

Constipation

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Resident Education Series

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Case

- 4 year old female presenting with painful, infrequent bowel movements (3x/week) without blood, occasional stool leakage onto underwear, decreased appetite.
- No fever, vomiting, normal growth parameters, no weight loss
- Thoughts?

Objectives

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

“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.

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

¹Merriam-Webster dictionary

*Formal NASPGHAN definition specifies minimum 2 week duration

Frequency

- Normal defecation
 - Infants: 4 per day (range 1 - 7x/day)
 - Children (2 yo): 1.2 - 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.

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

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

Organic causes of constipation

- Abnormalities of the colon and rectum
 - Chronic intestinal pseudoobstruction
 - 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 Ca²⁺ containing)
 - NSAIDs
 - Psychotropics
 - Sympathomimetics

Medical work-up

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

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



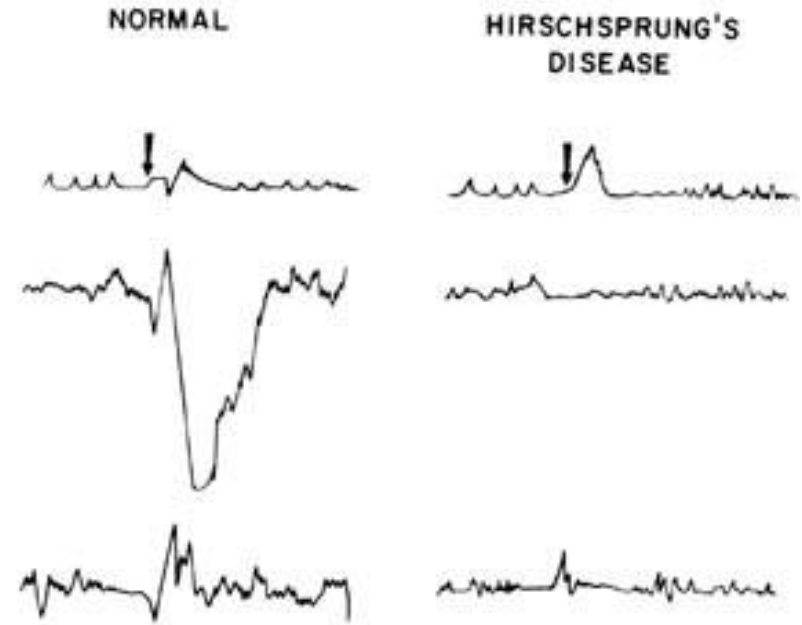
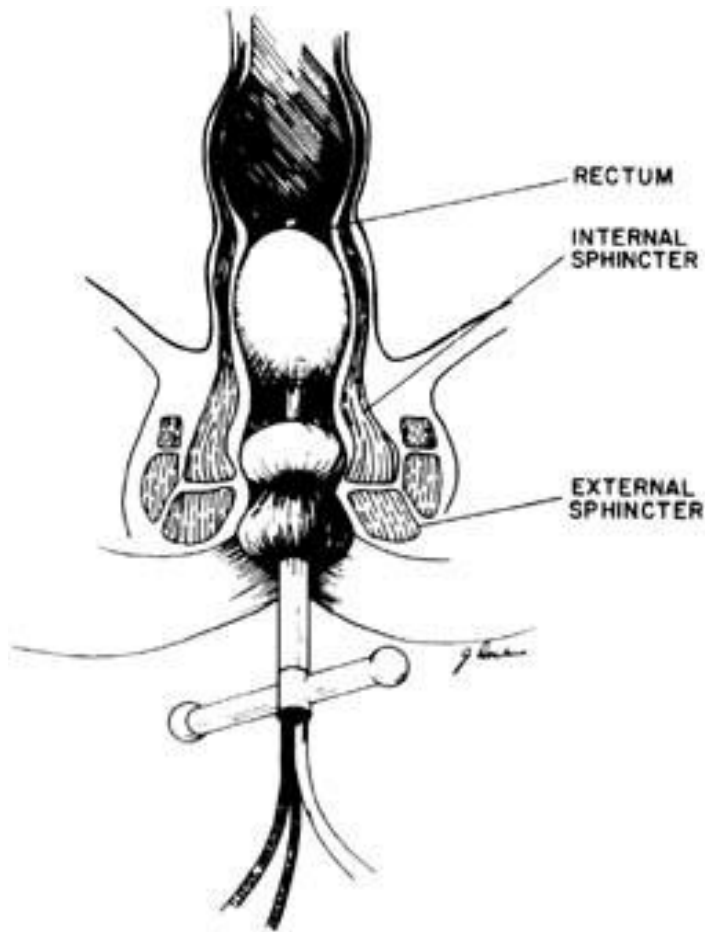
Croffie JM. Pediatric Gastrointestinal Disease. Fourth ed; 2004.

