Constipation in Pediatric Patients

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Reviewed by Christine Waasdorp Hurtado, MD of the Professional Education Committee

Question

A healthy 6-year-old boy presents for evaluation of repeated involuntary passage of stool into his underwear. He only has difficulties while awake and has not had any accidents while sleeping. He is toilet trained. A rectal examination reveals perianal fecal staining, no skin tags or fissures, a good rectal tone, and hard stools in the rectal vault. The physical exam notes a firm mass in the suprapubic area on abdominal palpation while the rest of the exam is normal.

Which of the following is correct with regard to the most likely diagnosis of this patient?

A. The child is not aware of the associated odor and discomfort of soiled underwear
B. Maintenance therapy is indicated for a 1-month period
C. Urinary signs and symptoms are rare in this condition and should prompt evaluation for a renal disorder as a cause of fecal incontinence
D. Disimpaction, usually with an oral laxative is the preferred initial treatment

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Objectives

- Know the differential diagnosis of constipation
- Differentiate functional vs. organic constipation
- Understand the pathophysiology of encopresis
- Learn treatment strategies for constipation

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"A regular pattern of defecation is considered by many to be a sign of good health"

- Epidemiology:
  - 3 million Americans/year receive medications for constipation from their physicians
    - (US population estimate: 314 million)

- Constipation:
  - 3% visits to general pediatrician
  - 10-25% visits to pediatric GI

•Croffie JM. Pediatric Gastrointestinal Disease. Fourth ed; 2004.
•Sonnenberg A. Dis Colon Rectum 1989.
•Loening-Baucke V. Gastroenterology 1993.
•Fleisher PR. Pediatric Annals 1976.

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Definition of constipation:

- "A term used to describe the subjective complaint of passage of abnormally delayed or infrequent passage of dry, hardened feces"[1]
  - Hard stools
  - Large stools
  - Infrequent stools
  - Discomfort with stools

[1]Merriam-Webster dictionary

*Formal NASPGHAN definition specifies minimum 2 week duration

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Frequency

- Normal defecation
  - Infants: 4 per day (range 1 - 7x/day)
  - Children (2 yo): 1- 2x day
  - Adults: 3 per week - 3 per day
    - Pattern attained by ~4 yo

•Croffie JM. Pediatric Gastrointestinal Disease. Fourth ed; 2004.
•Lemoh JN. Arch Dis Child 1979.
•Weaver LT. Arch Dis Child 1984.
•Weaver LT. J Pediatric Gastroenterology Nutrition 1988.

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History and Physical examination

Red flags:

- **History**: fever, anorexia, weight loss, vomiting, bloody diarrhea, constipation since infancy
- **Physical exam**: abnormal perianal exam (erythema, fistula), abnormal anal tone, absence of anal wink, sacral tuft of hair

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Differential diagnosis: constipation

Non-organic

- Developmental
  - Infant dyschezia
  - Cognitive
  - Attention-deficit disorders
- Situational
  - Toilet training
  - Toilet phobia
  - School bathroom avoidance
  - Sexual abuse
- Constitutional
  - Colonic inertia
  - Genetic predisposition
- Reduced stool volume and dryness
  - Low fiber in diet
  - Dehydration
  - Underfeeding or malnutrition

Organic

- Abnormalities of the colon and rectum
- Spinal cord lesions
- Neuropathic lesions
- Metabolic conditions
- Systemic disorders
- Drugs

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Organic causes of constipation

- Abnormalities of the colon and rectum
  - Chronic intestinal pseudobstruction
  - Anal stenosis
  - Anal/colonic stricture –post NEC/IBD
  - Ectopic anus
- Spinal cord lesions
  - Spina bifida, Meningomyelocele
  - Sacral agenesis
  - Tethered cord
  - Tumors
- Neuropathic lesions
  - Hirschsprung disease
  - Intestinal neuronal dysplasia
- Metabolic
  - Hypothyroidism
  - Hypo/hyper-calcemia
  - Hypokalemia
  - Uremia

- Systemic disorders
  - Celiac disease
  - Cystic fibrosis
  - Diabetes mellitus
  - Panhypopituitarism
  - Dermatomyositis, scleroderma
  - Autoimmune disorders
  - MEN, pheochromocytoma
  - Lead toxicity
- Drugs
  - Analgesics
  - Anticholinergics
  - Iron
  - Antacids (esp Ca^{2+} containing)
  - NSAIDs
  - Psychotropics
  - Sympathomimetics

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Medical work-up

- History and physical exam
- Labs:
  - Serum Calcium
  - TSH/T4
  - Celiac panel
  - Lead level
  - CBC
- Imaging
- Manometry

