Functional Constipation

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Disclosures

- No disclosures

Objectives

- Overview functional constipation
- Overview colonic physiology and defecation dynamics
  - Manometry testing insights
- Promote biological-psychological-social approach to treatment
  - Pharmacology review

Stool Burden

- 3-10% general pediatric outpatient visits
- ~25% pediatric GI visits
- No predisposition by sex

Mugie SM, et al. Best Pract Res Clin Gastroenterol. 2011;25(1):3–18.

Rome IV Criteria: Functional Constipation

Neonate/Toddler

*Diagnostic criteria Must include **one month of at least two** of the following in infants up to 4 years of age:*

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

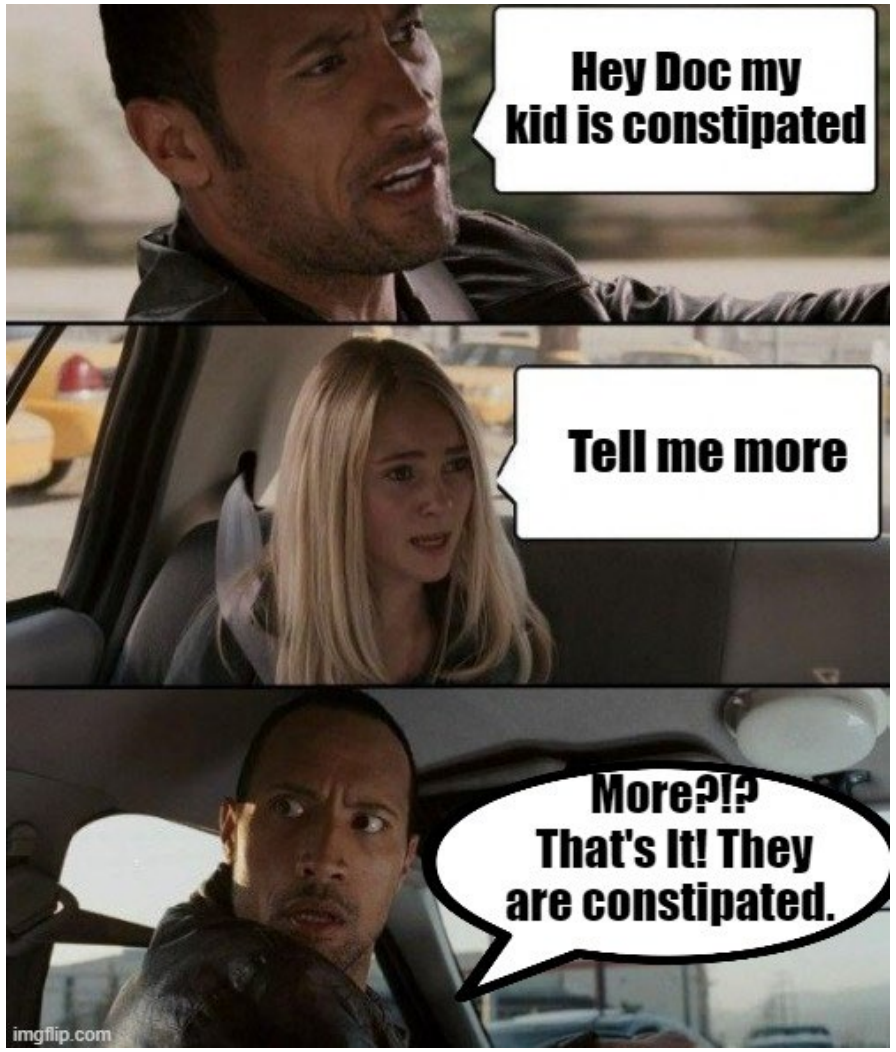
In toilet trained children, the following additional criteria may be used:

1. At least one episode/week of incontinence after the acquisition of toileting skills
2. History of large diameter stools which may obstruct the toilet

Child/Adolescent

*Diagnostic criteria Must include **two or more** of the following occurring at least once per week for a minimum of 1 month with insufficient criteria for a diagnosis of IBS:*

1. Two or fewer defecations in the toilet per week in a child of a developmental age of at least 4 years
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 can obstruct the toilet
7. After appropriate evaluation, the symptoms cannot be fully explained by another medical condition


Hey Doc my kid is constipated
Tell me more
More?!? That's It! They are constipated.
imgflip.com

History

Defecation

- Frequency?
- Consistency?
- Pain?
- Size?
- Effort?
- Incontinence?

Behavior

- Location (home, school, toilet, undergarments)?
- Type of undergarment (underwear, pull up, pads)?
- Withholding postures?
- Soiled garments?

Associated Symptoms

- Urinary incontinence or infections?
- Weight loss?
- Development (gross motor, fine motor, cognitive)?
- Psychological/Mood disorders?

Medication

- Types?
- Duration?
- Response?

Diet

- Appetite?
- Dietary habits?

Risk Factors

- Vulnerable phases
  - Infant solid introduction
  - Toddler toilet training
  - Older children avoiding public bathrooms and constant distractions
- Education
- Socioeconomic status
- Clustering in families → no specific gene mutations have been identified
- Decreased physical activity
- Low dietary fiber
- Low hydration

Physical Exam

Abdominal Exam

- Abdominal distension, palpable fecal masses

Perianal Exam

- Anal position, fissures, prolapse, hemorrhoids, scar, skin irritation, soiled garments or perianal stool, signs of sexual abuse

Digital Rectal Exam

- Presence, amount, and consistency of stool, anal tone, rectal size, sensation, anal wink, contraction and relaxation of anal sphincter

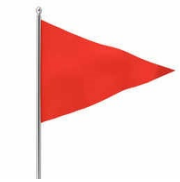
Neurological Exam

- Deep tendon reflexes, cremasteric reflux

Red Flags

- Delayed meconium
- Blood in the stools
- No fecal incontinence
- Abdominal distension
- Poor weight gain

- Abnormal anal exam (scars, positioning, fissures, hematomas)
- Squirt sign
- Tight anal sphincter
- Abnormal neurological exam



