Constipation in Pediatrics

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References

- Uptodate Apr ٢٠٢٠
- Nelson Textbook of Pediatrics ٢٠١٩
- Pediatric Gastrointestinal and Liver Disease sixth Edition
- Walker’s Pediatric Gastrointestinal Disease Sixth Edition

Epidemiology & Burden of disease

- One of the most common gastrointestinal disorders affecting children (≈١٠%)
- %٣ to ١٠% of general pediatric outpatient visits and up to ٢٥% of visits to pediatric gastroenterologists
- Majority of cases have no underlying disease

  designated as “idiopathic” or “functional”
- In Minority of cases there is an underlying disease

  designated as “organic”

Burden of disease

- Rarely life threatening, but negatively impair the quality of life of affected children and their families
- Many patients with functional constipation will have prolonged symptoms despite intensive medical management
- Long-lasting treatment with multiple relapses
- More prevalent in families with lesser education and lower socioeconomic

status

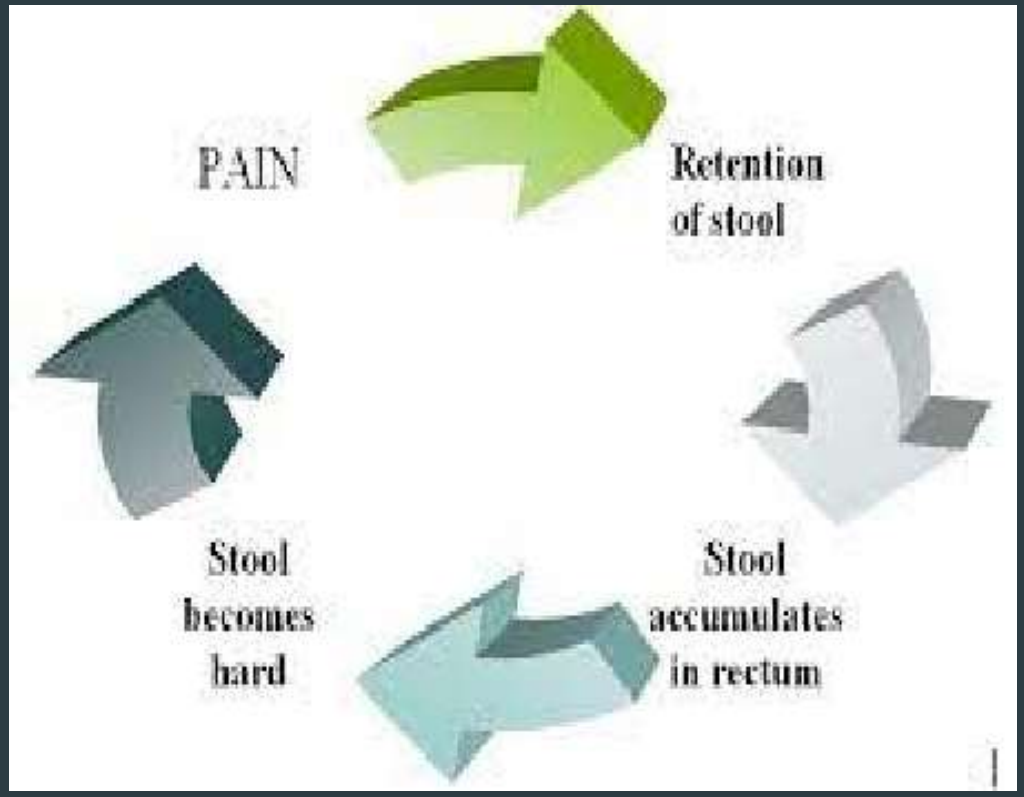
Two Type of Constipation

- Functional (٩٥%)
- Organic

Why functional constipation occurs?

- Abnormal fluid and/or electrolyte secretion
- Genetic predisposition
- Low level of physical activity
- Environmental (low amount of dietary fiber)
- Social (low parental education level)
- Food allergy (mainly cow's milk protein allergy)
- **Withholding after unpleasant experience of passing hard, large, and painful bowel movements**

Why Functional Constipation Occurs



Organic Constipation

Abnormalities of Colon and Rectum

- **Anal or colonic stenosis**
- **Imperforate anus**
- **Anteriorly displaced or ectopic anus**
- Cloacal malformations
- Chronic intestinal pseudo-obstruction

Spinal Cord Abnormalities

- Meningomyelocele
- Spinal cord tumor
- Sacral agenesis
- **Tethered cord**

Organic Constipation

Neuropathic Intestinal Disorders

- **Hirschsprung's disease**
- Intestinal neuronal dysplasia
- Chagas disease

Systemic Disorders

- **Hypothyroidism, Ca (high or low)**, DM, **CP**, Myotonia, Connective tissue Dis, Panhypopituitarism, scleroderma, Amyloidosis, Mixed connective tissue disease, Myotonic dystrophy, Progressive systemic sclerosis

Organic Constipation

Drugs: **Opiates, Anticholinergics**, Antacids, Antihypertensives, Antimotility agents, Cholestyramine, Psychotropics, Diuretics

Others: ***CF***, **Celiac, Heavy metal ingestion (lead, mercury)**

Abnormal Abdominal Musculature: Prune belly syndrome,Gastroschisis

DEFINITION

- defecation patterns that are suggestive of constipation
  - **infrequent (**less than three stools per week) **and painful defecation**
  - firm stool consistency
  - large stool size
  - delayed intestinal transit time
  - increased stool weight
  - associated retentive posturing

Retentive Posturing and Withholding

- tip toeing
- stiffening or crossing the legs
- holding onto furniture
- hiding in a corner

Retentive Posturing and Withholding

Retentive Posturing and Withholding

BOX 11.1 Rome IV Criteria for Pediatric Functional Constipation

Diagnostic criteria must include:

Two or more criteria for at least 1 month in infants up to 4 years

1. Two or fewer defecations per week
2. History of excessive stool retention
3. History of painful or hard bowel movements
4. History of large diameter stools
5. Presence of a large fecal mass in the rectum
6. At least one episode of fecal incontinence per week after the acquisition of toileting skills
7. History of large-diameter stools that may obstruct the toilet in toilet trained children

BOX 11.1 Rome IV Criteria for Pediatric Functional Constipation

Diagnostic criteria must include:

Two or more symptoms at least once per week for at least 1 month in children at least 4 years

1. Two or fewer defecations per week
2. At least one episode of fecal incontinence per week
3. History of retentive posturing or excessive stool retention
4. History of painful or hard bowel movements
5. Presence of a large fecal mass in the rectum
6. History of large-diameter stool that may obstruct the toilet
7. Additional criteria: without fulfilling irritable bowel syndrome criteria children

Stool frequency changes in children with age

- The first stool is typically passed within ۴۸ hours after birth in more than ۹۹% of term neonates
- Stool frequency ranging from multiple stools per day to one stool per week in breastfed infants
- frequency gradually declines from >۴ stools per day during the first week of life to ۱-۲ stools per day by the age of ۴ years (as adults)

Infant dyschezia

- In young infants who experience at least ١٠ minutes of straining and crying before successful defecation in the absence of any underlying health problems
- This is thought to occur in the first few months of life in those who fail to master the complex defecation process that requires coordinated increased intra-abdominal pressure with relaxation of the pelvic floor muscles