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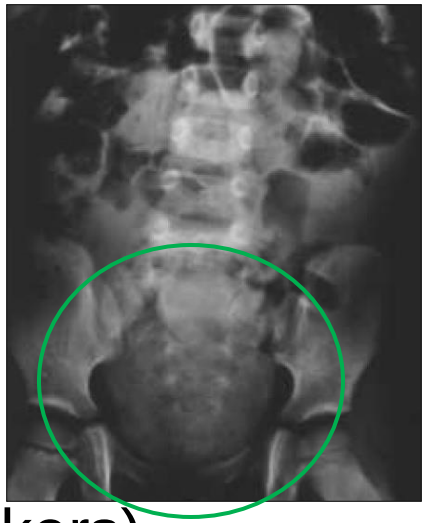
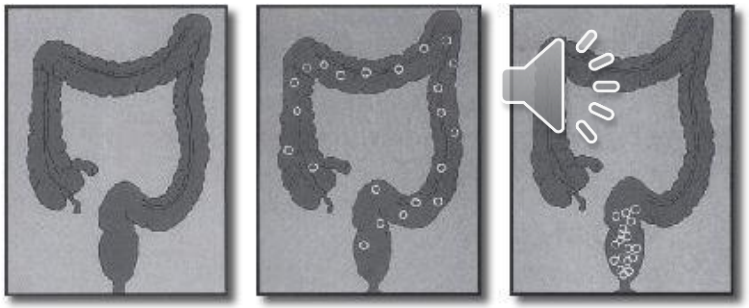
Imaging studies

- KUB: to establish fecal impaction in child refusing rectal exam or in obese child
- Un-prepped barium enema (to look for transition zone)
- MRI lumbosacral spine (to evaluate for tethered cord)



- Sitz marker study (capsule contains 24 markers)
  - Passage of 80%: normal transit
  - Scattered throughout: colonic inertia
  - In rectum: outlet dysfunction



Croffie JM. Pediatric Gastrointestinal Disease. Fourth ed; 2004.
http://www.sitzmarks.com/howtointerpretasitzmarkstest.aspx

Other Studies

- Anorectal manometry can identify:
  - Increased rectal sensory threshold
  - Paradoxical contraction of external anal sphincter and puborectalis muscles
  - Failure of relaxation of internal sphincter
- Anal sphincter electromyography*
  - Evaluate activity of external anal sphincter and puborectalis muscle
- Rectal biopsy
  - Hirschsprung disease – absence of ganglion cells in submucosa

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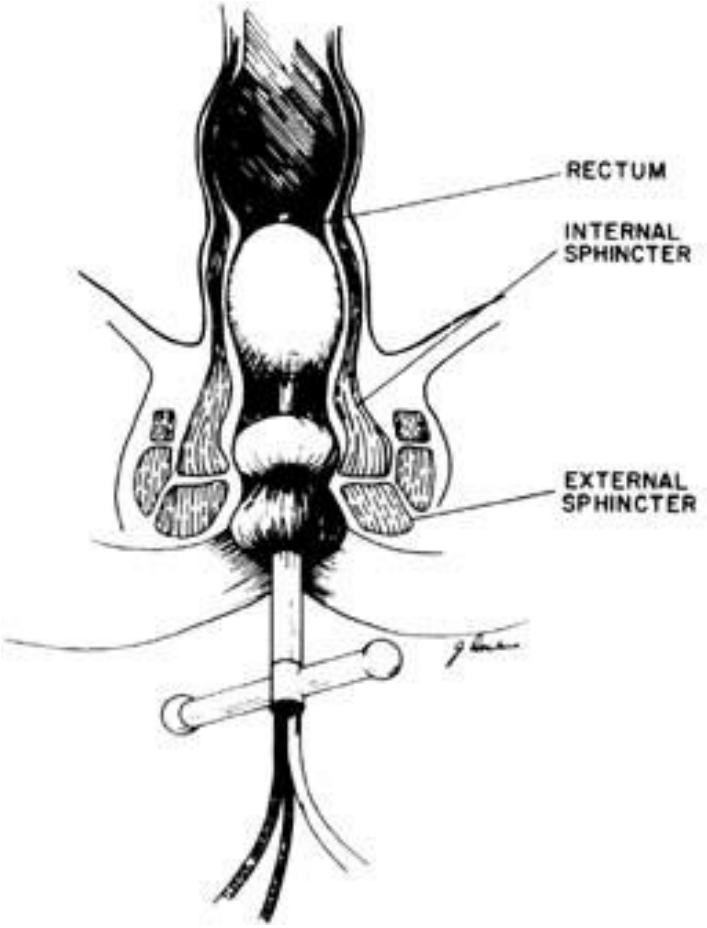
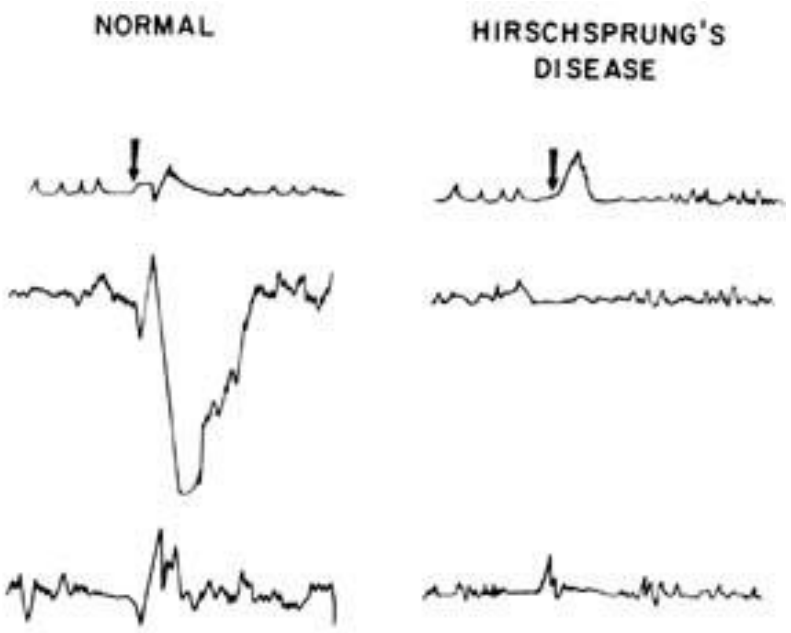
* To evaluate external anal sphincter and puborectalis muscle; can be used for biofeedback