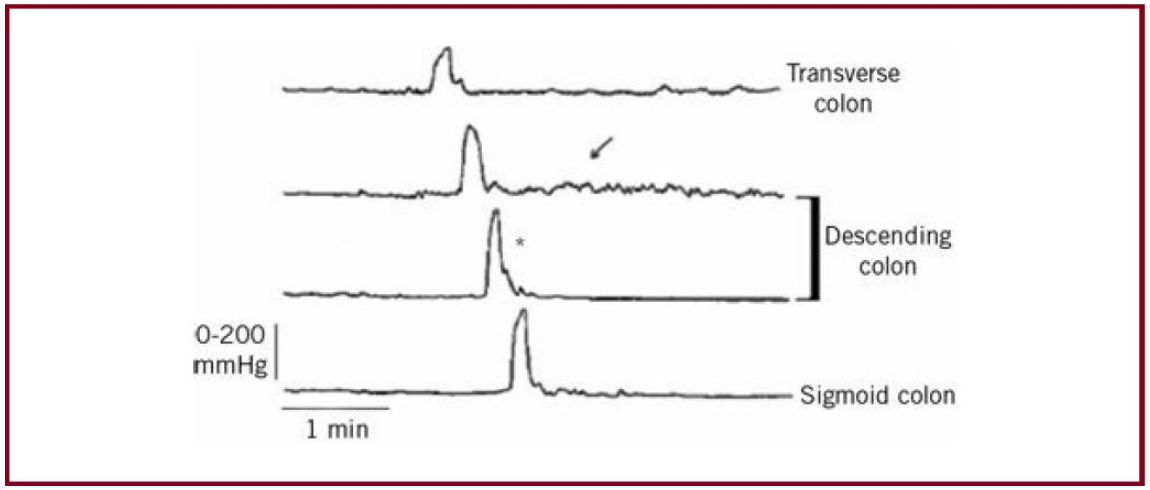
- Positive FH (Hirschsprung disease, celiac, etc.)
- Concern for sexual abuse (sexual acting out, extreme fear, abnormal lesions)
- **Poor response to adequate bowel regimen**
- Fever/Nausea/Vomiting

- Sacral dimple/hair tuft
- Empty rectum
- Urinary disease
- Developmental delay (gross/fine/cognitive)
- Surgical history (abdominal/colonic/rectal)

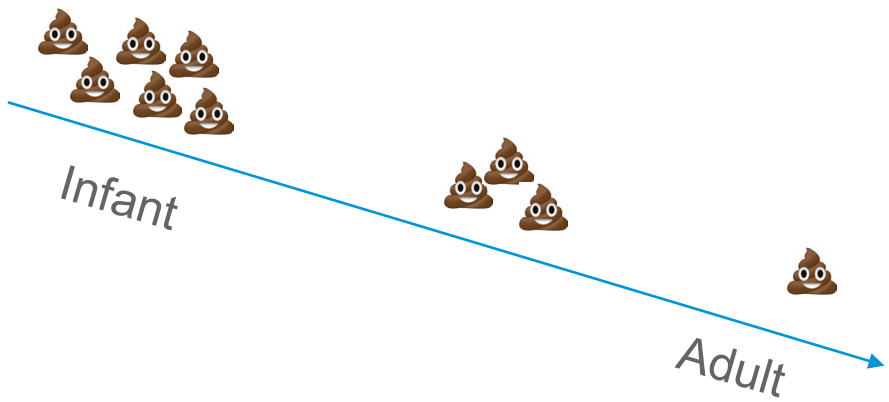
Organic Causes of Constipation

Abnormalities of Colon & Rectum	Imperforate Anus, Anal/Colonic Stenosis, Cloacal malformations
Spinal/Cord/Abdominal Musculature Abnormalities	Tethered cord, Meningomyelocele, Severe scoliosis, Prune belly syndrome
Neuropathic/Myopathic/Systemic Disorders	Hirschsprung's disease, Diabetes mellitus, Hypothyroidism, Connective tissue disorders, Cystic Fibrosis, Celiac disease
Drugs/Heavy Metals	Opiates, anticholinergics, cholestyramine, psychotropics, lead, mercury

Normal Colonic Activity



- Low amplitude propagating contractions (LAPCs)
- High amplitude propagating contractions (HAPCs)
  - Inverse correlation between age and frequency of HAPCs
  - Precede expulsion of stools



Di Lorenzo C, J Pediatr. 1995 Oct;127(4):593-PMID: 7562282.
Figure 23.1-5: Walker's Pediatric Gastrointestinal disease, 6th Ed