Three phases of Constipation Appearnce

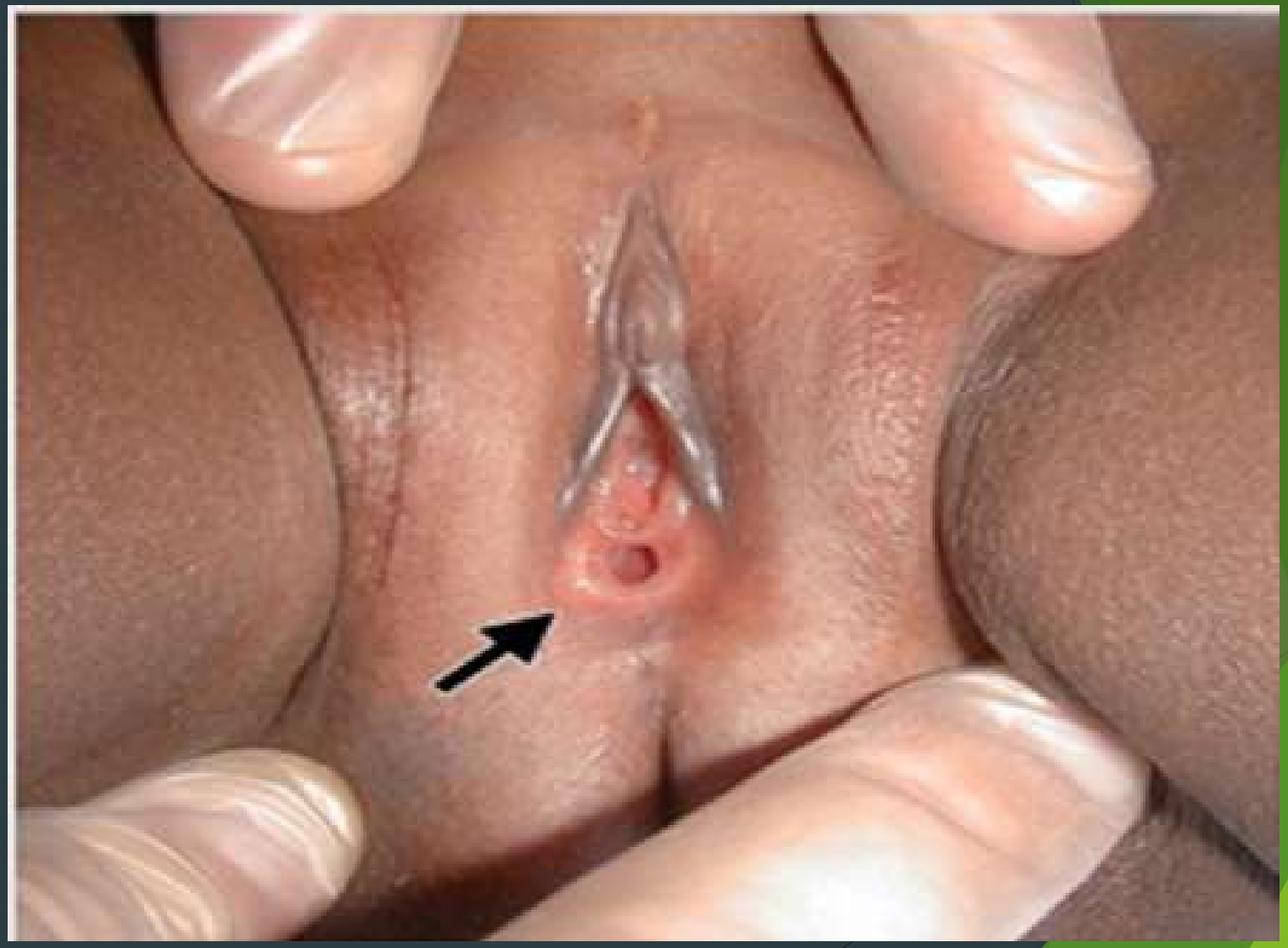
- Infants with the introduction of cereals and other solids and weaning of breast milk
- Toddlers at the time of toilet training, which is the peak incidence
- Older children who avoid bathrooms at school

Alarm Features

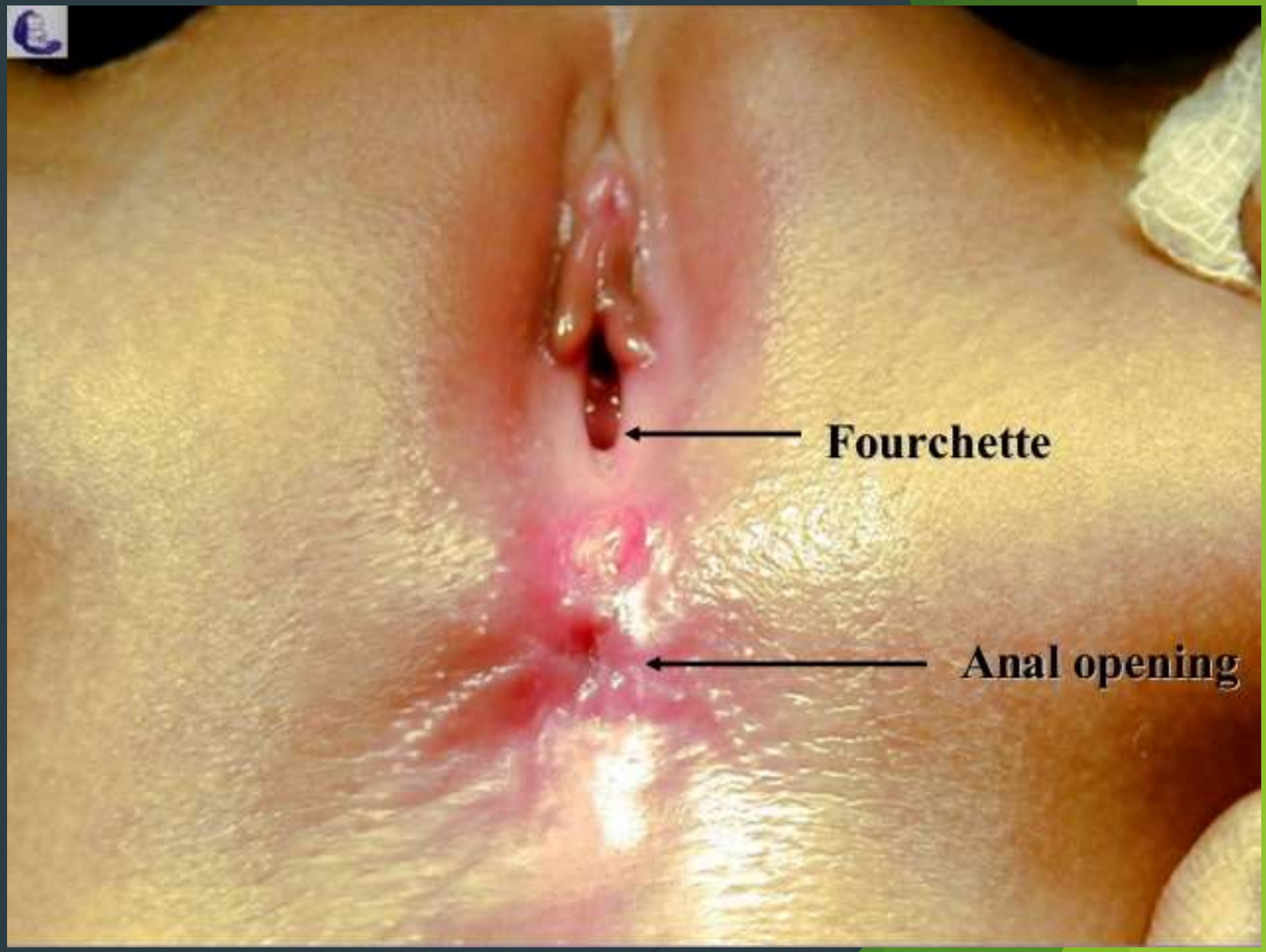
- Passage of meconium >٤٨ hr in a term newborn
- Constipation starting in the ١st mo of life
- Family history of Hirschsprung disease
- Ribbon stools
- Blood in the stools in the absence of anal fissures
- Failure to thrive
- Bilious vomiting
- Severe abdominal distension
- Abnormal thyroid glands

- Tuft of hair over spine/ spinal dimple
- Lack of lumbo-sacral curve
- Sacral agenesis
- Flat buttock
- Anteriorly displaced anus
- Tight & empty rectum
- Gush of liquid stool and air on withdrawal of finger
- Absent anal wrink and cremasteric reflex

