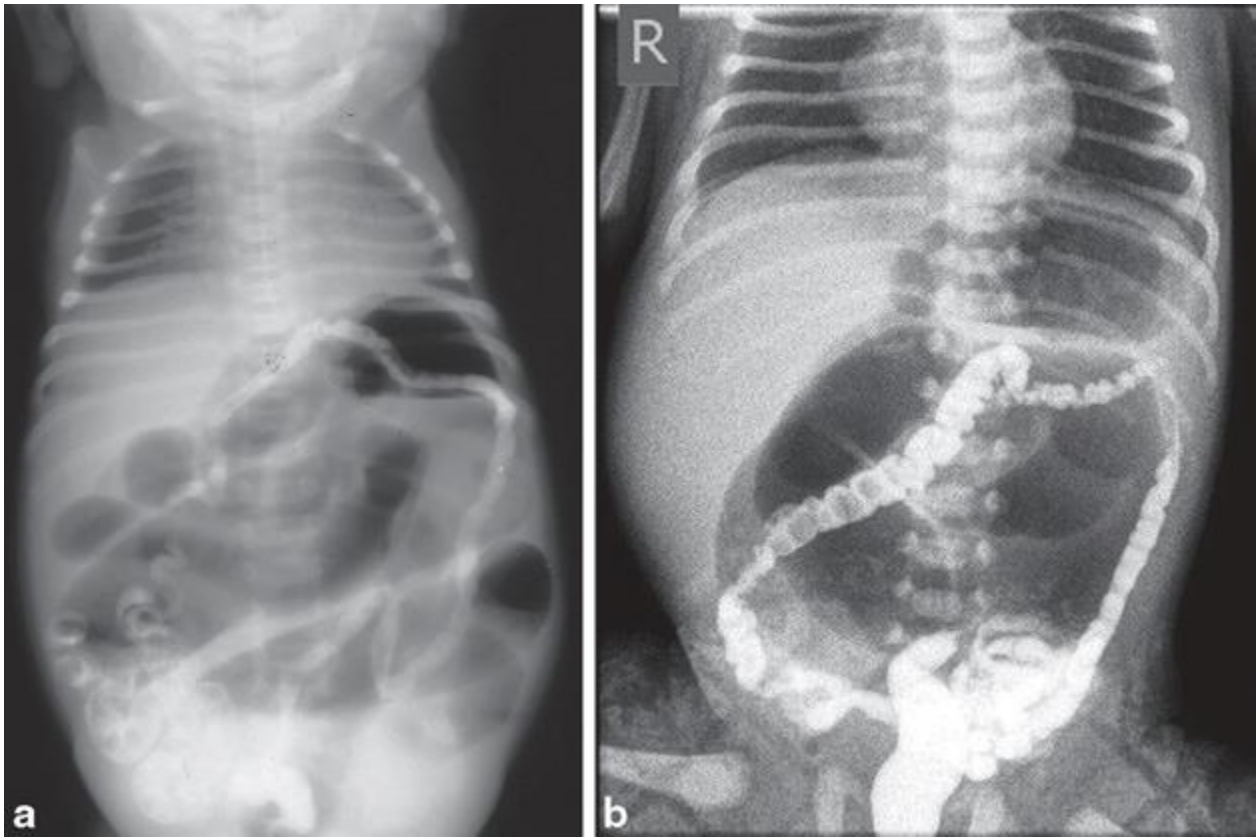
Lower contrast study showing Hirschsprung's disease