Defecation Dynamics

Normal

Withholding

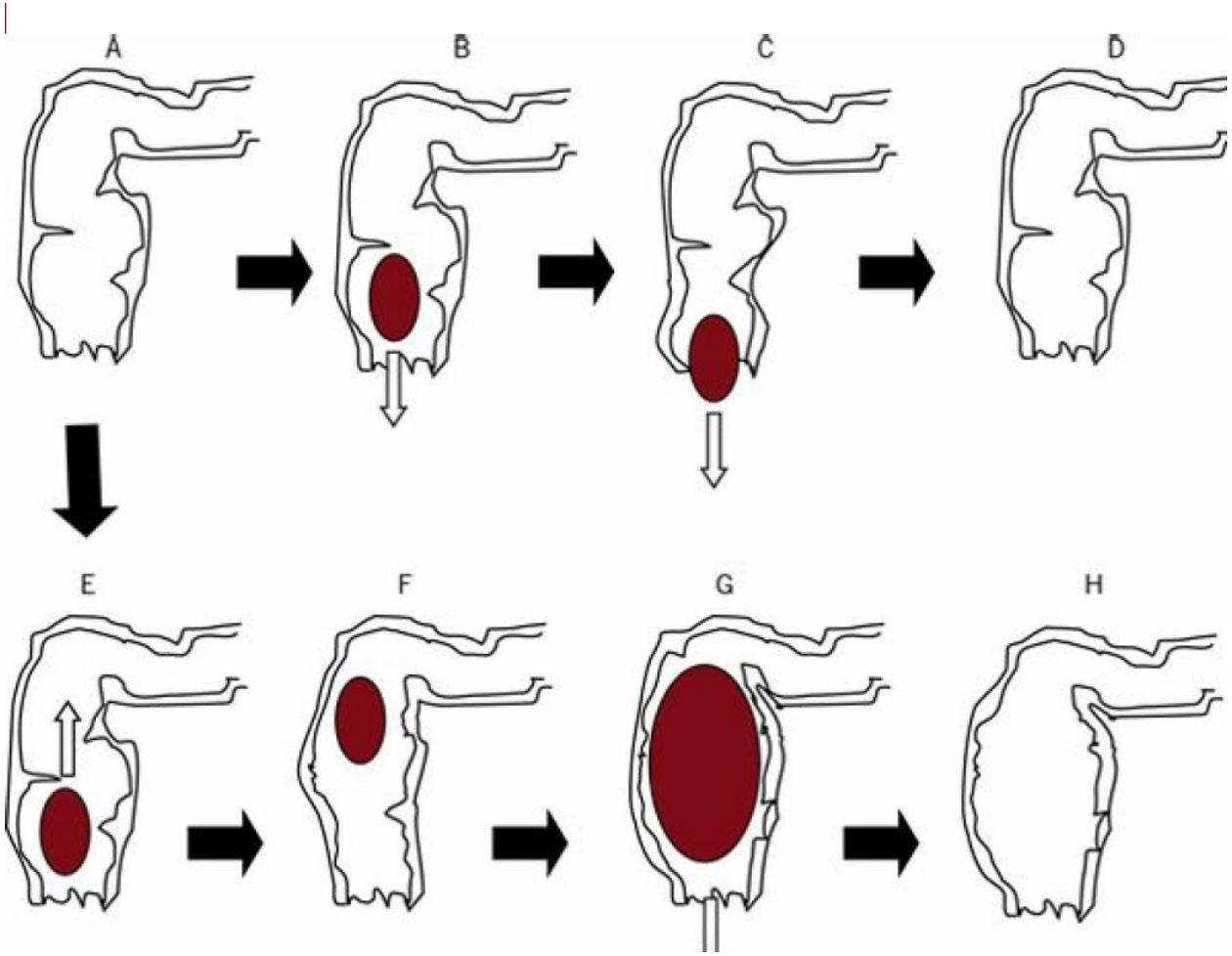
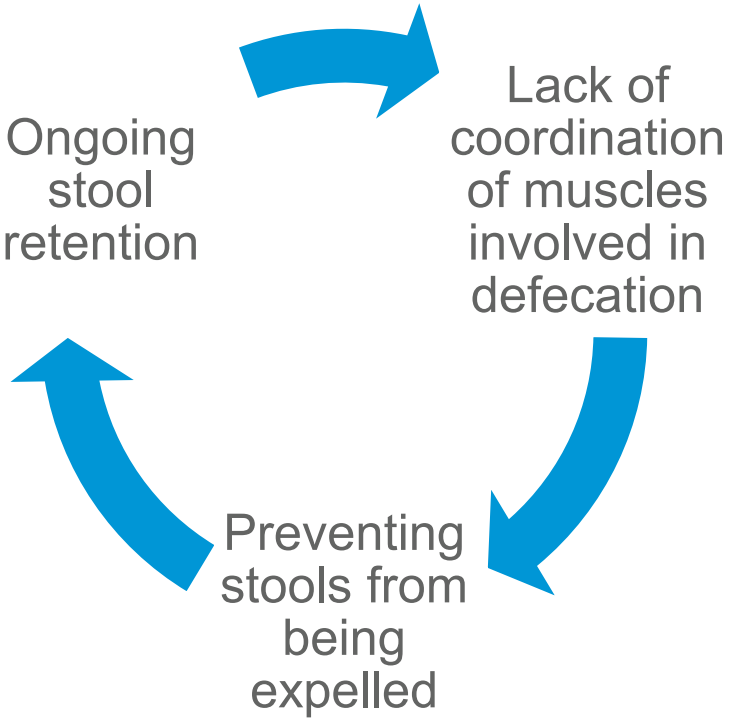


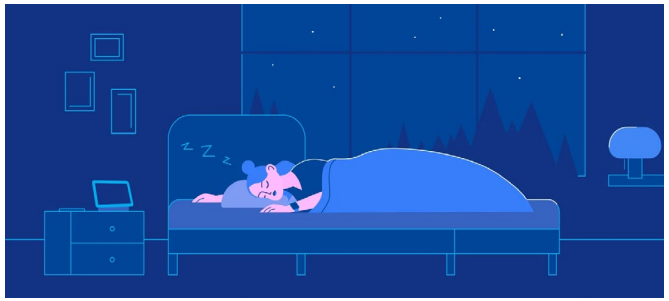
Figure 23.2a-2: Walker's Pediatric Gastrointestinal disease, 6th Ed

"My child can not feel it"

Dyssynergic Defecation



Gut Circadian Trend



Encourage toilet time

Gastrocolic reflux:

- Stomach stretch→ Increases colonic motility→ moving food distally toward rectum

Heightened ⟷ **Decreased**

↓ ↓

Irritable bowel syndrome **Constipation**

Consider timing of bowel medications

Malone JC, et al. Physiology, Gastrocolic Reflex. 2023 May 1. PMID: 31751078.