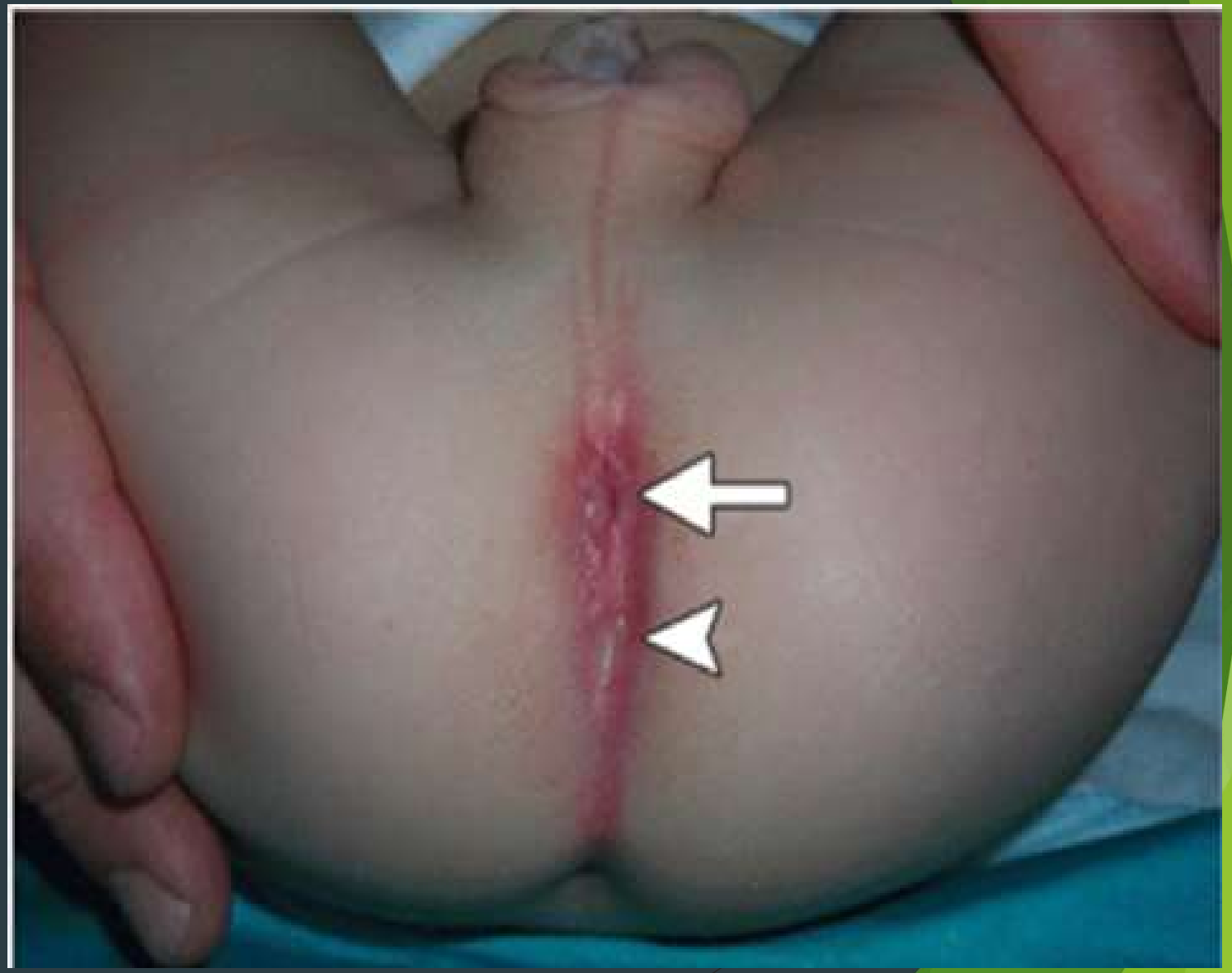
Perineal fistula



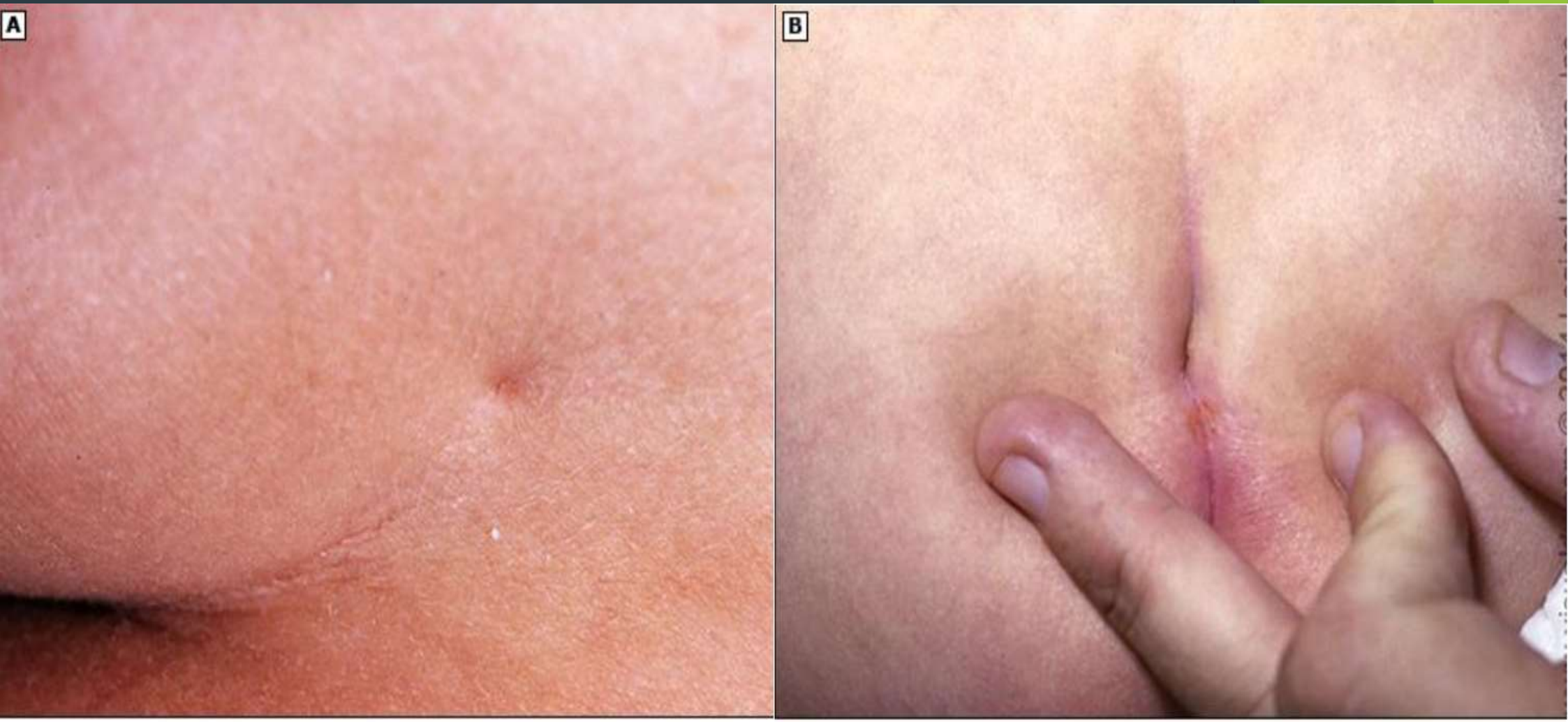
Anterior displacement anus



Anterior Displacement of Anus



Sacral Dimple (۲/۵ cm far from anus)