Lower contrast study showing meconium plug syndrome



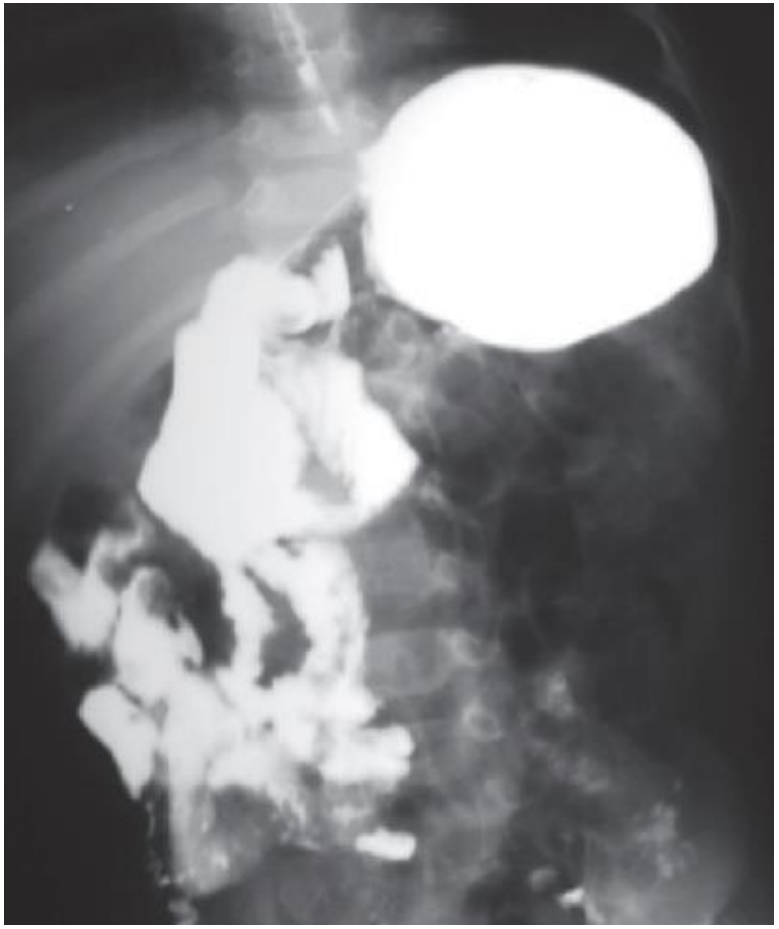
A lower contrast study:
small unused colon suggesting small bowel obstruction or total colonic hirschprung's disease.



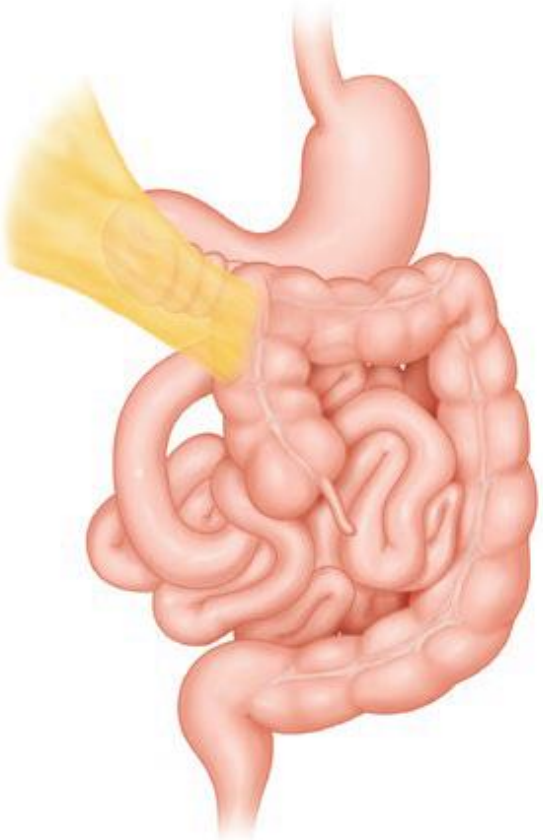
Contrast upper gastrointestinal (GI) studies

- If malrotation is suspected
- Sometimes to characterize the duodenal obstruction