Manometry





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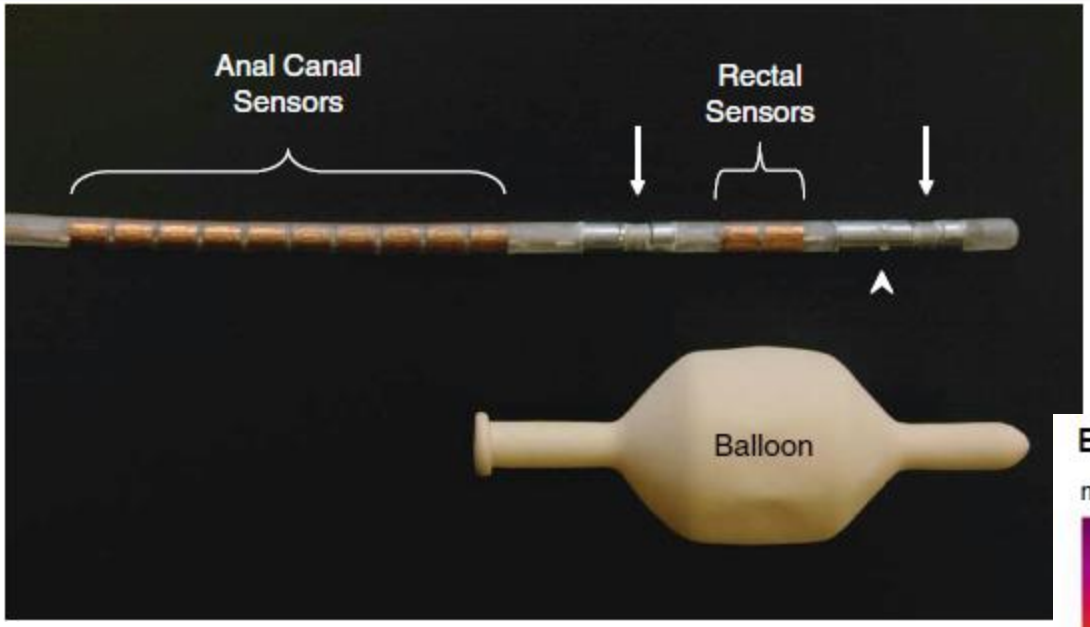