Work up

Diagnosis of constipation relies on a thorough history and physical

- Laboratory testing is not recommended in the absence of red flags
  - Thyroid screen, celiac screen, signs of gut inflammation

- Routine Xray is not recommended
  - Interobserver variation despite scoring systems
  - Variable sensitivity (60-80%) and specificity (40-60%)
  - Inconsistent correlation between constipation clinical symptoms and fecal loading on imaging
  - Useful if unable to perform physical exam or discrepancy between history and clinical findings

- Ultrasound
  - Variable data regarding reproducibility, clinical correlation, and response to treatment

- Defecography
  - MRI, Fluoroscopy, or scintigraphy
  - Limited data in children compared to adults


A: 2019


A: 2019-
TABLE
UPINE

Colonic Transit Time

Sitzmarks®

- Helpful when history is unclear
- Identify retentive behavior
- Differentiating overflow incontinence vs. non retentive fecal incontinence
- May be useful to predict results of colon manometry
- Variable protocols
  - Simplified –Day 0→Day 4 >20% retention
  - Segmental- Day 1/2/3→Day 4 & Day 7
  - Others: Day 5, Day 7

Radionuclide Scintigraphy

- Limited availability, expensive, lack pediatric normative values

Southwell BR, et al. Pediatr Surg Int. 2009 Jul;25(7):559-72. PMID: 19488763.

Contrast enema

- Not recommended in routine evaluation of functional constipation
- Identify anatomical abnormalities
- Useful in screen for Hirschsprung disease*
  - Lower sensitivity and specificity compared to anorectal manometry or rectal suction biopsy.
  - Normal colonic enema may not rule out HD

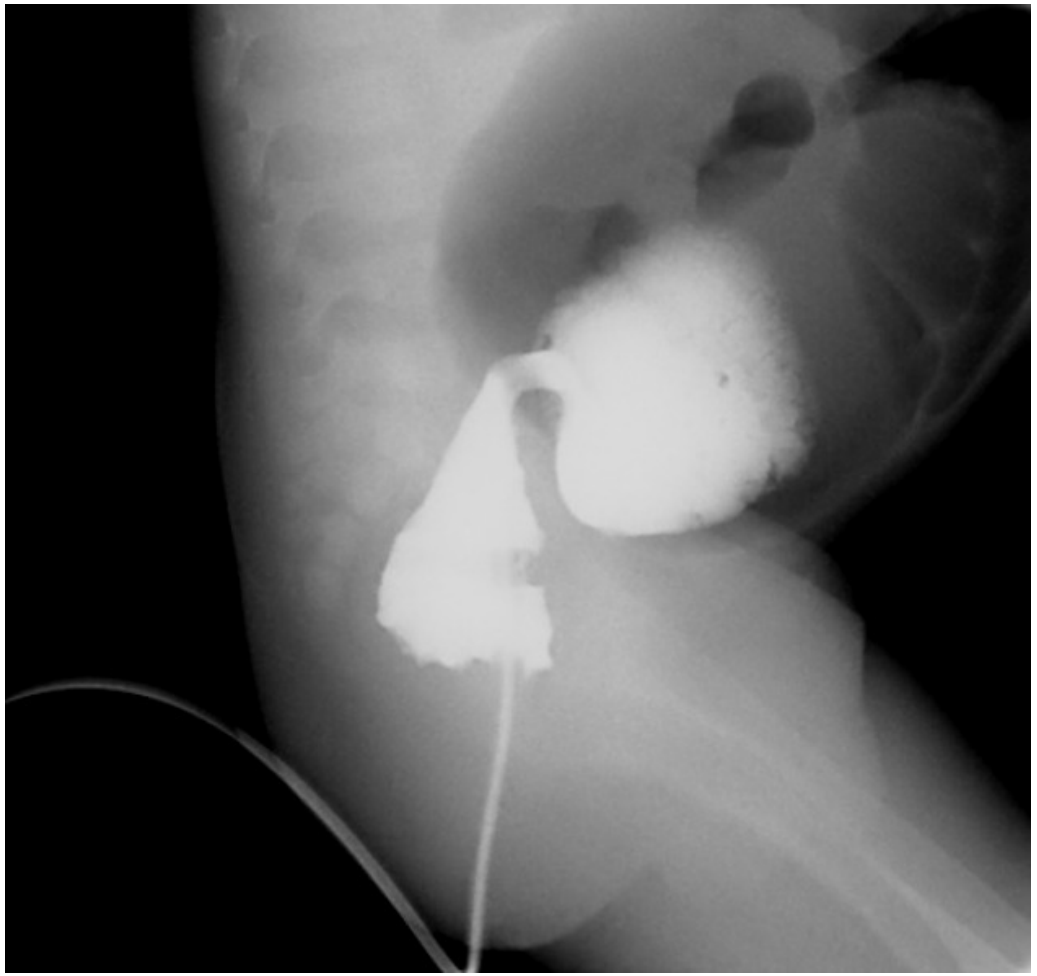
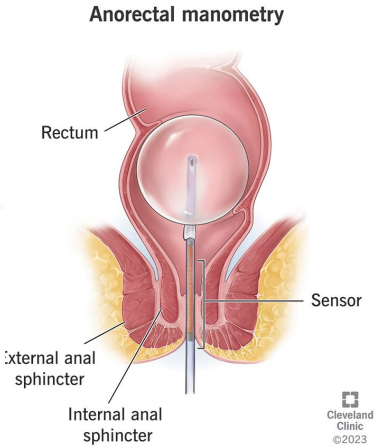


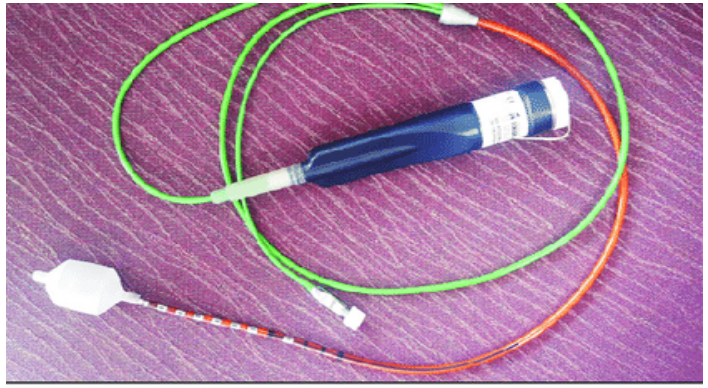
Image: Radiopaedia

de Lorijn F, et al. *J Pediatr Gastroenterol Nutr* 2006; 42: 496–505.