<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

Manometry



Making a diagnosis

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

Rome III 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:

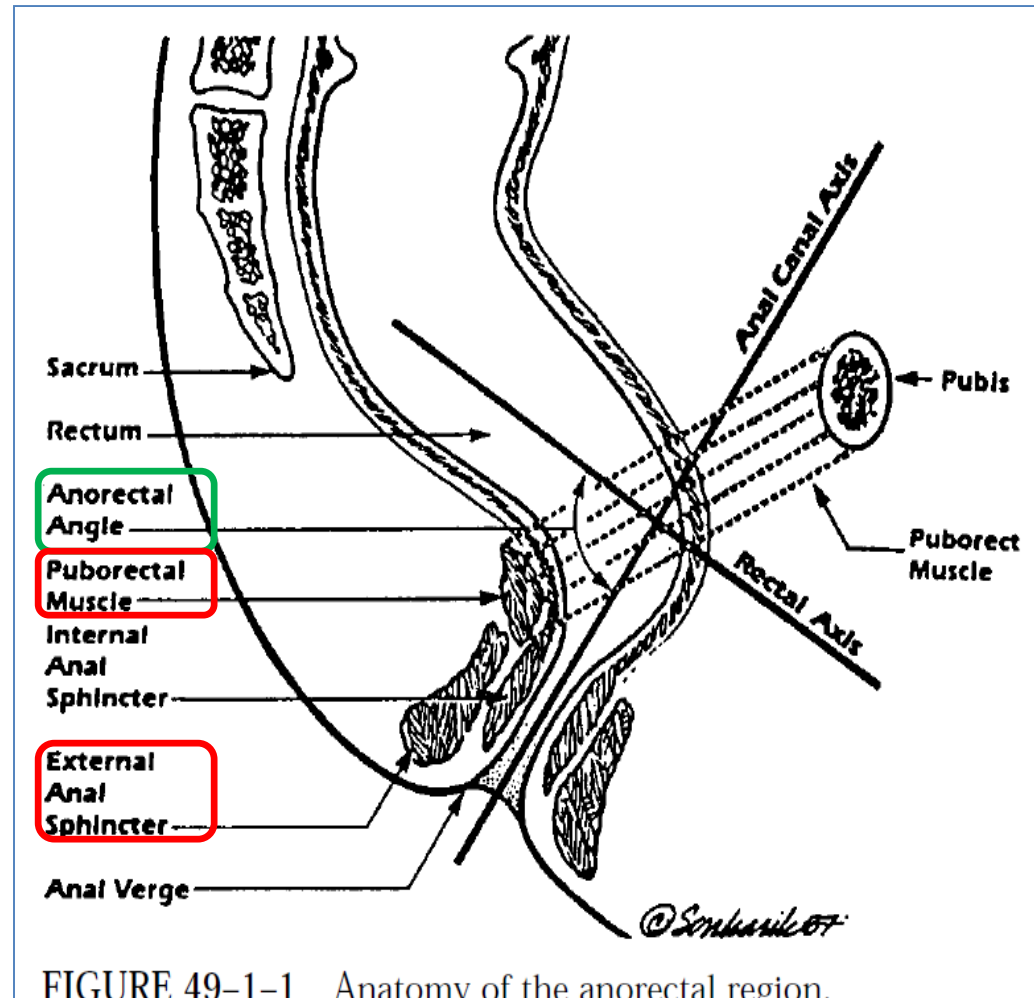
1. Two or fewer defecations in the toilet per week
2. At least one episode of fecal incontinence per week
3. History of retentive posturing or excessive volitional stool retention
4. History of painful or hard bowel movements
5. Presence of a large fecal mass in the rectum
6. History of large diameter 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

