EXPLORE HEALTHCARE SUMMIT

BEST CHILDREN'S HOSPITALS U.S.News GASTROENTEROLOGY & GI SURGERY 2023-2024

Common GI Issues in Children

M. Adnan Altaf, MD
Chief & CHF Endowed Chair, Pediatric Gastroenterology
Director, Pediatric Endoscopy & GI Motility Center
University of Oklahoma Health Sciences Center
Oklahoma Children's Hospital at OU Health

Oklahoma Children's Hospital OU Health

COLLEGE OF MEDICINE The University of Oklahoma

Disclosures

I do not have any conflict of interest or any financial affiliations

Learning Objectives

Upon completion of this session, participants will improve their competence and performance by being able to:

- Evaluate Abdominal Pain in children
- Diagnose, treat and refer children with Gastroesophageal Reflux Disease
- Evaluate and manage Functional Constipation according to society guidelines published in literature

Abdominal Pain in Children

Case 1

A 2-month-old exclusively breast-fed infant presents to your office because his mother thinks that he is irritable & colicky. His mother reports that the infant has been passing loose stools & cries when he has a bowel movement. He is generally happy at other times. Physical examination demonstrates a healthy, afebrile, vigorous infant who has normal skin color. Anal inspection demonstrates no fissures. A stool specimen has reddish flecks, and the guaiac test is positive

Of the following, the BEST next step is to:

- A. begin therapy with oral amoxicillin
- B. institute a trial of lansoprazole
- C. obtain an upper gastrointestinal radiography series
- D. remove milk products from the maternal diet
- E. send stool for Clostridium difficile toxin testing

Allergic Colitis

- Cow's milk protein allergy in infants
- Can occur in breast fed and formula fed infants
- Cross-reactivity with other proteins (Soy)
- Presentation of CMP allergy
  - Vomiting -- Diarrhea
  - Failure to Thrive -- Protein losing enteropathy
  - Anemia -- Bowel inflammation
  - Atopic dermatitis -- Colic
- Diagnosis:
  - Empiric therapy
  - Histopathology: intra-epithelial eosinophilic infiltrate
- Treatment: elimination of offending proteins
  - Protein hydrolysate formula / Elemental formula

Formulas

Formula	Protein	CHO	Fat	Notes
Cow's Milk Enfamil, Similac, Good Start	Casein, whey	Lactose	Palm, soy, coconut	Standard
Hydrolysate Pregestimil, Alimentum, Nutramigen	~5-mers AA	Corn syrup solids (gluc)	Palm, soy, coconut	Food allergy, $$ Pregestimil - 55% MCT (cholestasis, lymphatic obstruction)
Elemental Neocate, Elecare, Alfamino, Puramino	Amino acids	Corn syrup solids (gluc)	Palm, soy, coconut	Food allergy, $$$
Soy	Soy	Corn syrup solids (gluc)	Palm, soy, coconut	Soy protein 30% cross-reactivity with cow's milk
Lacto-free	Casein, whey	Corn syrup solids (gluc)	Palm, soy, coconut	

Case 1

A 2-month-old exclusively breast-fed infant presents to your office because his mother thinks that he is irritable & colicky. His mother reports that the infant has been passing loose stools & cries when he has a bowel movement. He is generally happy at other times. Physical examination demonstrates a healthy, afebrile, vigorous infant who has normal skin color. Anal inspection demonstrates no fissures. A stool specimen has reddish flecks, and the guaiac test is positive

Of the following, the BEST next step is to:

- A. begin therapy with oral amoxicillin
- B. institute a trial of lansoprazole
- C. obtain an upper gastrointestinal radiography series
- D. remove milk products from the maternal diet
- E. send stool for Clostridium difficile toxin testing

Case 2

A 5-year-old Caucasian male comes in for a well child check with a 6-month history of intermittent peri-umbilical abdominal pain, loose & foul-smelling stools. He is frequently ill with cough and wheezing. You note he is < 3rd % for height and weight. He has a protuberant belly on examination and has several bruises. Of the following, which can be the likely diagnosis?