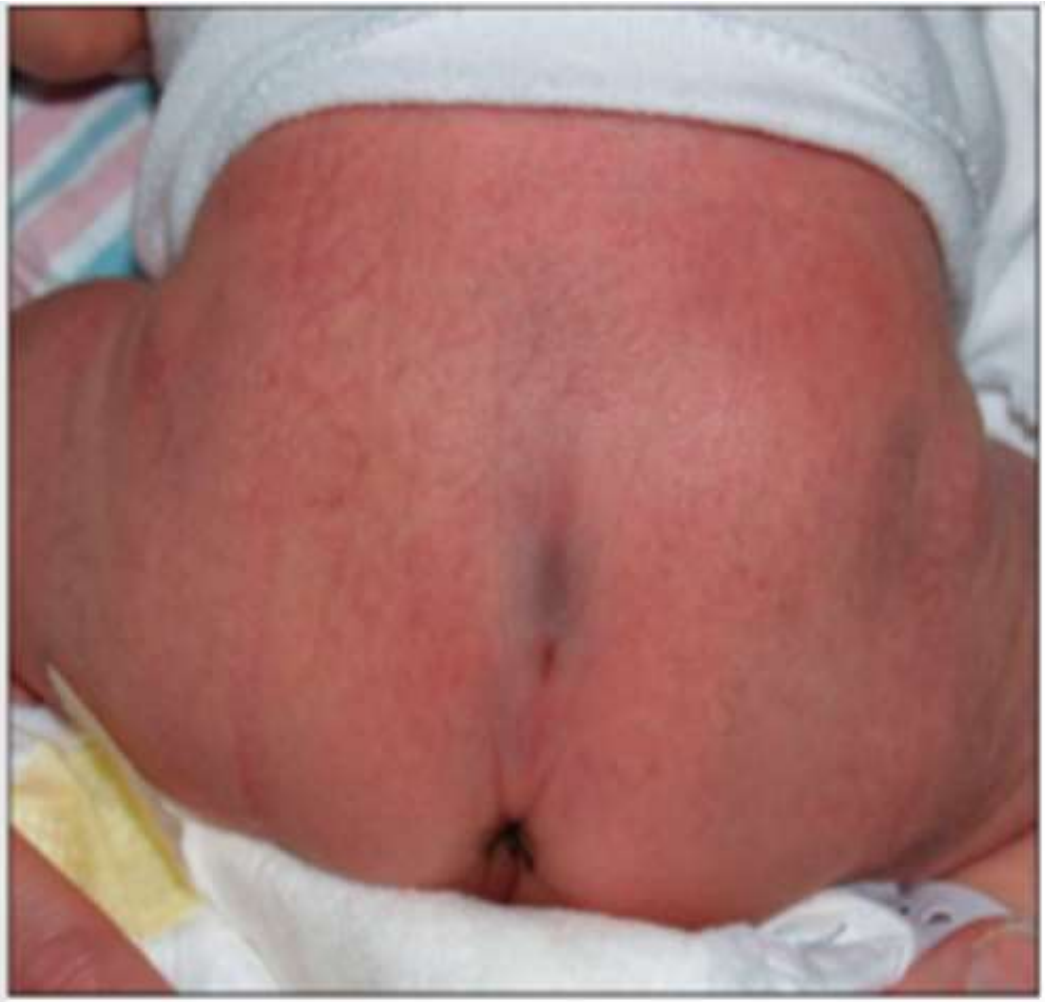
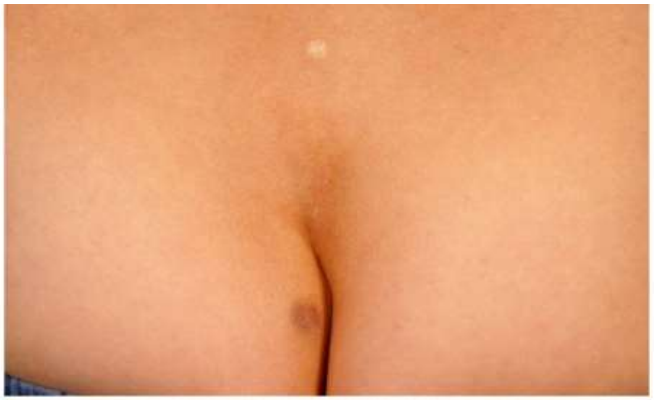
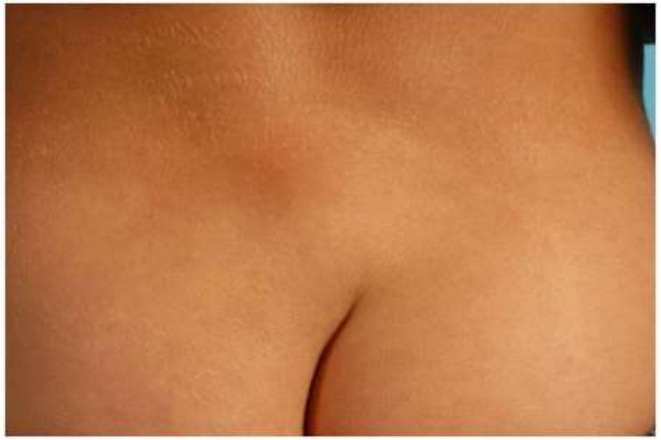
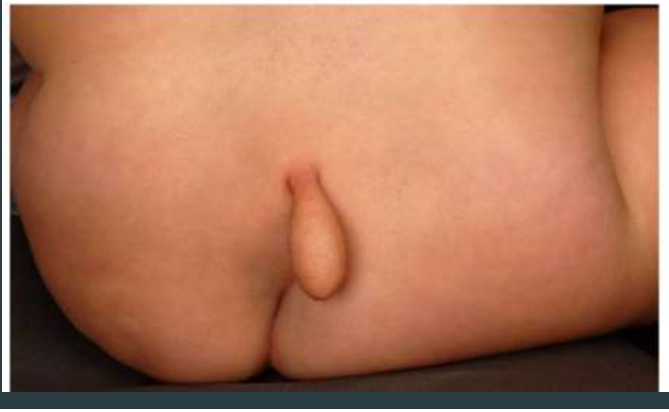


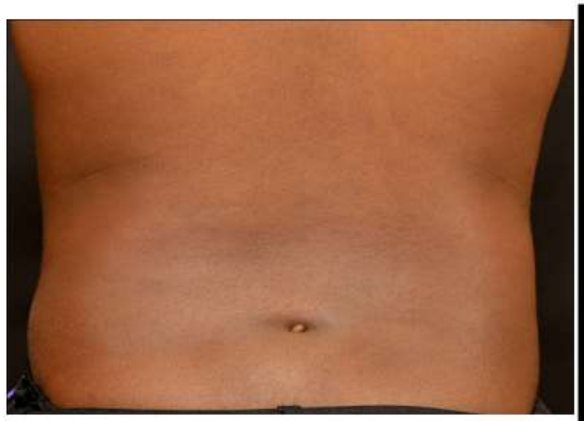
Figure 1. Solitary dimple whose location greater than 2.5 mm above the anus indicated the need for further evaluation, which revealed an occult spinal dysraphism requiring neurosurgical intervention.

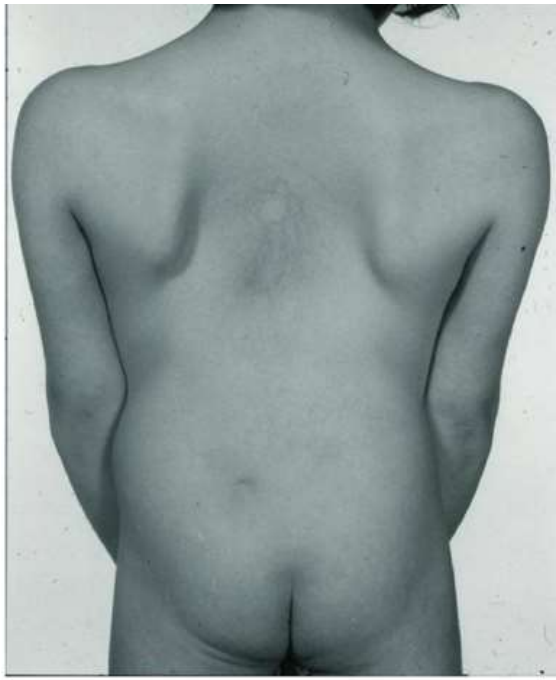
Examination of Low Back

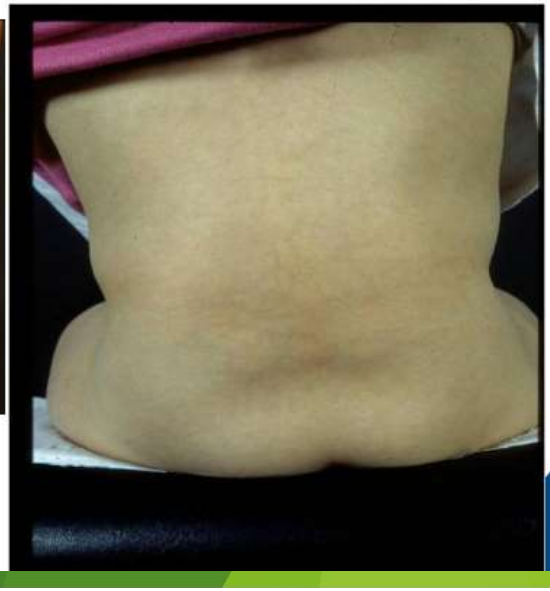












CLINICAL EVALUATION AND DIAGNOSIS

- It is important to emphasize that constipation and fecal incontinence are clinical diagnoses that are primarily based on symptoms
- Absence of red flag symptoms
- In the majority of patients no further testing is needed

I**nfrequent (**less than three stools per week) **and painful defecation**

Firm stool consistency

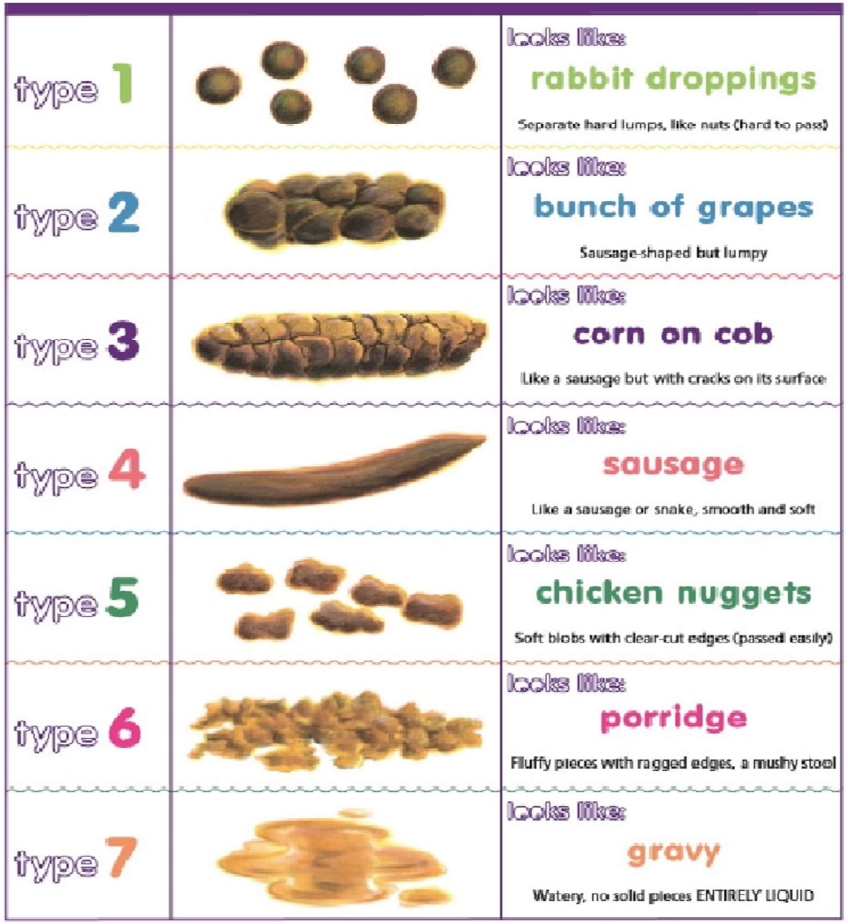
Large stool size

Delayed intestinal transit time

Increased stool weight

Associated retentive posturing

The Bristol Stool Scale



History

- Time of the first bowel movement (Meconium)