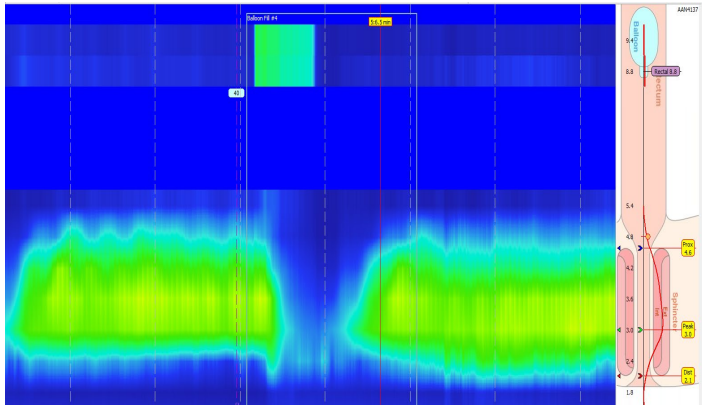
Anorectal Manometry



- Awake & Cooperative
  - Midazolam as needed however causes study limitations
  - Recto-Anal Inhibitory Reflex (RAIR)
  - Internal anal sphincter response to rectal distension
  - Anal sphincter pressure
  - Rectal sensation
  - Defecation coordination
  - Spinal abnormalities



- Does not negate the need for treatment of constipation

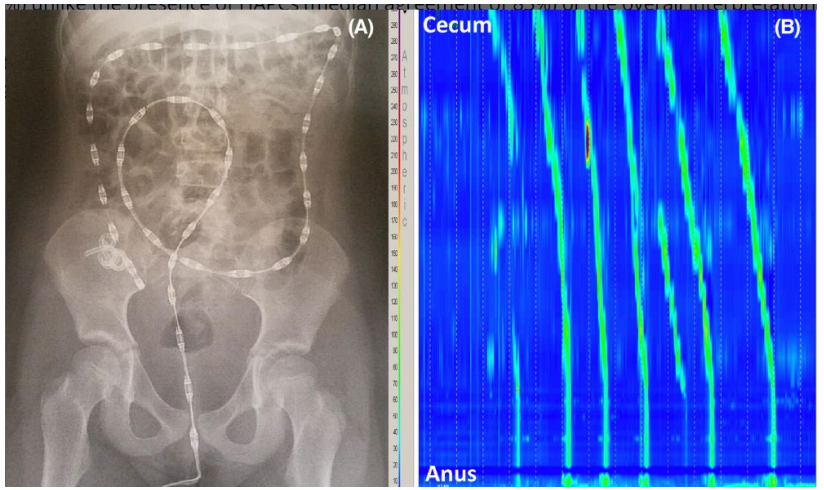


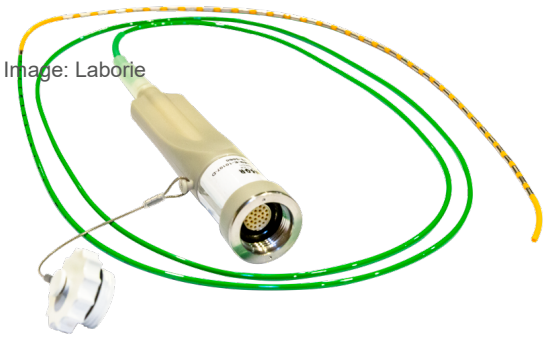
- Adds supplemental direction for treatment
  - Anal sphincter botox?
  - Lumbosacral MRI ?
  - Pelvic floor therapy?

- Not routinely performed in children suspected of functional constipation

Colon Manometry

- Catheter placed during colonoscopy then study is performed awake
- Medication challenge
  - Intracolonic bisacodyl to induce HAPCs
- Guides necessity for surgical interventions
  - Anterograde Colonic enemas
  - Colorectal resection
  - Nerve stimulators (SNS)
- Finding may not be due to primary colonic dysmotility but secondary to dilation of the bowel
- Does not negate the need for treatment of constipation
- Not routinely performed in children suspected of functional constipation

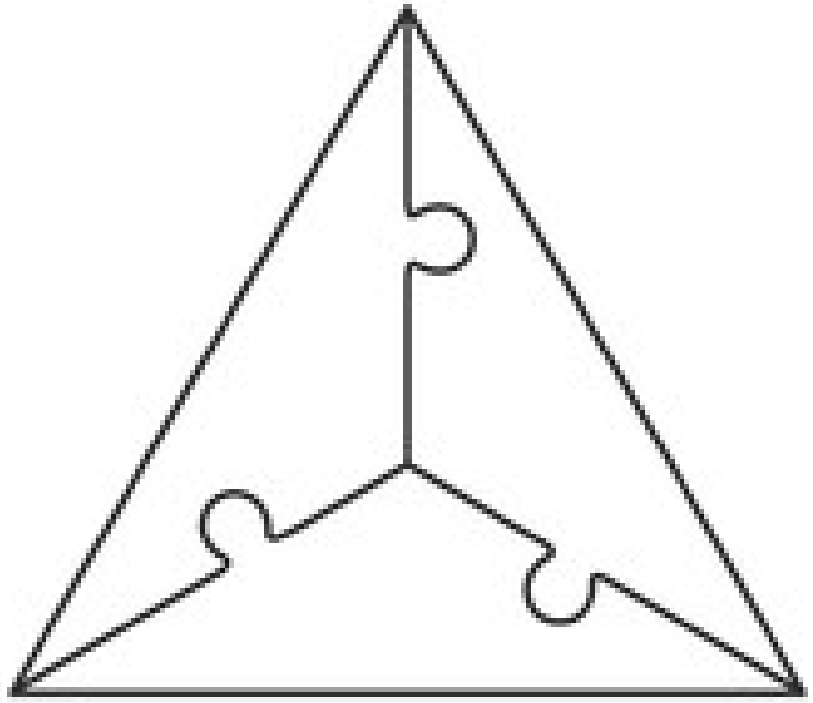




Rodriguez L. Aliment Pharmacol Ther. 2024 Jun 28.PMID: 38940015.