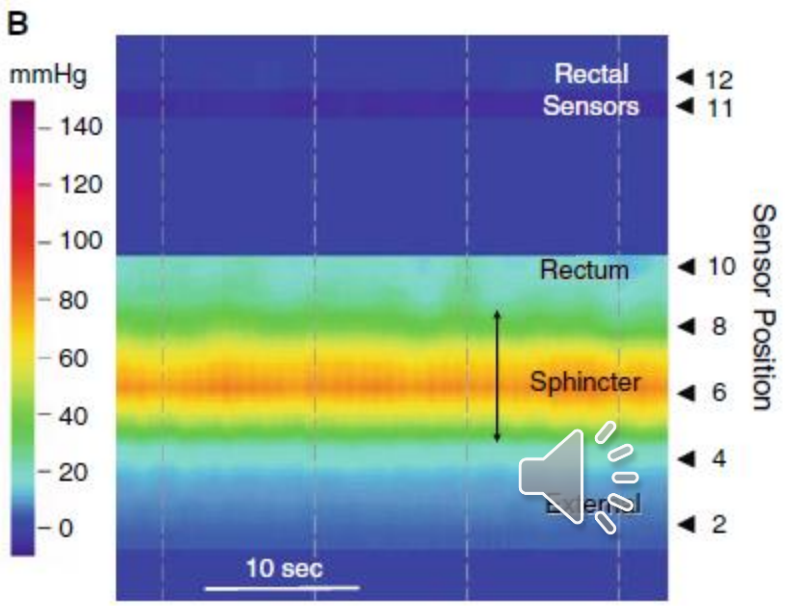

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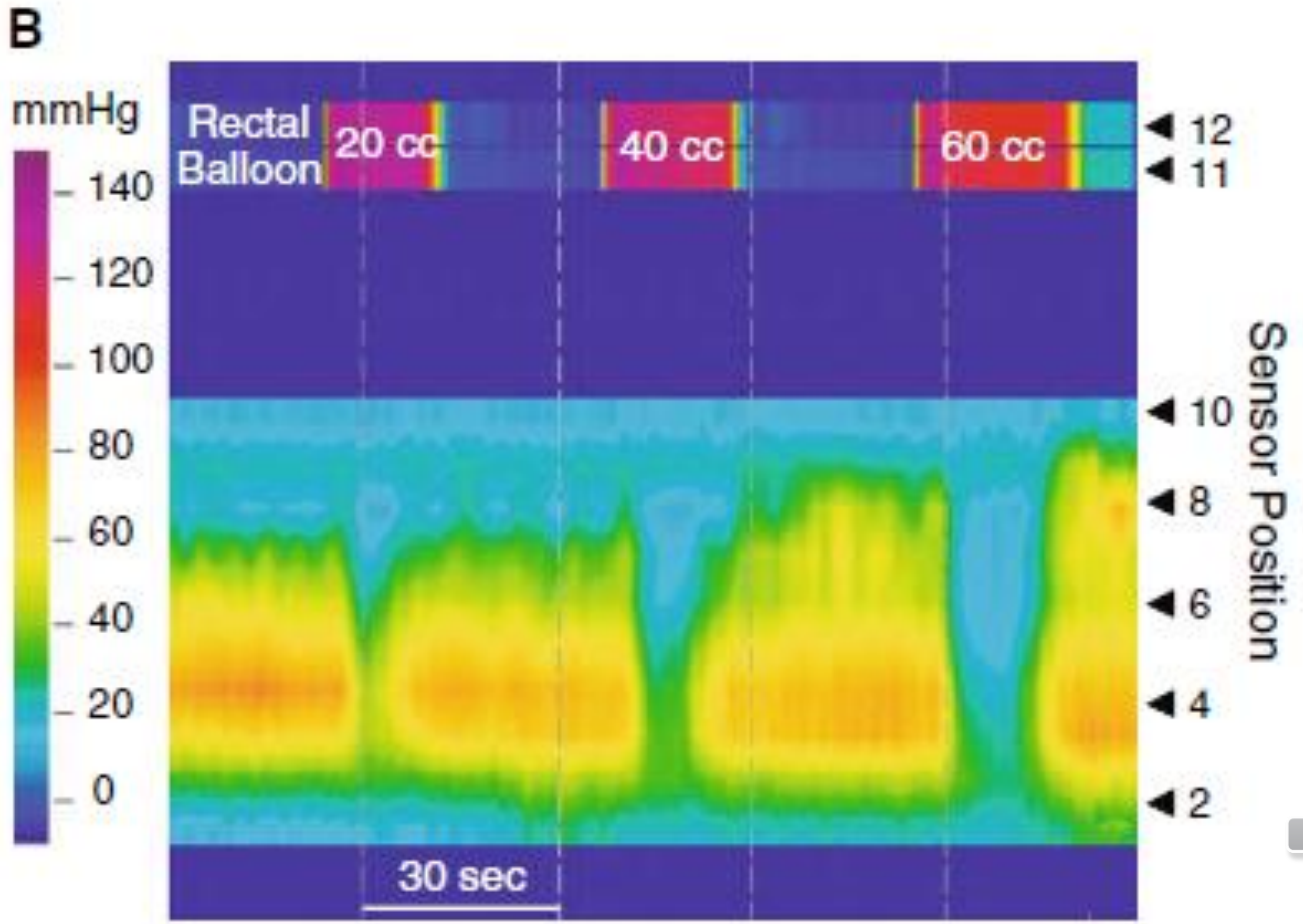

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Making a diagnosis

- If history and physical examination (+/- labs, imaging, manometery) are **not** consistent with organic disease, functional constipation can be diagnosed.

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Rome IV criteria: Functional Constipation

H3a. Functional Constipation: Diagnostic criteria*

Must include **two or more of the** following in a child with a developmental age of at least 4 years** with insufficient criteria for diagnosis of IBS:

1. Two or fewer defecations in the toilet per week
2. At least one episode of fecal incontinence per week
3. History of retentive posturing or excessive volitional 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 stools which may obstruct the toilet

*Criteria fulfilled at least once per week for at least 2 months prior to diagnosis

**Criteria for functional constipation in infant up to 4 years of age is similar

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Defecation Dynamics

- Normal ano-rectal angle: 85-105 degrees
- Stool in anorectum: temporary relaxation of internal anal sphincter
- **The Decision:**
  - Allow escape?
  - Hold in?
- **Voluntary Muscle Relaxation:**
  - Puborectalis muscle
  - External anal sphincter