  HD, CF, Imperforated Anus, …
- The age of onset
- Frequency, consistency, and size of stools
- Whether the child experiences pain during defecation or exhibits retentive posturing
- Whether blood is present on the toilet paper
- Hard-caliber stools, which may be large enough to clog the toilet, may cause anal fissuresr

History

- presence of abdominal pain, distension, loss of appetite, fever, nausea, vomiting, weight loss or poor weight gain
- Presence of neuromuscular development problems, psychological or behavioral problems
- Presence of urinary incontinence or UTI
- Dietary history and the history of previous treatment strategies for constipation should be investigated
- Presence of important life events that might contribute to the development of retentive behavior such as death in the family, birth of a sibling, school problems, and sexual abuse.

Fecal Incontinence

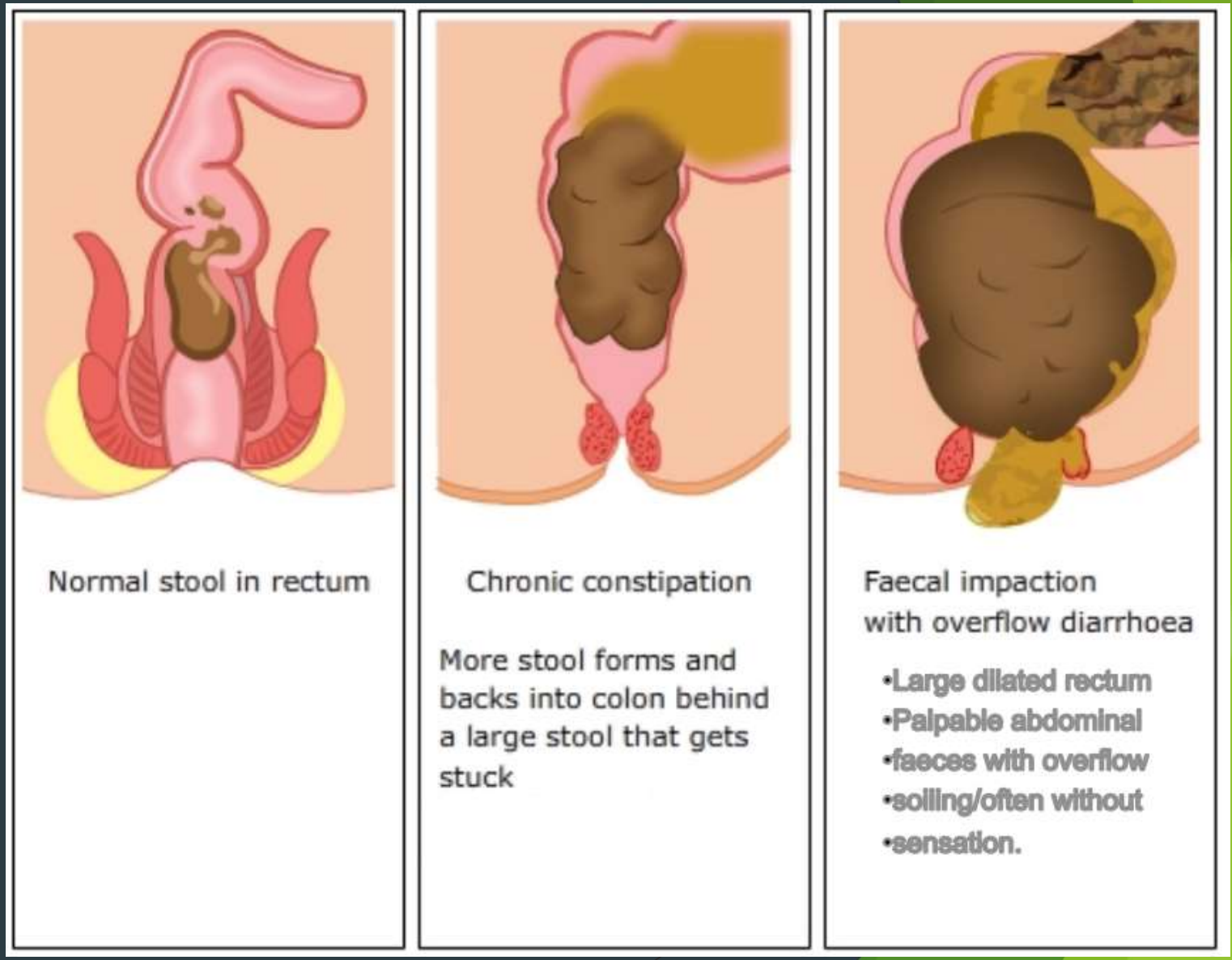
Functional :

- Functional Retentive Fecal Incintinence ;FRFI(soiling)
- Non Retentive Fecal Incintinence ;FNRFI

Non Functional:

- Neuromuscular anorectal dysfunction
- Anal surgery
- Fistula
- HD surgery

How FRFI Occurs



Non Retentive Fecal Incintinence ;FNRFI

- Repeated socially inappropriate stool passage in the absence of fecal retention or any other predisposing medical condition
- These children are older than ۴ years and have no evidence of constipation by history or examination
- The treatment differs from patients with functional constipation, with recommendations for educating the family, a rigorous toilet training program, caution against intensive use of stool softeners and a referral to a mental health professional when appropriate

Non Retentive Fecal incontinence

BOX 11.2 Rome IV Criteria for Pediatric Functional Nonretentive Fecal Incontinence

Diagnostic criteria must include all of the following in children at least 4 years of age, for at least 1 month prior to diagnosis

1. Defecation into places inappropriate to the social context
2. The fecal incontinence cannot be explained by another medical condition after appropriate medical evaluation
3. No evidence of fecal retention

Physical Examination

- Weight and height
- Abdominal examination
- Evaluation of the perianal region: position of the anus, fecal incontinence, skin irritation, eczema, fissures, hemorrhoids, signs of possible sexual abuse
- The anorectal digital examination: perianal sensation, anal tone, size of the rectum, and contraction and relaxation of the anal sphincter
- The lumbosacral area: sacral dimple, tuft of hair, asymmetry of the buttocks, (as an indicator of spina bifida occulta)

Paraclinical Evaluation

- No routine laboratory testing (TFT, Celiac, Ca) in the absence of alarm symptoms
- Abdominal Radiography: no role in the diagnosis of functional constipation, just to determining the presence of a fecal rectal mass when there is uncertainty and rectal examination is not possible (obesity, refusal, or psychological factors like sexual abuse)
- Colonic Transit Time: to assess intestinal motility
- Abdominal Ultrasonography: assessment of stool retention & a reliable alternative to assess the rectal filling state (might replace TR)

Paraclinical Evaluation

- Contrast Enema: unnecessary in uncomplicated constipation, often used in the diagnostic workup of HD
- Anorectal Manometry: demonstrate the presence of the rectoanal inhibitory reflex (absent in anal achalasia or HD), can diagnose pelvic floor dyssynergia (paradoxical contraction of the external anal sphincter during attempted defecation)
- Colonic Manometry: to diagnose colonic neuromuscular disorders in the children with intractable constipation
- Magnetic Resonance Imaging: to diagnose spinal cord abnormalities when neurologic complaints or physical symptoms (such as gluteal cleft deviation)