Treatment

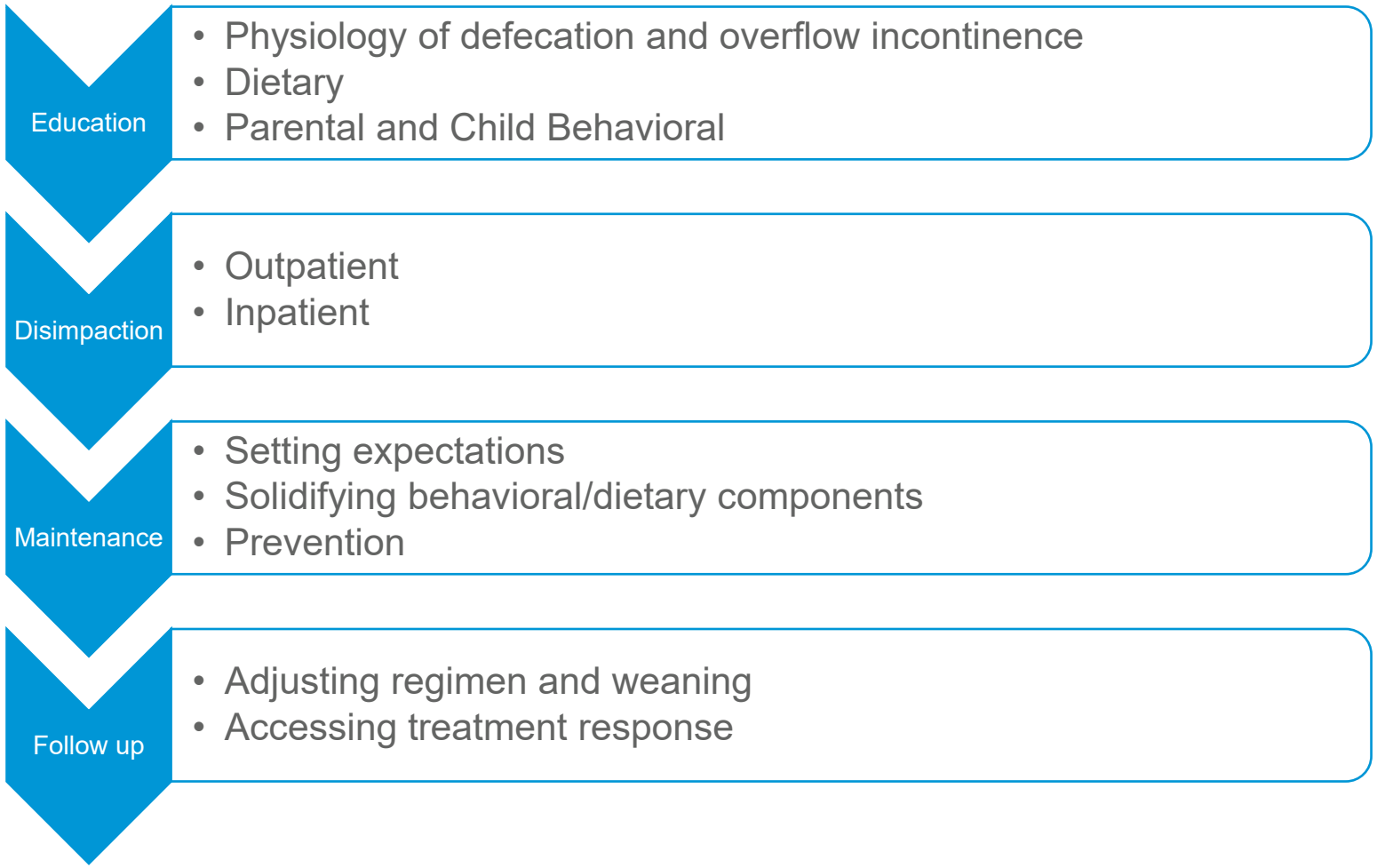
Behavior



Medication

Diet

Treatment


Education
• Physiology of defecation and overflow incontinence
• Dietary
• Parental and Child Behavioral
Disimpaction
• Outpatient
• Inpatient
Maintenance
• Setting expectations
• Solidifying behavioral/dietary components
• Prevention
Follow up
• Adjusting regimen and weaning
• Accessing treatment response

Treatment Goals

- Fecal disimpaction is recommended prior to maintenance regimen
- Goal: soft, daily to 4-5 times/week, improved straining, painless, resolution of incontinence
- Setting realistic expectations for the family
  - Perceived worsening at onset of treatment
  - Interval improvement over months
  - Allow rectal vault to approach normal size→ may take months to years
  - 50% recovered constipation patients had at least 1 relapse in 5 years
- Doing well does not mean stop or lose momentenum

Behavioral Aspects

- Autism spectrum and attention deficit hyperactivity disorder are associated with higher risk of constipation
- Behavioral problems are 3-4x more likely in children with constipation
- Delinquent, aggressive, antisocial, bullying and oppositional behaviors are more common in children with fecal incontinence
- Initial response to therapy may be worse in children with behavioral disorders
- Behavior may improve after successful treatment of constipation

-Neumeyer AM, et al. Acad Pediatr. 2019;19(3):300–6.
-Peeters B, et al. J Pediatr. 2013;163(3):873–8.
-McKeown C, et al. Pediatrics. 2013;132(5):e1210–5.