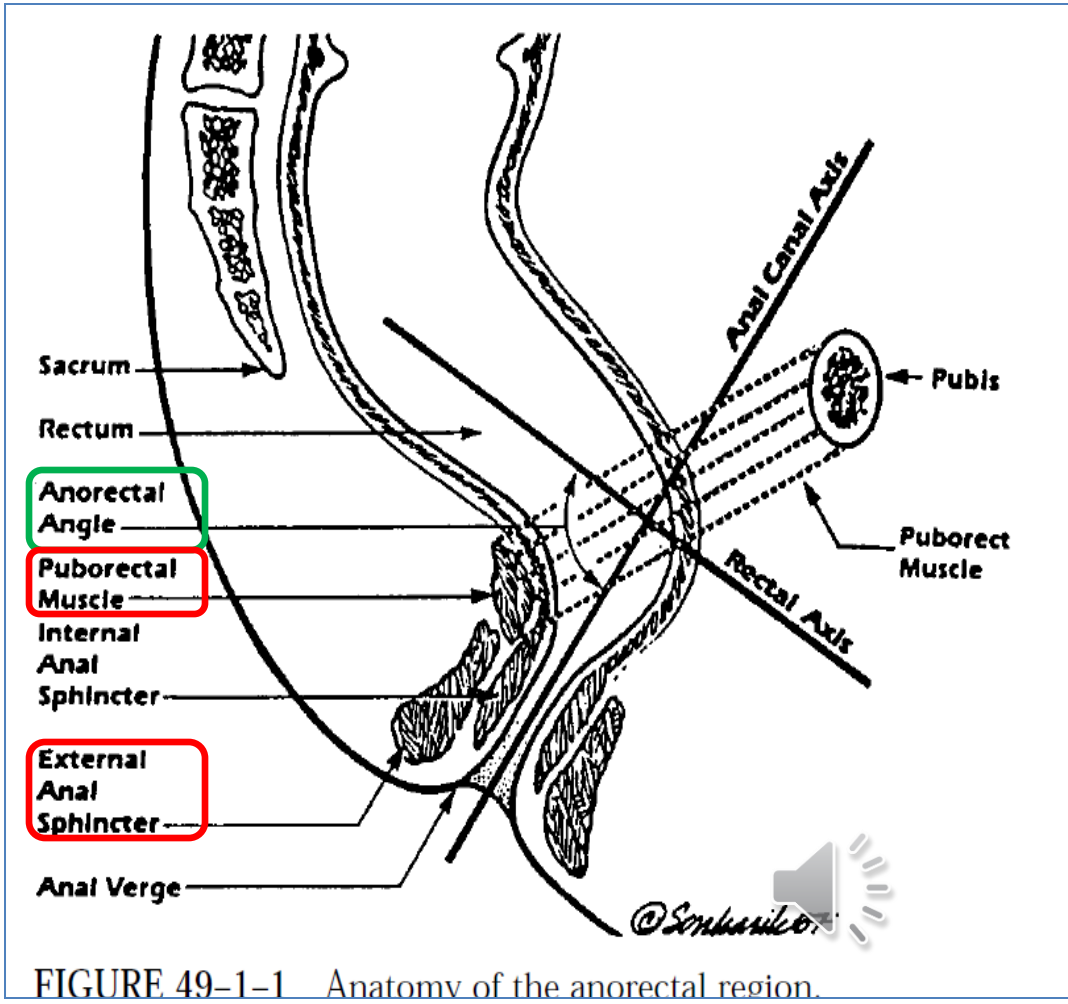
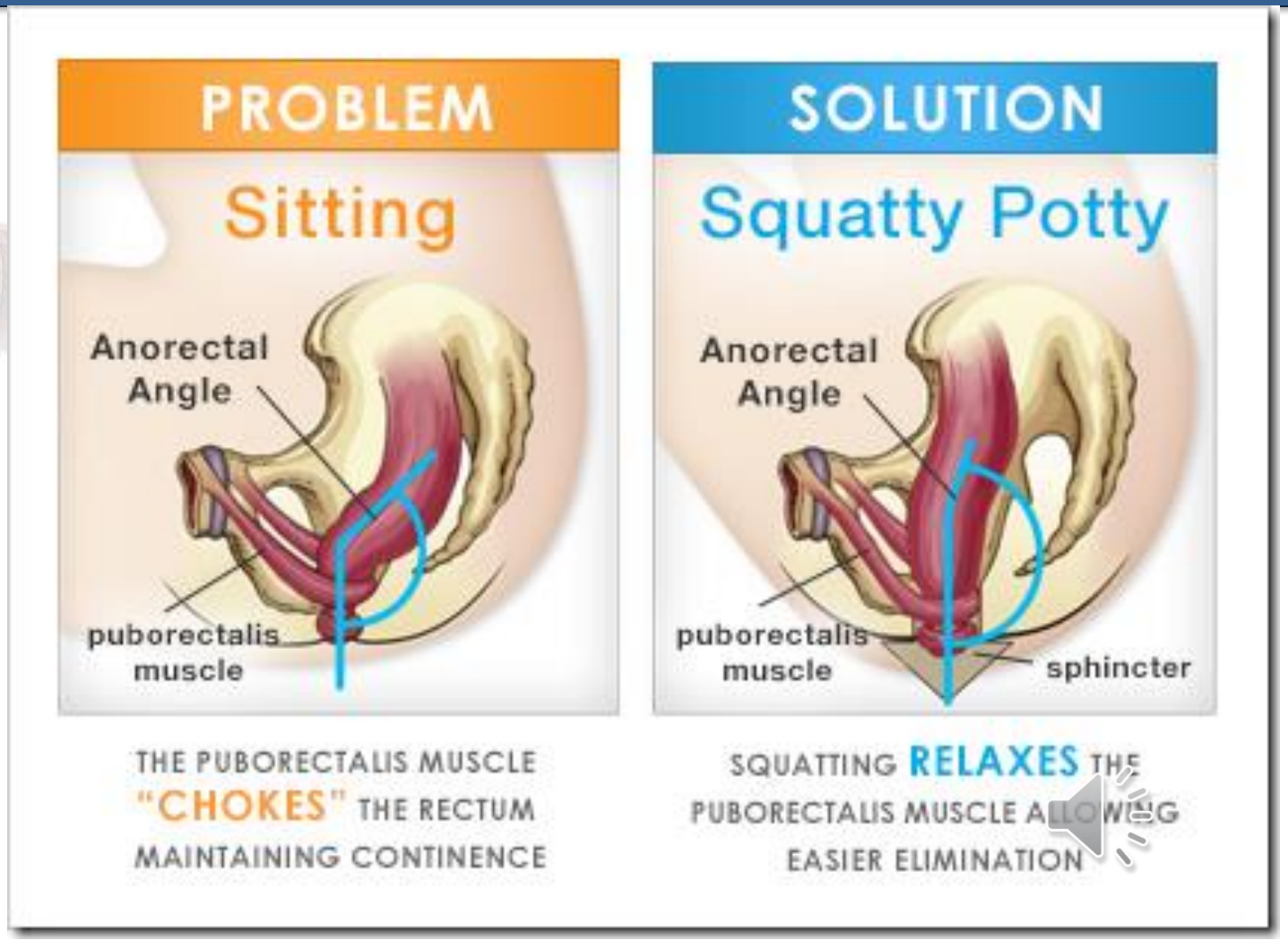