TREATMENT FOR CONSTIPATION

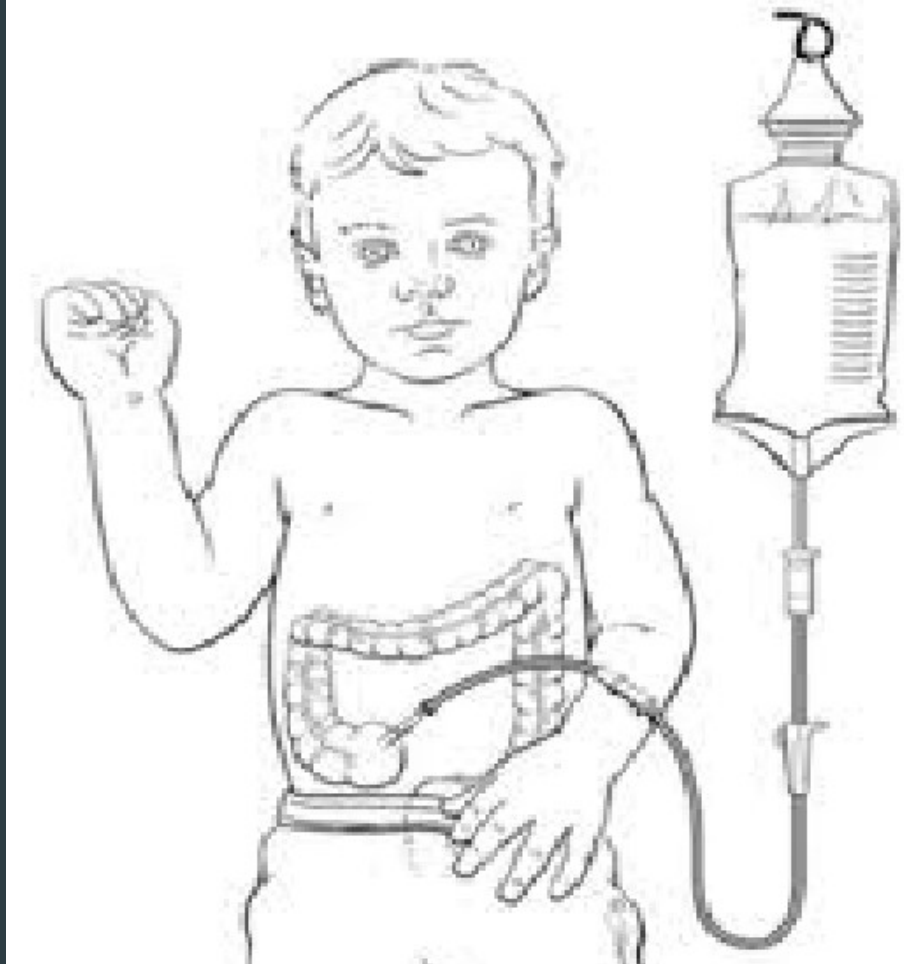
- **Education**
- **Disimpaction (Antegrade or Retrograde Enemas and Irrigation)**
- **Maintenance Treatment (**combination of dietary changes, behavioral interventions, and medication)
- **Surgery: Antegrade Colonic Enema (ACE), Rectosigmoid Resection**

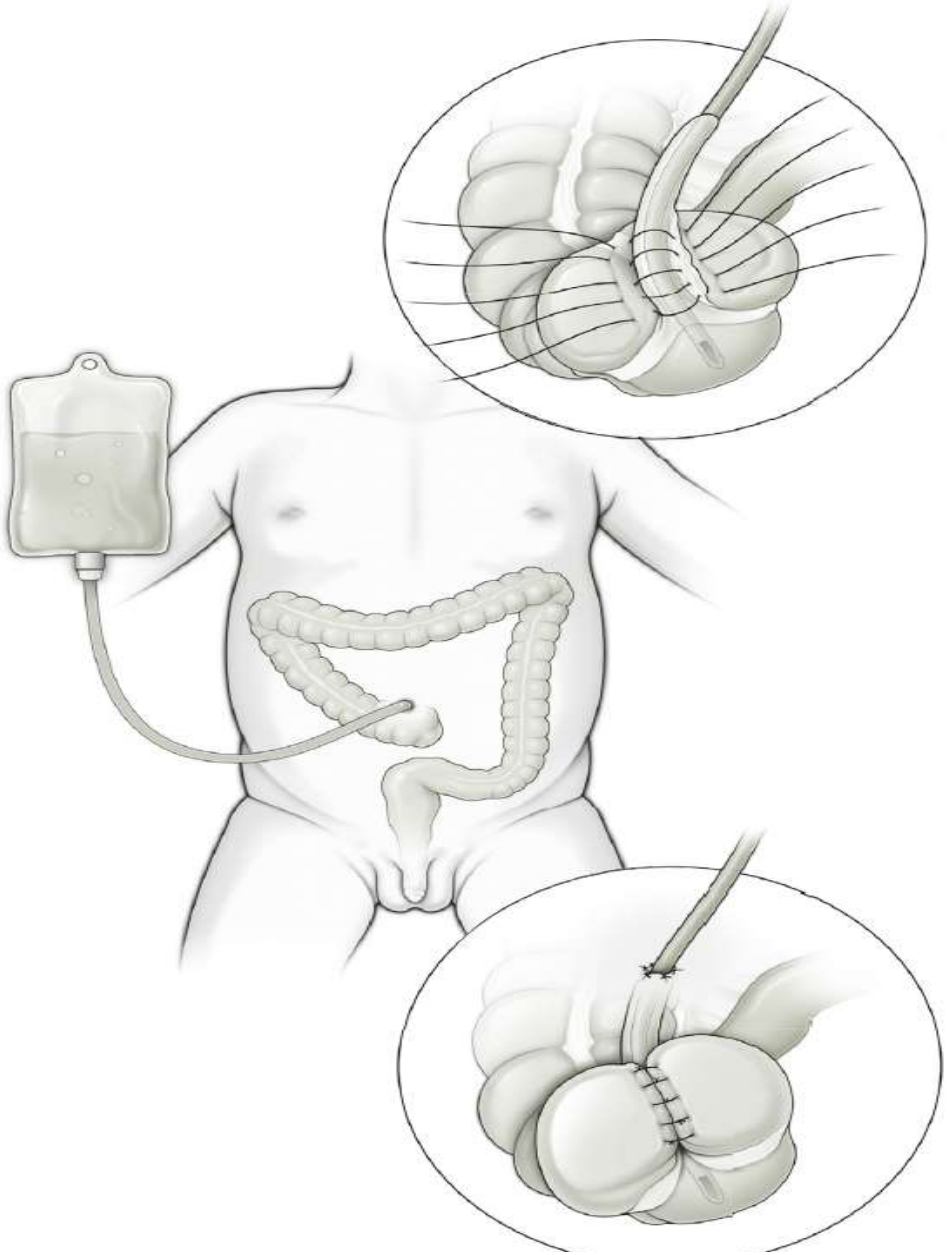
TABLE 11.3 Dosages of Most Frequently Used Oral and Rectal Laxatives

Oral Laxatives	Dosages
Osmotic Laxatives	
Lactulose	1–2 g/kg, once or twice/day
PEG 3350	Maintenance: 0.2–0.8 g/kg/day
PEG 4000	Fecal disimpaction: 1–1.5 g/kg/day (with a maximum of 6 consecutive days)
Milk of magnesia (magnesium hydroxide)	2–5 years: 0.4–1.2 g/day, once or divided 6–11 years: 1.2–2.4 g/day, once or divided 12–18 years: 2.4–4.8 g/day, once or divided
Fecal Softeners	
Mineral oil	1–18 years: 1–3 mL/kg/day, once or divided, max: 90 mL/day
Stimulant Laxatives	
Bisacodyl	3–10 years: 5 mg/day >10 years: 5–10 mg/day
Senna	2–6 years: 2.5–5 mg once or twice/day 6–12 years: 7.5–10 mg/day >12 years: 15–20 mg/day
Sodium picosulfate	1 month to 4 years: 2.5–10 mg once/day 4–18 years: 2.5–20 mg once/day

Rectal Laxatives/ Enemas	Dosages
Bisacodyl	2–10 years: 5 mg once/day
	>10 years: 5–10 mg once/day
Sodium docusate	<6 years: 60 mL
	>6 years: 120 mL
Sodium phosphate	1–18 years: 2.5 ml/kg, max: 133 mL/dose
NaCl	neonate <1 kg: 5 mL, >1 kg: 10 mL
	>1 year: 6 mL/kg once or twice/day
Mineral oil	2–11 years: 30–60 mL once/day
	>11 years: 60–150 mL once/day
Prucalopride[131]	<50 kg: 0.04 mg/kg once/day
	>50 kg: 2 mg once/day
Lubiprostone[135]	12–23 kg: 12 µg once/day
	24–35 kg: 12 µg twice/day
	≥36 kg: 24 µg twice/day

ACE Surgery (Malone Appendicocecostomy)





Congenital Aganglionic Megacolon (Hirschsprung Disease)

- Absence of ganglion cells in the submucosal and myenteric plexus
- The most common cause of lower intestinal obstruction in neonates
- ١:٥٠٠٠ live births
- M>F
- May be associated with other congenital defects

- The aganglionic segment ٨٠% is limited to the rectosigmoid
- ١٠-١٥% long-segment (disease proximal to the sigmoid colon)
- Total bowel aganglionosis is rare (≈٥% of cases)