Behavior Aspects

- Embarrassment, self esteem, shame, social withdrawal, depression, anger
- Regression from underwear to pull-ups
- Hiding underwear for fear of punishment →can progress to normalized behavior

Behavior Aspects

- Encourage the child to take responsibility for their actions and become an active contributor to their improvement
- Cleaning up soiling accidents
- Setting an alarm for taking medication
- Setting an alarm for toilet time
- Involving the kids in grocery shopping for both food and cleaning supplies

Toilet Time

- Scheduled not optional
- After meals → utilize gastrocolic reflex
- No electronics or books
- Encourage activities to engage the abdominal musculature→ bubbles, pinwheels, singing
- Feet supported
- Limit to 5 minutes

GI Psychology

- Patient and Parental Intervention
- Understanding motivations
- Counseling parents on positive reinforcement
- Encourage autonomy
- Teaches parents how to remain neutral with toileting issues
- Avoid shaming or punishment
- Empowering parents that they can shape child behavior
- Rewarding the skill not the behavior
  - Adhering to toilet time
  - Clean up
  - Taking medication
  - Self initiated trips to the restroom
- Facilitate diagnosis of co-morbid psychological condition and appropriate referral

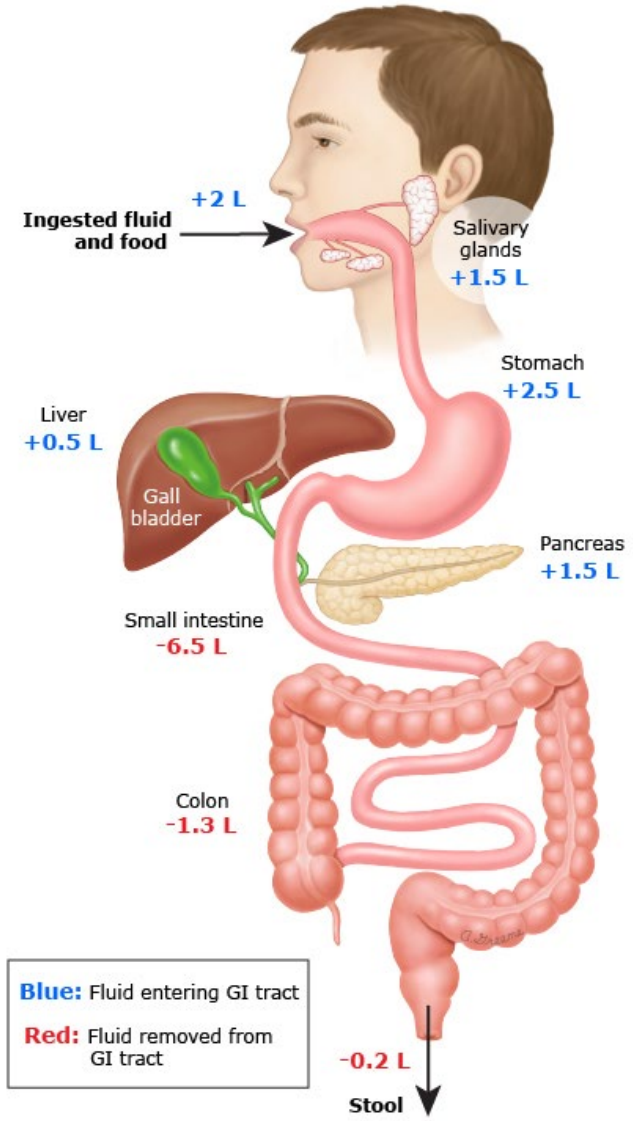
Pelvic Floor Therapy/Biofeedback

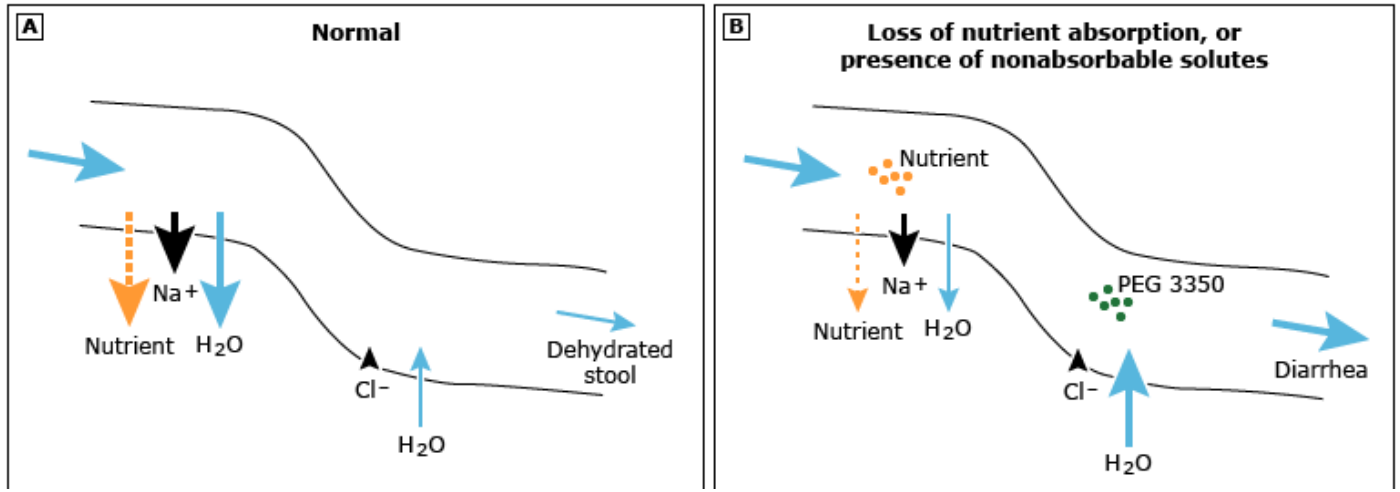
- Techniques coordinating abdominal muscles and relaxing pelvic floor muscles
- Reinforces stimuli to achieve recognizable sensations

Nutrition

- Encourage adequate hydration
- Fiber 5-10 g + age in years
- Encourage healthy balanced diet with fiber

Osmotic Laxative





Figures:UpToDate

Osmotic Laxatives

- **Softens stools**
  - Poorly absorbed
  - Water retention in the intestinal lumen → luminal distension
  - Bacterial fermentation induces gas formation→ distension
  - Decreases stool pH
  - Lactulose, Magnesium are less effective than PEG

- **Polyethylene glycol**
  - With or without electrolytes
  - Fecal incontinence, flatulence, abdominal pain, nausea, abdominal bloating
- **Lactulose**
  - Bacterial fermentation into short chain fatty acids
  - Abdominal bloating, flatulence, abdominal pain
- **Soribtol**
- **Magnesium**
  - Diarrhea, hypotension, weakness, lethargy, hypermagnesemia

Gordon M, et al. Cochrane Database Syst Rev. 2016;2016(8):CD009118.