FIGURE 49–1–1 Anatomy of the anorectal region.

Croffie JM. Pediatric Gastrointestinal Disease. Fourth ed; 2004.



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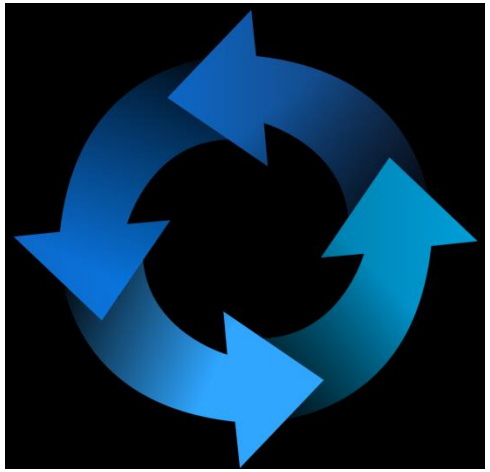
Pathogenesis and Mechanism of Constipation

- Causes:
  - Decrease in propulsive force
  - Impaired rectal sensation
  - Functional outlet obstruction
  - Behavioral withholding



- Constipation Cycle:

  Pain/irritation → retention → rectum accommodates → atonic/desensitized rectum → larger volumes stool →rectum dilates and anal canal shortens → stool escape (encopresis)

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Triggers

- Usually acute episode precedes a chronic course: i.e. diet change—human milk to cow's milk (higher protein to carbohydrate ratio; cow's milk protein allergy)
- Toddlers: toilet training and pattern of stool retention
- Older children: retentive pattern due to inconvenient or uncomfortable situations (i.e. school)