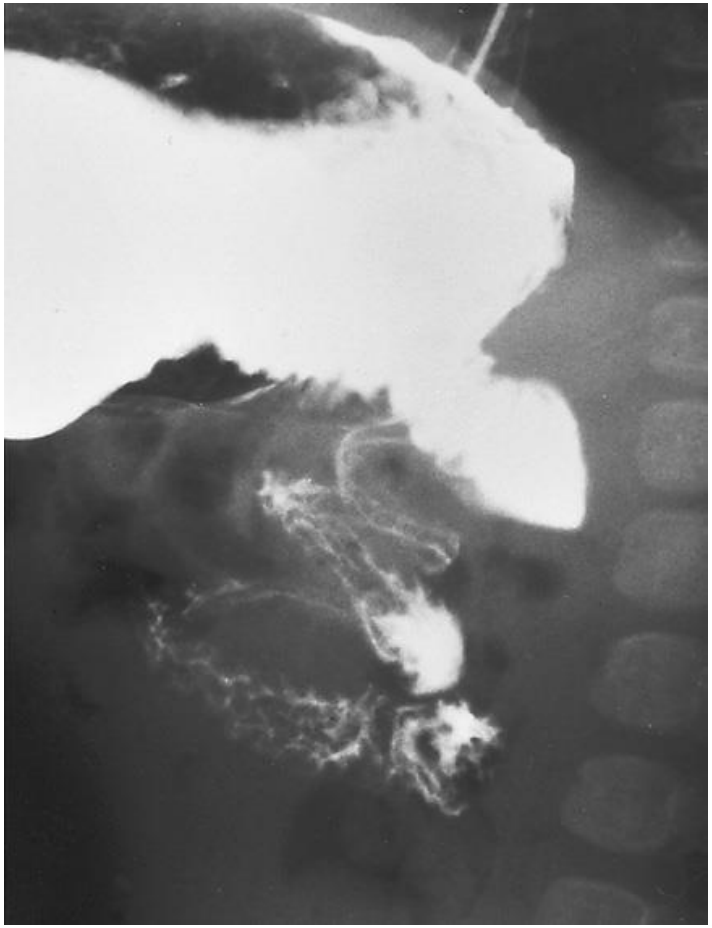
Malrotation



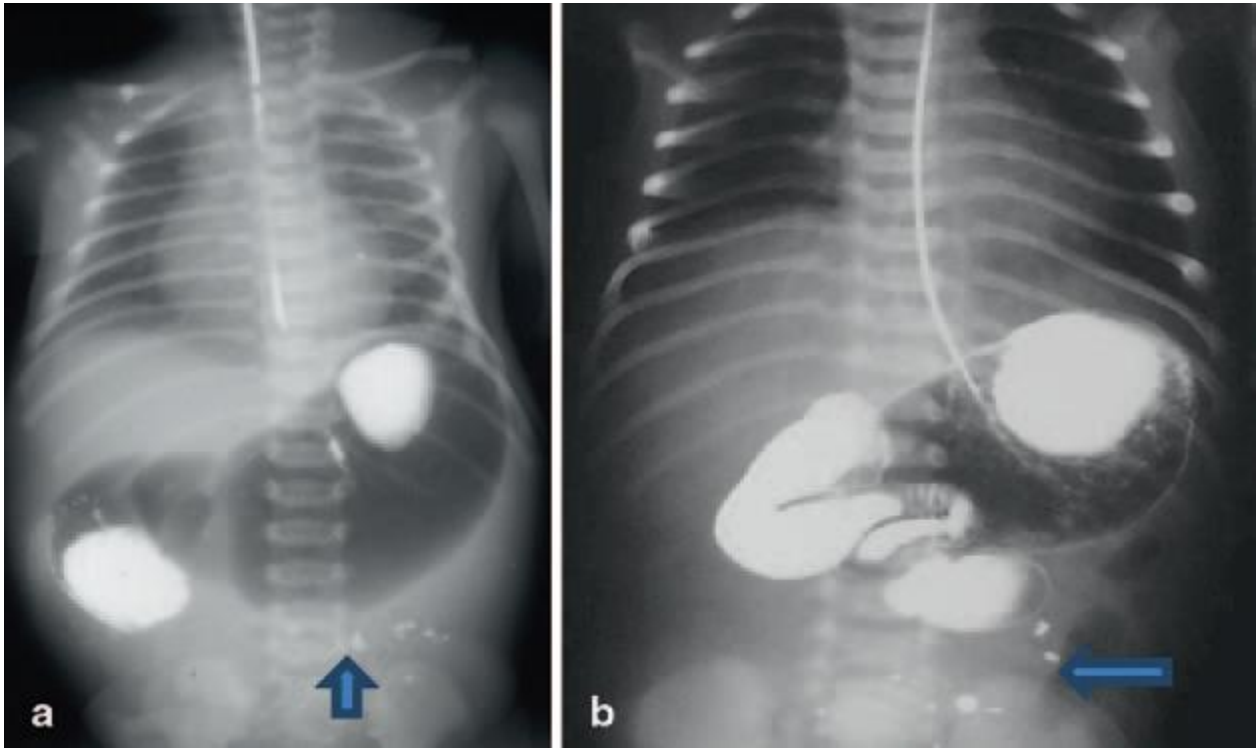
Malrotation



Volvulus neonatorum- spiral twist of the bowel



Upper contrast study showing congenital duodenal obstruction.