Clinical Manifestations

- Usually diagnosed in the neonatal period
- Abdominal distention, failure to pass meconium(٩٩% in first ٤٨ hour), and/or bilious emesis or aspirates, feeding intolerance
- FTT
- Hypoproteinemia from protein-losing enteropathy
- Enterocolitis (high intraluminal pressure and reduced blood flow and deterioration of the mucosal barrier)

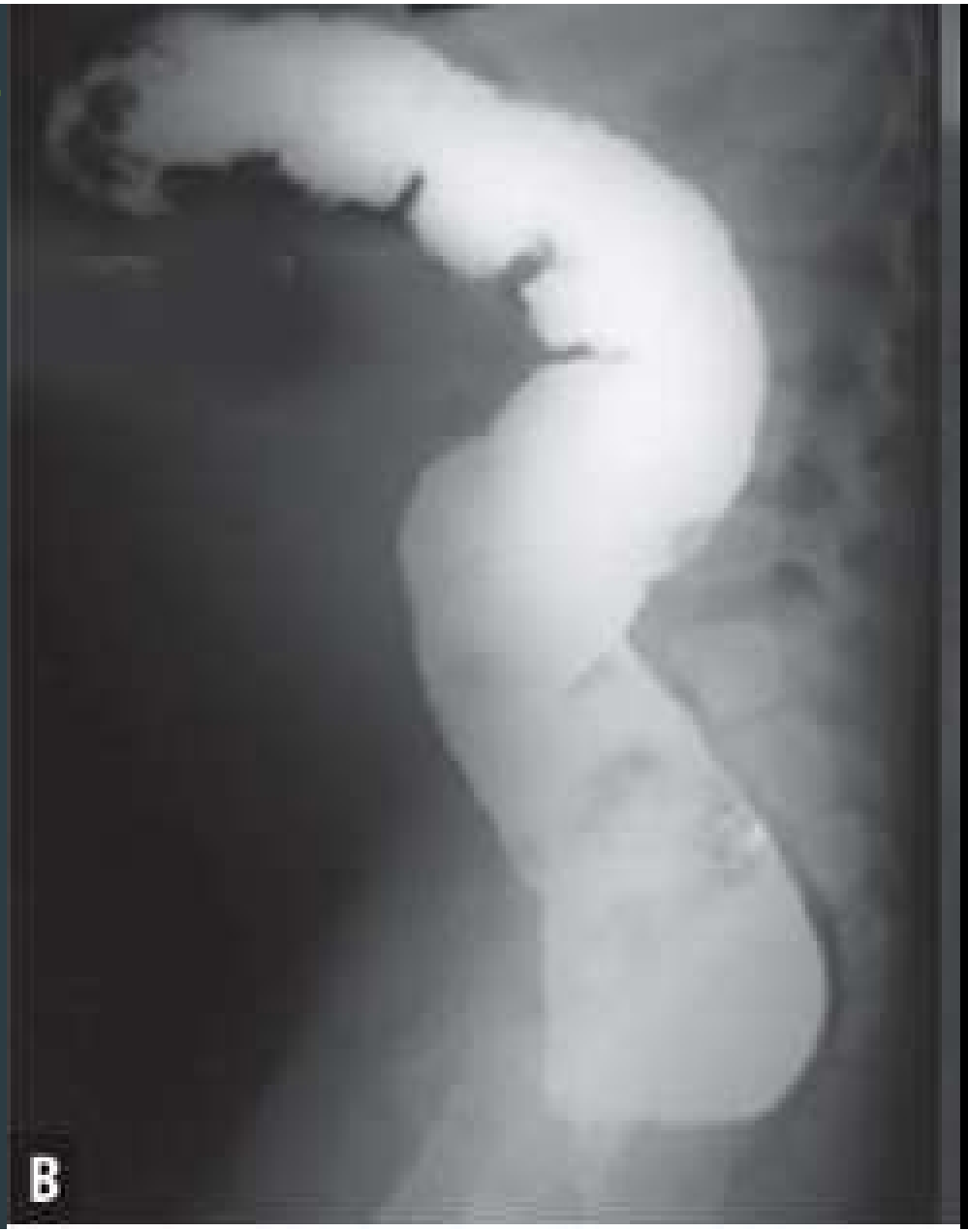
Hirschsprung Versus Functional Constipation

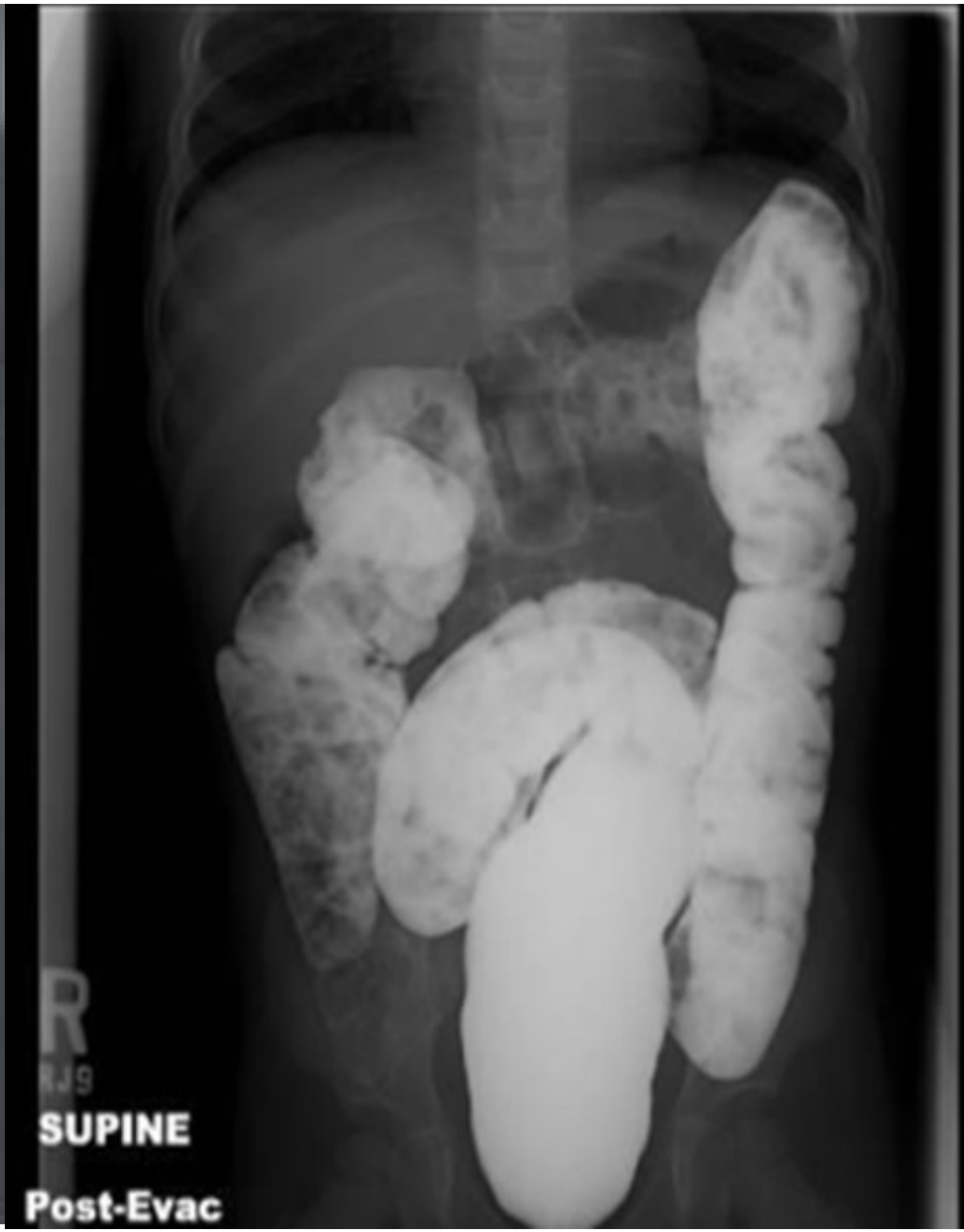
VARIABLE	FUNCTIONAL	HIRSCHSPRUNG DISEASE
HISTORY		
Onset of constipation	After 2 yr of age	At birth
Encopresis	Common	Very rare
Failure to thrive	Uncommon	Possible
Enterocolitis	None	Possible
Forced bowel training	Usual	None
EXAMINATION		
Abdominal distention	Uncommon	Common
Poor weight gain	Rare	Common
Rectum	Filled with stool	Empty
Rectal examination	Stool in rectum	Explosive passage of stool
Malnutrition	None	Possible
INVESTIGATIONS		
Anorectal manometry	Relaxation of internal anal sphincter	Failure of internal anal sphincter relaxation
Rectal biopsy	Normal	No ganglion cells, increased acetylcholinesterase staining
Barium enema	Massive amounts of stool, no transition zone	Transition zone, delayed evacuation (>24 hr)