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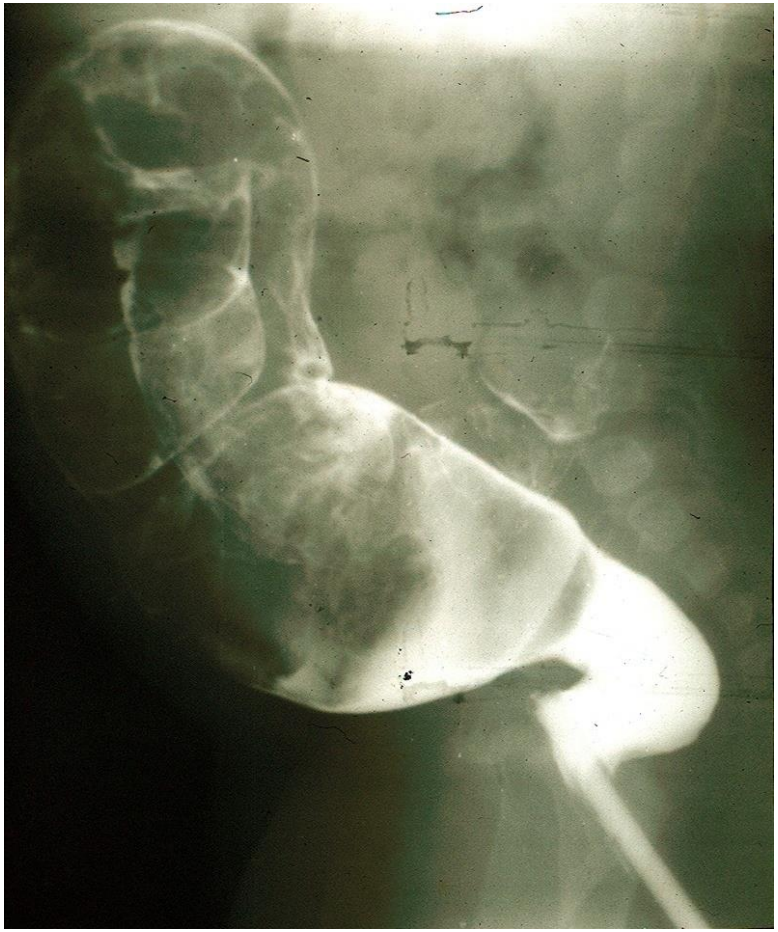
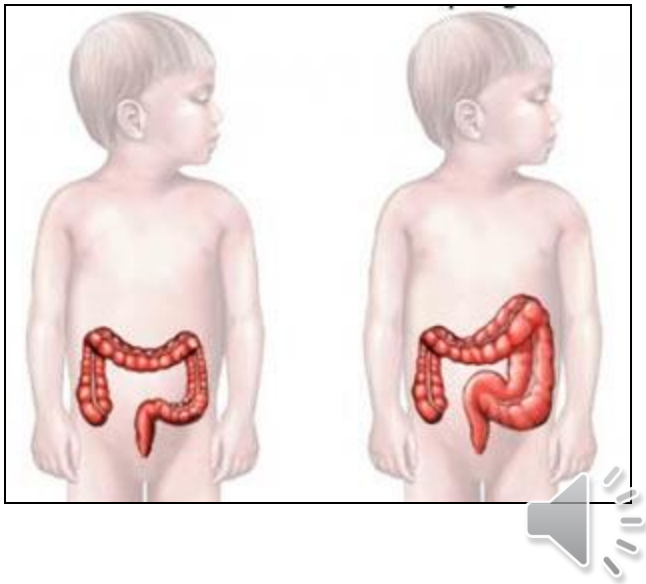
Fecal Incontinence: Encopresis

- Definition: incontinence of stool **not** resulting from organic defect/illness
  - Fecal incontinence followed by expulsion of megastool
  - Incontinence due to organic pathology is not the same!
  - Mean age: 7.4 - 9 yo
  - Male/Female: 2 to 1
  - Parents often do not understand why their child is soiling themselves

Levine MD. Pediatrics 1975.
Croffie JM et al. Gastroenterology 1995.

Most common condition that must be differentiated from idiopathic constipation?





http://uvahealth.com/services/childrens-hospital/conditions-treatments/22828

Most common condition that must be differentiated from idiopathic constipation?

Hirschsprung disease

- Segmental colonic aganglionosis
  - Absence of ganglion cells in the submucosal (Meissner) and myenteric (Auerbach) plexuses in the distal colon
- Prevalence 1 in 5000 live births
- Male/female ratio: 4 to 1
- Association with trisomy 21 and other chromosomal abnormalities
- Presentation varies:
  - Severe enterocolitis in infancy
  - Abdominal distension, feeding refusal, obstruction
  - Fecal impaction and FTT
- Exam: empty rectum, gush of air/liquid stool

**In short/ultra-short segment Hirschsprung, diagnosis may not be made until late in life

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Imseis E. Pediatric Gastrointestinal Disease. Fourth ed; 2004.

Medicines for Treatment of Constipation

Osmotic	Dose	Side Effects
Lactulose (70% solution)	1-3 ml/kg/day	Flatulence, abdominal cramps
Sorbitol (70% solution)	1-3 ml/kg/day	(same as lactulose)
Magnesium hydroxide	0.5-3 ml/kg/day	Hyper-Mg, hypo-phosphatemia
Magnesium citrate	1-3 ml/kg/d (>6yo: 150ml/d)	Hyper-Mg, hypo-phosphatemia
Polyethylene glycol	1-1.5 g/kg/day	---
Lubricant		
Mineral oil	1-3 ml/kg/day	Aspiration pneumonia
Stimulant		
Senna	2.5-7.5 ml/d (2-6 yo)	Idiosyncratic hepatitis, melanosis coli
Bisacodyl	5-10 mg/d	Abdominal pain/diarrhea, hypokalemia
Glycerin suppository	---	---

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Evaluation and Treatment of Constipation in Infants and Children: Recommendations of NASPGHAN. JPGN. 2006.