HIRSCHSPRUNG DISEASE

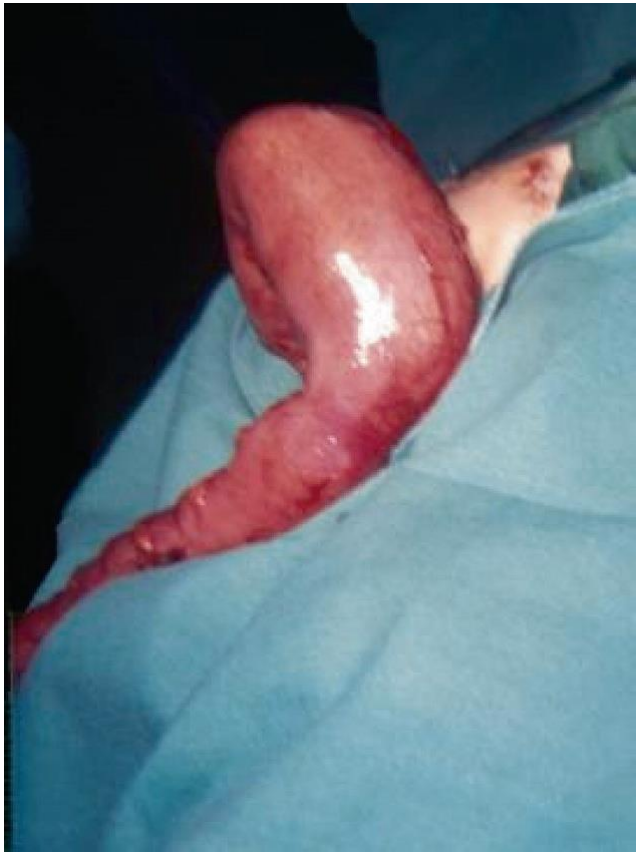
definitions

- Congenital megacolon
- HD is characterized by the absence of myenteric and submucosal ganglion cells in the distal alimentary tract; resulting in decreased motility in the affected bowel segment

Pathophysiology

- Hirschsprung disease results from the absence of parasympathetic ganglion cells in the myenteric and submucosal plexus of the rectum and/or colon.
- Ganglion cells, which are derived from the neural crest, migrate caudally with the vagal nerve fibers along the intestine.
- These ganglion cells arrive in the proximal colon by 8 weeks of gestational age and in the rectum by 12 weeks of gestational age.
- Arrest in migration leads to an aganglionic segment.

transitional zone



Frequency

- Hirschsprung disease occurs in approximately 1 per 5000 live births.

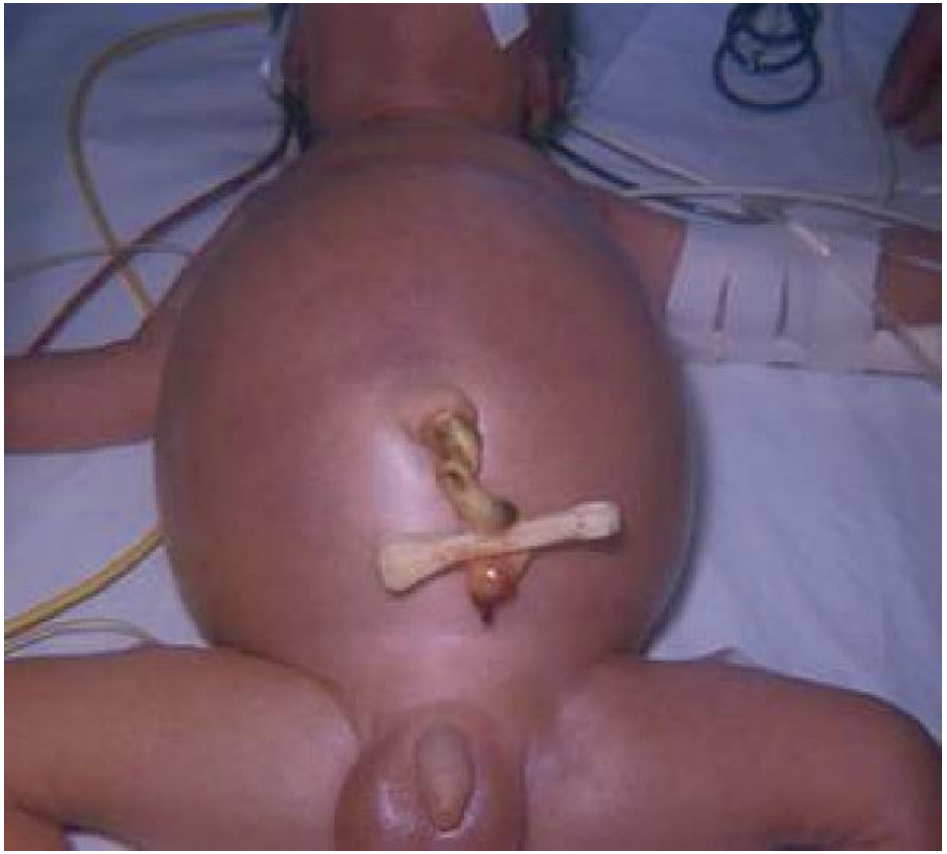
- **Sex:** 4 times more common in males than females.
- **Age:**
  - Nearly all children with Hirschsprung disease are diagnosed during the first 2 years of life.
  - one half are diagnosed before they are aged 1 year.
  - Minority not recognized until later in childhood or adulthood.