A. Celiac disease
B. Cystic fibrosis
C. Crohn's disease
D. Chronic Giardiasis
E. All of above

Case 3

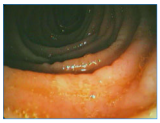
The family of a diabetic patient in your practice requests evaluation for celiac disease. They have heard from other families of children who have diabetes that patients who have type 1 diabetes are at increased risk for this condition.

Of the following, a TRUE statement regarding celiac disease screening is that:

A. Empiric gluten withdrawal is the diagnostic test of choice
B. Initial screening should include serum immunoglobulin A (IgA) and tissue transglutaminase antibody
C. Patients who have selective IgA deficiency have a lower rate of celiac disease than the general population
D. The most specific antibody test for celiac screening is the antigliadin IgG antibody
E. The prevalence of celiac disease in children who have type 1 diabetes mellitus is greater than 10%

Celiac Disease

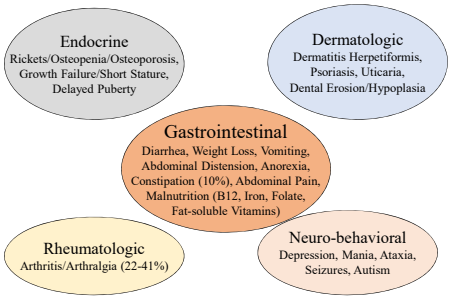
- Gluten-sensitive enteropathy, permanent intestinal intolerance to dietary wheat gliadin and related proteins
  - Gluten (wheat), Secalins (rye), Horleins (barley)
  - Avenin (oats) are OK
- Pathogenesis:
  - Transglutaminase enzyme deaminates glutamine residues (gliadin) to glutamic acid
  - High affinity binding to DQ2 on APC
  - Activation of mucosal cytokine system
  - Results in small bowel inflammation
- Untreated → Long-term risk of lymphoma, osteoporosis, autoimmunity, anemia



Celiac Disease

- Epidemiology
  - Prevalence of celiac auto-antibodies 1 in 250 in the US
  - **3%** of celiac patients have selective IgA deficiency
  - Associated with other conditions (increased 5-10% risk)
    - Autoimmune-Diabetes Mellitus, Thyroid, Alopecia, etc.
    - Down Syndrome
- Genetics:
  - HLA Typing
    - 99.7% celiac patients have HLA-DQ2 or DQ8
    - 30% General healthy population has DQ2

Celiac Disease



Celiac Disease

Current diagnostic recommendations

- Symptomatic → Screen
- Asymptomatic → Screen
  - Tissue transglutaminase IgA antibody
  - Serum IgA level
    - Negative tTG, normal serum IgA → ~~Celiac~~
    - Positive tTG → Biopsy
    - Negative tTG, low IgA → IgG Test, HLA Type, Biopsy

Case 2

A 5-year-old Caucasian male comes in for a well child check with a 6-month history of intermittent peri-umbilical abdominal pain, loose & foul-smelling stools. He is frequently ill with cough and wheezing. You note he is < 3rd % for height and weight. He has a protuberant belly on examination and has several bruises. Of the following, which can be the likely diagnosis?

A. Celiac disease
B. Cystic fibrosis
C. Crohn's disease
D. Chronic Giardiasis
E. All of above

All of these conditions can cause malabsorption – loose, foul-smelling stools and FTT

Bruises are secondary to vitamin K malabsorption

Case 3

The family of a diabetic patient in your practice requests evaluation for celiac disease. They have heard from other families of children who have diabetes that patients who have type 1 diabetes are at increased risk for this condition.