Defecation Dynamics

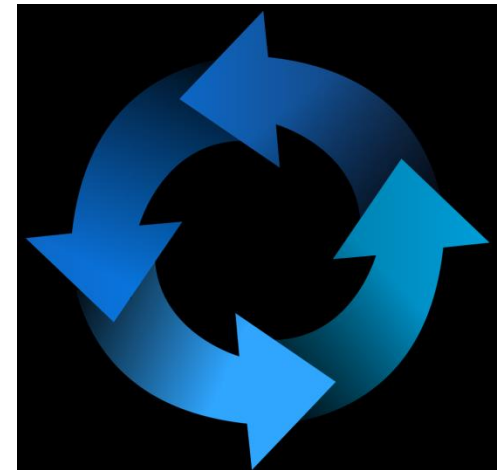
- Normal ano-rectal angle: 85-105 degrees
- Stool in anorectum: temporary relaxation of internal anal sphincter
- **The Decision:**
 - ▣ Allow escape?
 - ▣ Hold in?
- **Voluntary Muscle Relaxation:**
 - Puborectalis muscle
 - External anal sphincter



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)

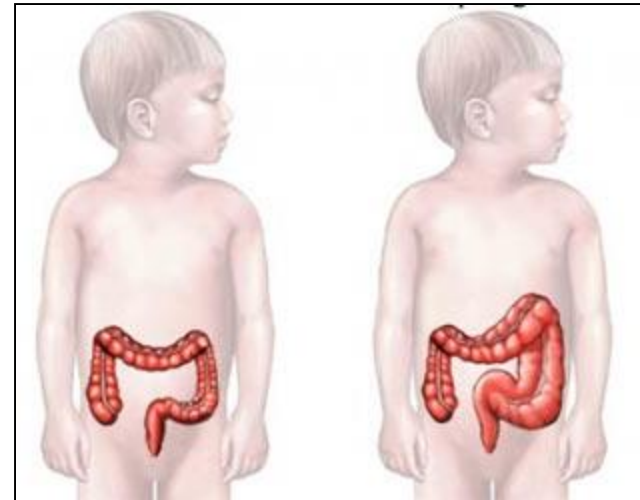
Triggers

- 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)

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

Most common condition that must be differentiated from idiopathic constipation?



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**

Medicines for Treatment of Constipation

Osmotic

Dose

Side Effects

Lactulose (70% solution)	1-3 ml/kg/day	Flatulence, abd cramps
Sorbitol (70% solution)	1-3 ml/kg/day	(same as lactulose)
Magnesium hydroxide	0.5-3 ml/kg/day	Hyper-Mg, hypo-phosp
Magnesium citrate	1-3 ml/kg/d (>6yo: 150ml/d)	Hyper-Mg, hypo-phosp
Polyethylene glycol	1-1.5 g/kg/day	---

Lubricant

Mineral oil	1-3 ml/kg/day	Aspiration pneumonia
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Stimulant

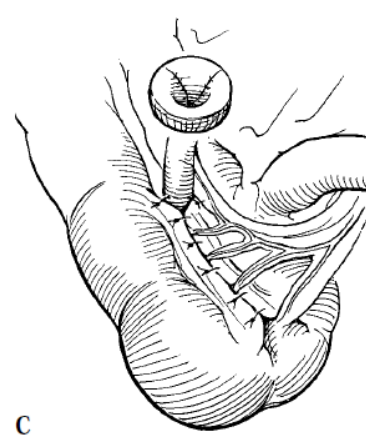
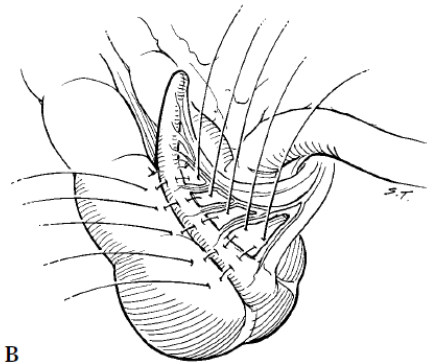
Senna	2.5-7.5 ml/d (2-6 yo)	Idiosyncratic hepatitis, melanosis coli
Bisacodyl	5-10 mg/d	Abd pain/diarrhea, hypokalemia
Glycerin suppository	---	---

Treatment of idiopathic constipation

- **Disimpaction**
 - Oral medications: mineral oil, polyethylene glycol
 - Rectal disimpaction: phosphate soda 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

Refractory constipation

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



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