HD can be classified by the extension of the aganglionosis as follows:

- Classical HD (75% of cases): Rectosegmoid
- Long segment HD (20% of cases)
- Total colonic aganglionosis (3-12% of cases)
- rare variants include the following:
  - Total intestinal aganglionosis
  - Ultra-short-segment HD (involving the distal rectum below the pelvic floor and the anus)

Clinical presentation:

- Newborns :
  - Failure to pass meconium within the first 48 hours of life
  - Abdominal distension that is relieved by rectal stimulation or enemas
  - Vomiting
  - Neonatal enterocolitis
- Symptoms in older children and adults include the following:
  - Severe constipation
  - Abdominal distension
  - Bilious vomiting
  - Failure to thrive



Differential Dx

- Intestinal atresias or stenosis
- Small left colon syndrome
- Meconium plug syndrome
- Intestinal malrotation

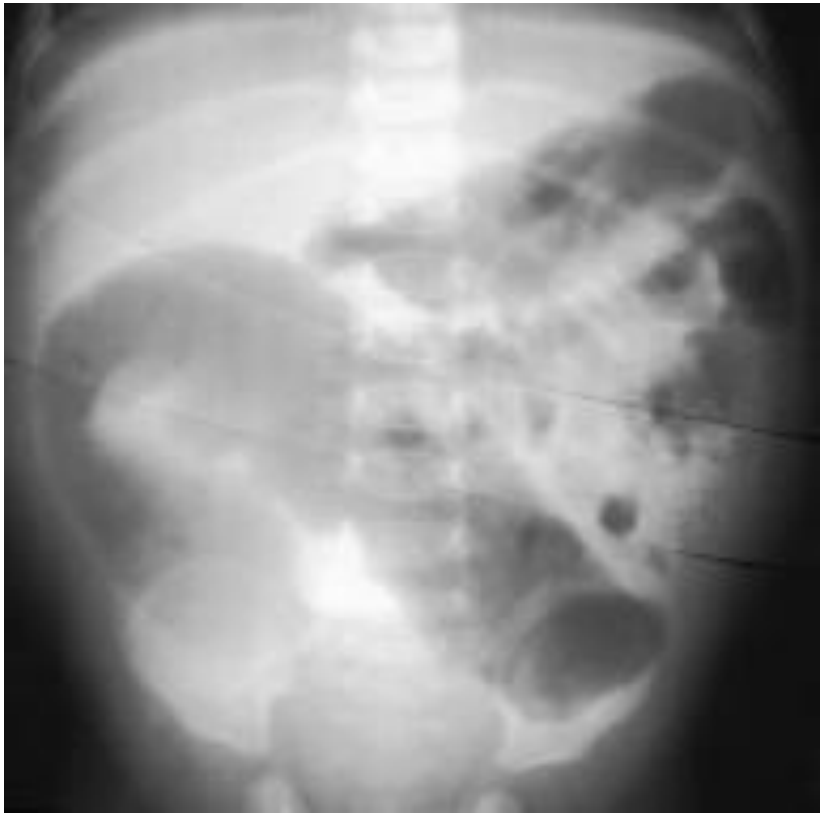
diagnostic workup

- Plain abdominal radiography
- Contrast enema
- Biopsy

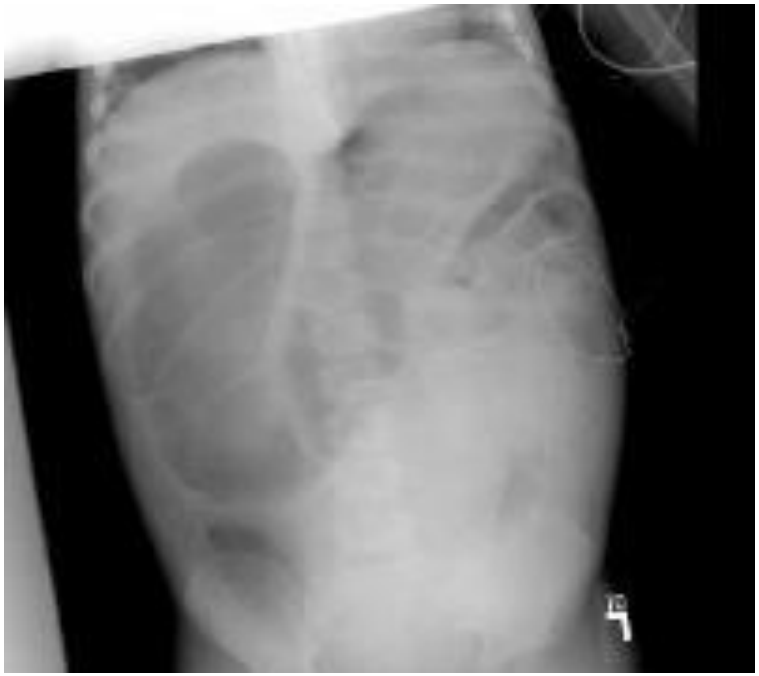
Abdomenal X-Ray

- Dilated bowel
- Air-fluid levels.
- Empty rectum

AXR



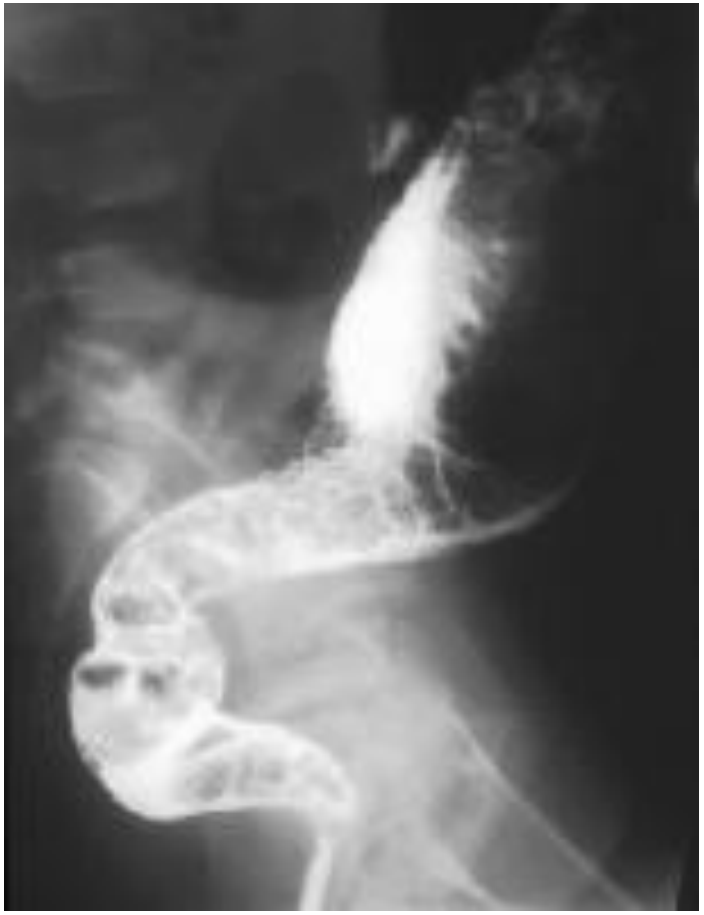
AXR



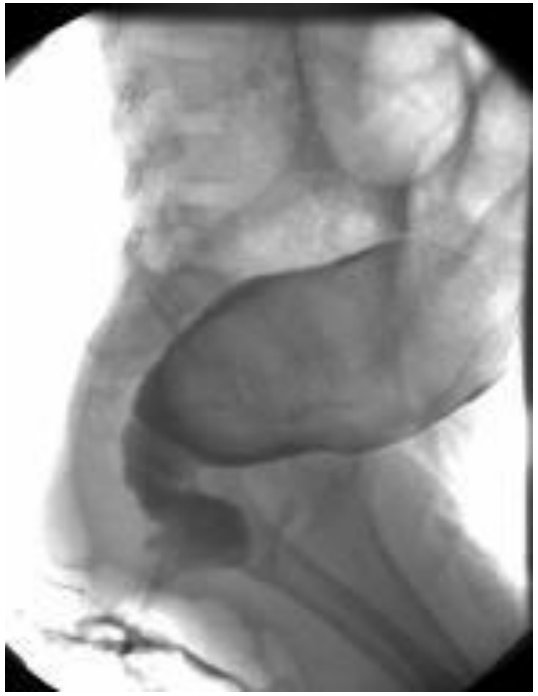
barium enema

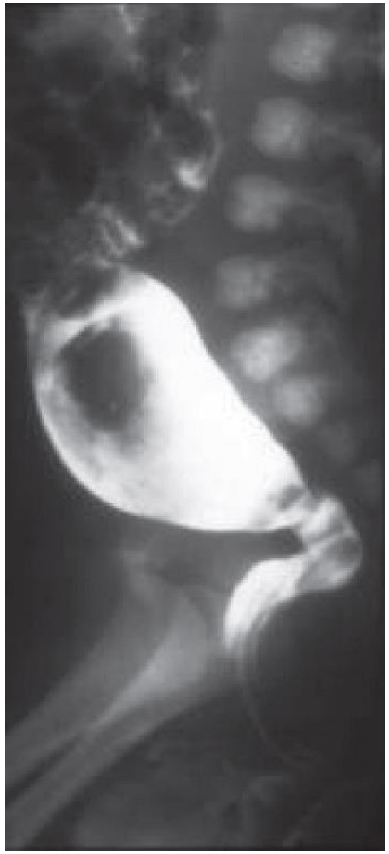
- Transition zone
- Abnormal, irregular contractions of aganglionic segment
- Delayed evacuation of barium