Of the following, a TRUE statement regarding celiac disease screening is that:

A. Empiric gluten withdrawal is the diagnostic test of choice
B. Initial screening should include serum immunoglobulin A (IgA) and tissue transglutaminase antibody
C. Patients who have selective IgA deficiency have a lower rate of celiac disease than the general population
D. The most specific antibody test for celiac screening is the antigliadin IgG antibody
E. The prevalence of celiac disease in children who have type 1 diabetes mellitus is greater than 10%

Case 4

- 16-year-old female presents to your office for follow-up of 4 months of mucusy diarrhea, 3 days low grade fever (100.4), bloody stools for 1 day and RLQ pain at McBurney's point. She also has nodules on her shins and a hot swollen left knee. Stool studies were all negative. Which of the following statements is false regarding this child's condition:

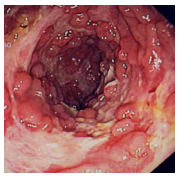
A. Crohn's disease involves the ileum in most cases.
B. Yersinia enterocolitica infection can mimic appendicitis
C. Ulcerative colitis typically has areas of normal mucosa surrounding areas of diseased mucosa.
D. Inflammation in Crohn's disease involves the full thickness of the bowel wall while inflammation in ulcerative colitis involves just the mucosa.
E. Liver disease can occur in patients with ulcerative colitis.

Inflammatory bowel disease
Ulcerative colitis

- Disease typically limited to the rectum and colon
- Inflammation is limited to the mucosal layer
- Continuous inflammation
- Clinical features
  - Rectal bleeding
  - Diarrhea
  - Abdominal pain
- Associated sclerosing cholangitis

Inflammatory bowel disease
Crohn's disease

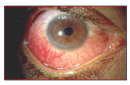
- Segmental areas of involvement
  - Skip lesions: normal mucosa surrounding areas of disease
  - 70% of patients have ileal involvement
- Can involve any part of the GI tract from the mouth to the anus
  - Perianal disease
- Full-thickness bowel inflammation
- Granuloma is a hallmark finding on biopsies



Extraintestinal manifestations of IBD

Pyoderma gangrenosum

Erythema nododusm



Uveitis

Perianal disease

Buccal ulcers

- Growth failure
- Pubertal delay
- Renal stones (oxalate)

Case 4

- 16-year-old female presents to your office for follow-up of 4 months of mucusy diarrhea, 3 days low grade fever (100.4), bloody stools for 1 day and RLQ pain at McBurney's point. She also has nodules on her shins and a hot swollen left knee. Stool studies were all negative. Which of the following statements is false regarding this child's condition:

A. Crohn's disease involves the ileum in most cases.
B. Yersinia enterocolitica infection can mimic appendicitis
C. Ulcerative colitis typically has areas of normal mucosa surrounding areas of diseased mucosa.
D. Inflammation in Crohn's disease involves the full thickness of the bowel wall while inflammation in ulcerative colitis involves just the mucosa.
E. Liver disease can occur in patients with ulcerative colitis.

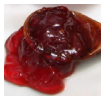
Case 5

- A previously healthy 11-month-old boy was brought to the ED with a 48-hour history of emesis, irritability, increasing abdominal distention, suspected abdominal pain, and blood-tinged stools. Abdominal exam revealed a sausage-shaped mass in the RUQ, while the RLQ appeared empty. There was no abdominal tenderness or guarding. The next step in this child's management would be:

A. Laparotomy
B. Blood cultures
C. Water-soluble contrast enema
D. CT scan of the abdomen

Intussusception

- Most common cause of intestinal obstruction in young children; ileocolonic 80% before 2yo
- Patients present between 1-2 years of age with paroxysmal abdominal pain and vomiting
  - Classic triad: abdominal pain, sausage shaped mass, currant jelly stools 15-20%
- "Currant jelly" stools: ischemia intestinal mucosa → sloughed, bloody mucosa mixed in with the stool
- Younger children - idiopathic intussusception (75-90%)
- Older children - identifiable "lead point"
  - SB lymphoma, Meckel's, polyp, hemangioma
- Can be reduced by water soluble contrast enema / surgery