Secretagogues

- Modulate epithelial channels→ increase intestinal secretion of fluids→ increase stool volume

- **Lubiprostone**
  - Prostaglandin E1 derivative
  - Activates chloride channel type 2 (CIC-2) and cystic fibrosis transmembrane conductance regulator (CFTR) on the apical surface

- **Linaclotide**
  - Guanylate cyclase 2c agonist
  - On luminal surface of epithelial cells increases cGMP stimulating chloride and bicarbonate

Emollient/Surfactant

Lubricants

Mineral oil (liquid paraffin)

- Retards colonic water absorption and lubricates intestines
- Petroleum derivate
- Should not be administered orally in patient at risk of aspiration (< 3 years old or abnormal swallow dynamics)
- Leakage associated with anal irritation, itching, staining clothing

Surfactants

Docusate

- Reduces tension of oil-water
- Enhances incorporation of water and fat into stool
- Subtle stimulators effects

Stimulant Laxatives

- Direct acting on intestinal mucosa
  - Irritating smooth muscle and possibly intramural plexus
- **Stimulates intestinal motility**
- Increase electrolyte and water secretion
- Long term use not associated with complications or development of tolerance.
- Diphenylmethanes
  - **Bisacodyl and Sodium picosulfate**
- Anthraquinones
  - **Senna**
- Most common side effects flatulence, abdominal pain, nausea, diarrhea
- DO NOT CRUSH

Bonilla S, et al. J Pediatr Gastroenterol Nutr. 2020;71(3):288–91.

Serotonergic Agents

Pruaclopride

- Selective 5-HT_4 agonist
- Central and enteric neurotransmitter that increases release of acetylcholine → increases secretion
- **Increases high amplitude propagating contractions (HAPCs) increasing bowel motility**
- Headache, nausea, abdominal pain, diarrhea
- FDA approved for chronic constipation in adults
- DO NOT CRUSH

Rectal Therapies

Enemas

- Sodium docusate
- Sodium phosphate
- Bisacodyl
- Sodium lauryl sulfoacetate
- Saline
- Mineral oil

Suppository

- Glycerin
- Bisacodyl

Considerations

- Useful for rectal disimpaction prior to starting oral laxative therapies
- Rectal discomfort, bleeding, perforation, traumatizing experience
- Magnesium and Phosphate enemas can cause infrequent metabolic derangements

Bile Acids

- Small portion of deconjugated bile acids end up in the colon
- Deconjugated bile salts have the potential to function as endogenous laxatives →increasing colonic motility and fluid secretion
- Chenodeoxycholic acid effective improving stool consistency in women with IBS-C
- No studies on the use of bile acids in children with functional constipation
- There are no recommendations for testing bile acids in constipation

Rao AS, et al. Gastroenterology. 2010;139(5):1549–1558.e1.

Disimpaction

- Recommend starting with a softening enema if concern for fecal impaction
- Recommend using both osmotic and stimulant laxative
- Additional enemas can be considered
  - Mineral oil once stooling has started
  - Bisacodyl enema in patients unable to take pill or obtain liquid

Sample Cleanout Regimen

	Weight	Bisacodyl (Dulcolax) 5mg Tablets Choose one → (Prefers Pill)	Senna 8.8mg/5ml Liquid ← Choose one (Prefers Liquid)	Doses of Miralax (PEG 3350, Glycolax, etc) Dose = 1 capful (17g)	Liquid Per Dose	Total Amount of Liquid Needed Sports Drink Preferred (Gatorade, Powerade, etc)
○	10-13 kg 22-29 lbs	None	None	3 doses	8 oz	24 oz
○	14-17 kg 30-37 lbs	None	None	4 doses	8 oz	32 oz
○	18-19 kg 38-42 lbs	None	None	5 doses	8 oz	40 oz
○	20 kg 43-44 lbs	1 tablet	10 ml	5 doses	8 oz	40 oz
○	21-22 kg 45-48 lbs	2 tablets	15 ml	5 doses	8 oz	40 oz
○	23-26 kg 49-57 lbs	2 tablets	15 ml	6 doses	8 oz	48 oz
○	27-30 kg 58-66 lbs	2 tablets	15 ml	7 doses	8 oz	56 oz
○	31-34 kg 67-75 lbs	3 tablets	20ml	8 doses	8 oz	64 oz
○	35-40 kg 76-88 lbs	3 tablets	20ml	9 doses	4-8 oz	64 oz or more
○	41-42 kg 89-92 lbs	3 tablets	20ml	10 doses	4-8 oz	64 oz or more
○	43-46 kg 93-101 lbs	3 tablets	20ml	11 doses	4-8 oz	64 oz or more
○	47-50 kg 102-110 lbs	3 tablets	20ml	12 doses	4-8 oz	64 oz or more
○	>50 kg >111 lbs	3 tablets	20ml	14 doses	4-8 oz	64 oz or more

Ochsner Children's

Contact us with any questions or concerns:
Ochsner Pediatric Gastroenterology Clinic

Referral to Neurogastroenterology & Motility

- Functional Constipation with poor response to adequate bowel regimen
- Concerns for organic causes of Constipation (Hirschsprung disease, Anorectal malformations, systemic disorders)
- Multidisciplinary approach is necessary
  - GI Psychology/GI Dietician/Motility Specialist
- Recommend evaluation by Peds Gastroenterology
- All Neurogastroenterology & Motility referrals are reviewed prior to scheduling

Key Points

- Detailed H&P are usually sufficient to confirm diagnosis of functional constipation and rule out organic etiologies
- Constipation requires biological-psychological-social treatment
- Treatment can be over months to years can be associated with relapses and prolonged symptoms despite intensive medical management
- Refer to Peds GI if red flags are present or does not respond to adequate bowel regimen


Recovery
It looks like Windows didn't load correctly
UNITED
Access to these gates will be available 30 minutes before departure.

THANK YOU