Ba-enema

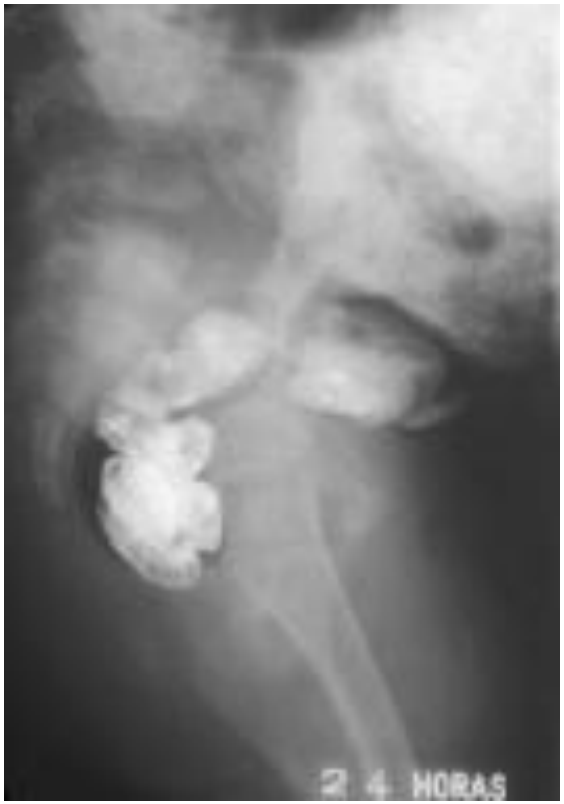


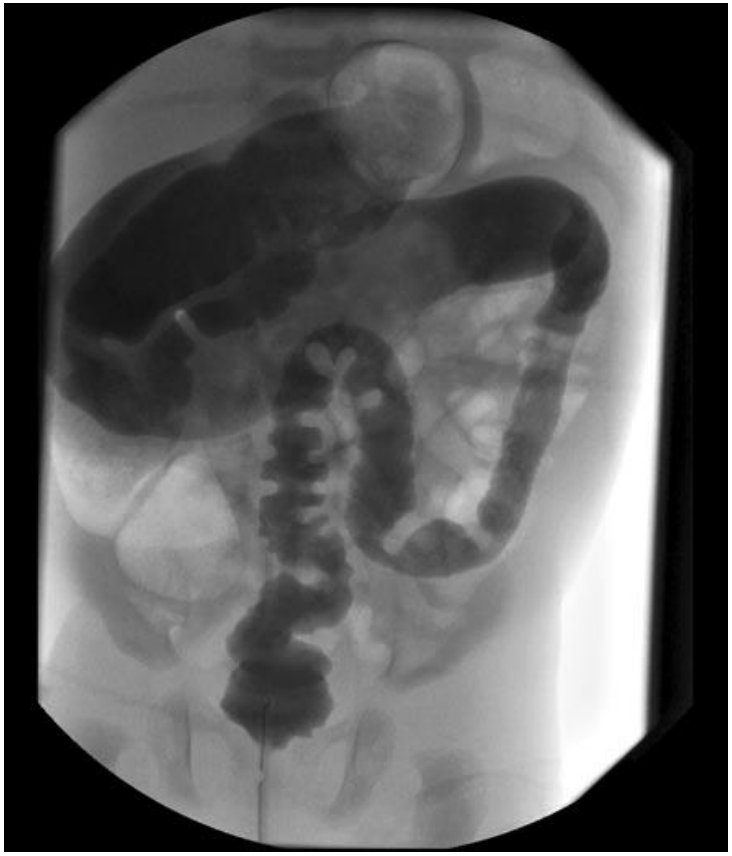
Ba-enema - TZ





Ba-enema- delayed emptying





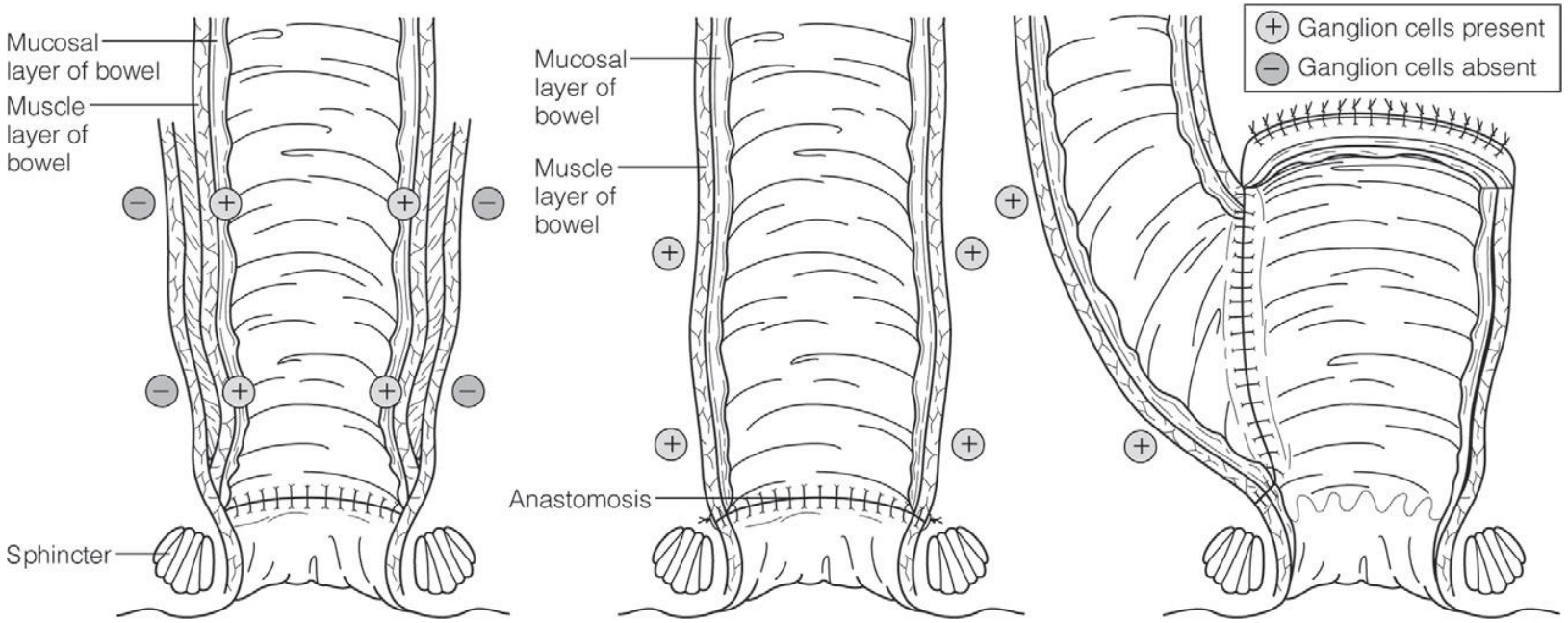
Biopsy

- Types:
  - rectal suction biopsy
  - full-thickness rectal biopsy.
- In HD, the biopsy reveals:
  - absence of ganglion cells
  - hypertrophy and hyperplasia of nerve fibers,
  - increase in acetylcholinesterase-positive nerve fibers in the lamina propria and muscularis mucosa.

treatment

- The treatment is surgical removal or bypass of the aganglionic bowel,
- This can be performed by means of:
  - preliminary colostomy followed by a definitive pull-through procedure or,
  - primary definitive procedure.
- Examples include:
  - Soave pull-through procedure,
  - Duhamel procedure,
  - Swenson procedure.

The three most commonly performed operations
A, Soave. B, Swenson. C, Duhamel



Enterocolitis

- Enterocolitis accounts for significant morbidity and mortality in patients with Hirschsprung disease.
  - Patients typically present with explosive diarrhea, abdominal distention, fever, vomiting, and lethargy.
  - Approximately 10-30% of patients with Hirschsprung disease develop enterocolitis. Long-segment disease is associated with an increased incidence of enterocolitis.
  - Treatment consists of rehydration, intravenous antibiotics and colonic irrigations.

Post operative complications

- anastomotic leak
- anastomotic stricture
- intestinal obstruction
- pelvic abscess
- wound infection

Prognosis

- The long-term outcome is difficult to determine because of conflicting reports in the literature.
- Some investigators report a high degree of satisfaction, while others report a significant incidence of constipation and incontinence.
- approximately 1% of patients with Hirschsprung disease require a permanent colostomy to correct incontinence.
- patients with associated trisomy 21 have poorer clinical outcomes.

THANK YOU