Diagnosis

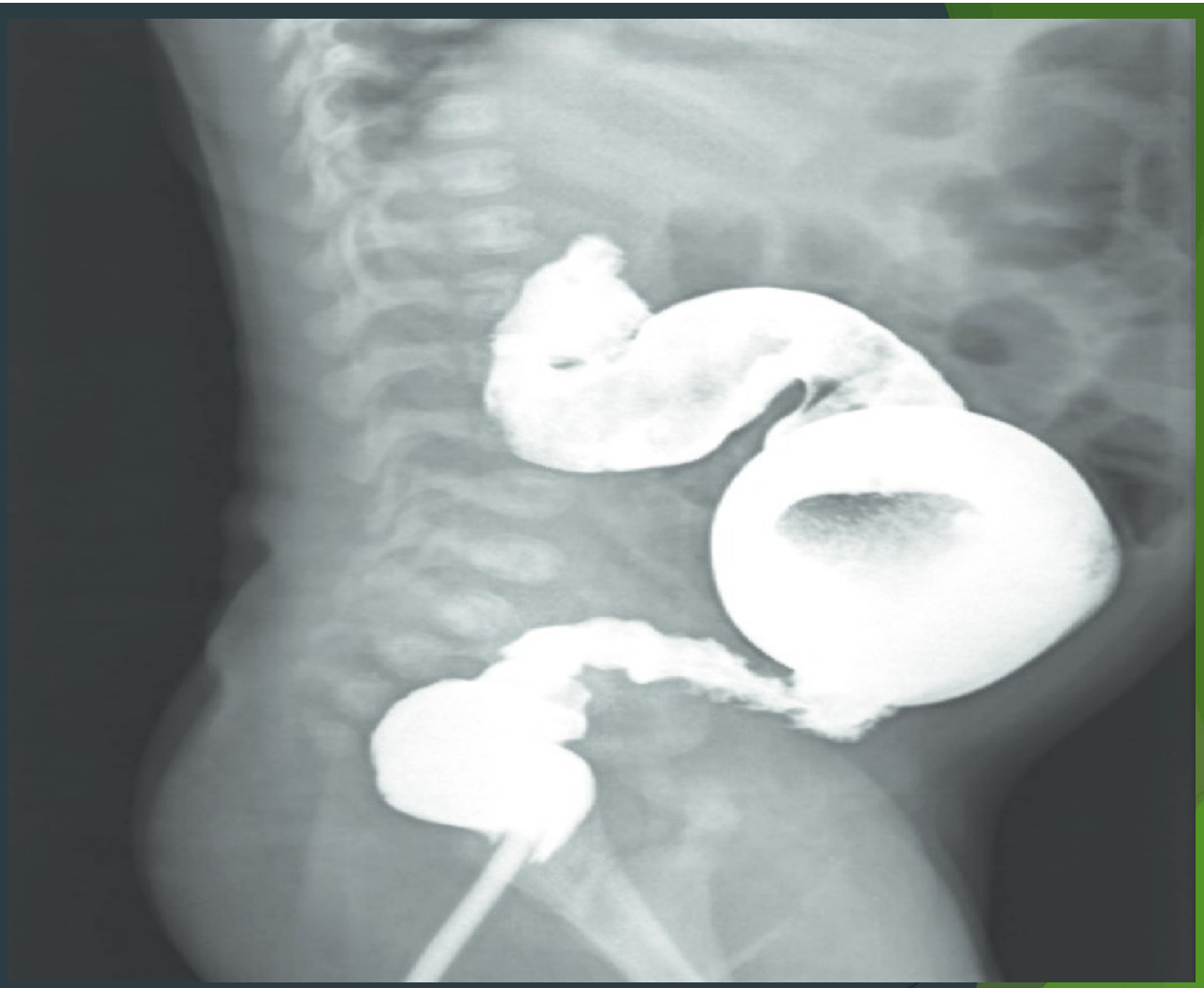
- Unprepared contrast enema
- Rectal suction biopsy
- Anorectal manometry (No RAIR)

Normal Barium Enema

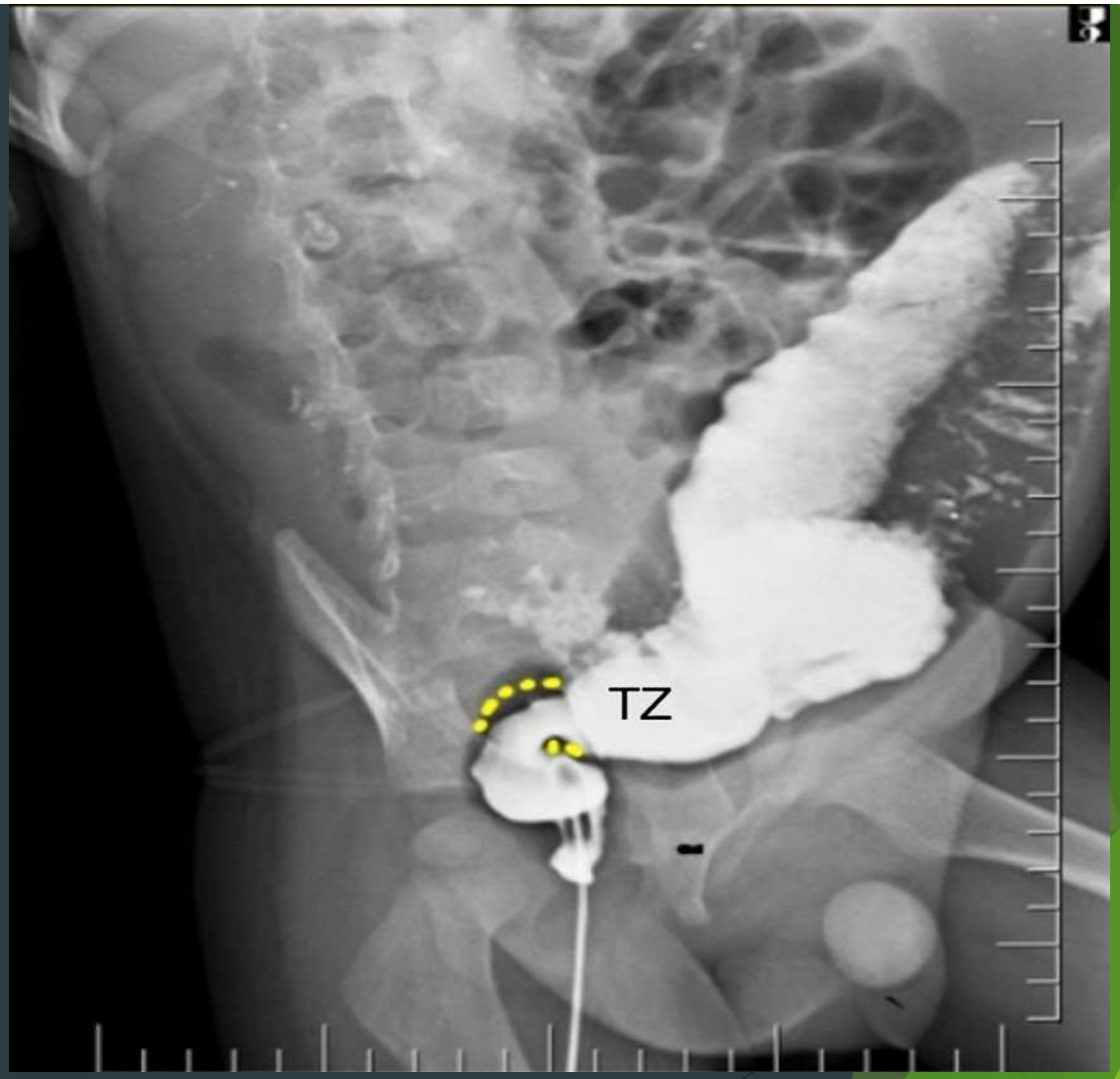




Barium Enema in Hirschsprung



Barium Enema in Hirschsprung



Treatment

- The definitive treatment is operative intervention (pull-through procedure)
- Three type: Swenson, Duhamel, Duhamel, Soave

ultrashort-segment Hirschsprung disease，also known as anal achalasia

- the aganglionic segment is limited to the internal sphincter.
- The clinical symptoms are similar to those of children with functional constipation
- Diagnosed with anorectal manometery
- anal
- botulism injection to relax the anal sphincter and anorectal myectomy if
- indicated.

Hirschsprung disease–associated **enterocolitis**

- Explosive, foul-smelling and/or bloody diarrhea, abdominal distention, explosive discharge of rectal contents on digital examination, diminished peripheral perfusion, lethargy, and fever
- Management principles include hydration, decompression from above and below (nasogastric Salem Sump, rectal tube, rectal irrigation), and the Use of broad-spectrum antibiotics,