By ASHLEY WELCH / CBS NEWS / March 1, 2017, 10:56 AM

Should parents be concerned about MiraLAX side effects in kids?

MiraLAX laxative is available over-the-counter and recommended by many doctors, but some parents have raised concerns. / BAYER/AMAZON

When children suffer from constipation, many parents turn to over-the-counter laxatives like MiraLAX for relief. Pediatricians often recommend them. But some families are raising concerns about safety and sharing alarming accounts of apparent side effects in their kids.

An ongoing study is looking into the safety of the popular medication in response to reports that a number of children developed "neuropsychiatric problems" after taking MiraLAX.

The researchers from The Children's Hospital of Philadelphia (CHOP) are looking specifically at polyethylene glycol 3350, or PEG 3350, the active ingredient in MiraLAX and similar generic products. Medications containing PEG 3350 are not labeled for use in anyone under 17, but MiraLAX is often recommended off-label by pediatricians to treat chronic constipation in kids — sometimes for extended

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Treatment of idiopathic constipation

- **Disimpaction**
  - Oral medications: mineral oil, polyethylene glycol
  - Rectal disimpaction: phosphate sodium enemas, saline enemas, mineral oil enemas
  - Manual disimpaction
- **Maintenance Therapy**
  - Diet: ↑ fluids; balanced diet with whole grains, fruits, vegetables, chia, flax seed
  - Behavior modification: regular toilet-sitting, reward system, possible psychology referral
  - Laxatives

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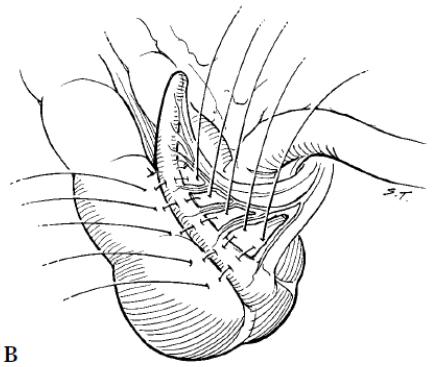
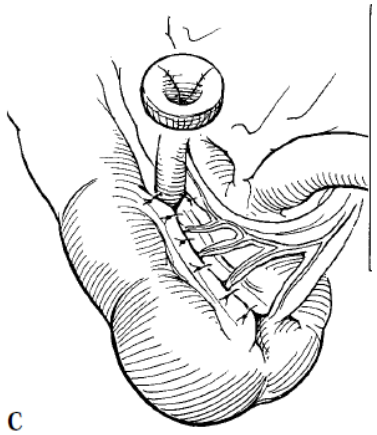
Refractory constipation

- Consider GI clinic referral
- Gastroenterologist may consider:
  - Maintenance rectal therapy
    - Medications and behavioral therapy
  - Referral for surgical intervention
    - Anterograde enemas (appendicocecostomy, sigmoid button)
    - Diverting ostomy
    - Cecostomy





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Explanation

- The child has functional constipation with fecal incontinence. Oral medications are the preferred initial treatment for disimpaction because these methods are better tolerated and noninvasive. The most palatable oral medication is polyethylene glycol without electrolytes. However, sometimes enemas are required. Fecal incontinence (encopresis) is defined as the repetitive (voluntary or involuntary) passage in stool in children ≥ 4 years (i.e., an age at which a child is generally able to exercise bowel control). Fecal incontinence is usually associated with chronic constipation and functional fecal retention. Whenever a parent detects soiling, the child needs to clean up and change clothing on the 1st request. In exchange for this level of cooperation, it is understood that the child will not receive any punishment or admonitions from the parent. A reward system should be established in which the reward is provided for effort (toilet sitting) rather than success (evacuation in the toilet).
- After disimpaction, maintenance therapy for at least 6 months is necessary to stop the cycle of withholding. The most commonly used agents include polyethylene glycol, mineral oil, and lactulose. Titrate doses up or down to reach the desired results. After at least 6 months of pain-free and accidents-free success, discontinue the agents.
- Children are often aware that they have soiled their underwear and of the associated odor.
- Abdominal pain and/or urinary signs and symptoms are often associated with functional fecal incontinence. Associated urinary findings include daytime wetting, nighttime wetting, and urinary tract infections.
- It is recommended that the child sit on the toilet, preferably 2-3 x/day, for intervals of 5-10 minutes. Some children are resistant to sitting due to fear of having painful bowel movements, which should be alleviated by the use of oral laxatives, sometimes in combination with a stool softener. Refusal to sit on the toilet should always be met with a privilege restriction.

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Any Questions???

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