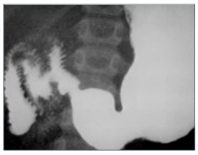
Case 5

- A previously healthy 11-month-old boy was brought to the ED with a 48-hour history of emesis, irritability, increasing abdominal distention, suspected abdominal pain, and blood-tinged stools. Abdominal exam revealed a sausage-shaped mass in the RUQ, while the RLQ appeared empty. There was no abdominal tenderness or guarding. The next step in this child's management would be:

A. Laparotomy
B. Blood cultures
C. Water-soluble contrast enema
D. CT scan of the abdomen

Malrotation with volvulus

- Defect in embryonic gut rotation
- Should be considered in anyone with bilious emesis
  - 75% of symptomatic cases occur in newborns
    - Most present within the 1st week of life
  - 90% within the 1st year of life
- Risk of midgut volvulus → short bowel syndrome
- Infants with bilious emesis should be considered to have malrotation and volvulus until proven otherwise
- Emergent upper GI series can be done in stable infants
- In sick infants with bilious emesis, urgent laparotomy is essential



Case 6

- A 6-year-old girl presents with a 1-year history of periumbilical, non-radiating abdominal pain. The pain occurs at least three times per week and lasts up to 30 minutes. There is no history of heartburn, constipation, or diarrhea. Physical examination, complete blood count, erythrocyte sedimentation rate, and urinalysis yield normal results. A *Helicobacter pylori* serology (immunoglobulin G antibody) is positive.

Of the following, a TRUE statement regarding this patient is that

A. Empiric therapy with omeprazole and trimethoprim-sulfamethoxazole should be instituted
B. The *H pylori* antibody test is more sensitive in younger children than older children
C. The positive serology should be confirmed by another diagnostic test
D. The prevalence of *H pylori* increases with higher socioeconomic status
E. this patient most likely has a gastric ulcer

Case 6

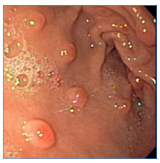
- A 6-year-old girl presents with a 1-year history of periumbilical, non-radiating abdominal pain. The pain occurs at least three times per week and lasts up to 30 minutes. There is no history of heartburn, constipation, or diarrhea. Physical examination, complete blood count, erythrocyte sedimentation rate, and urinalysis yield normal results. A *Helicobacter pylori* serology (immunoglobulin G antibody) is positive.

Of the following, a TRUE statement regarding this patient is that

A. Empiric therapy with omeprazole and trimethoprim-sulfamethoxazole should be instituted
B. The *H pylori* antibody test is more sensitive in younger children than older children
C. The positive serology should be confirmed by another diagnostic test
D. The prevalence of *H pylori* increases with higher socioeconomic status
E. this patient most likely has a gastric ulcer

H. Pylori

- Colonized in 5-25% of healthy children
- Risk factors – low SE status, family members being positive, nursing home
- Serology – not useful
- Fecal antigen, urease breath test
- Gold standard – endoscopy
- Tx necessary – anemia, ulcer, lymphoma
- PPI + 2 antibiotics (amoxycillin + clarithromcyin or flagyl) for 2 weeks (+ Bismuth)
- Check Stool Ag for Clearance



Case 7

- An 8 year old girl presents with intermittent peri-umbilical abdominal pain for the past 3 months. At times her stools are hard, at other times normal. There is no blood. She has no other GI symptoms; no fever, weight loss, oral ulcers, or joint symptoms. Labs done at the PMD's office included a normal CBC, ESR, albumin, TSH and celiac panel. The most likely diagnosis is:

A. IBD
B. Celiac Disease
C. Functional Abdominal Pain
D. Salmonella enteritis
E. Appendicitis

Case 7

- An 8 year old girl presents with intermittent peri-umbilical abdominal pain for the past 3 months. At times her stools are hard, at other times normal. There is no blood. She has no other GI symptoms; no fever, weight loss, oral ulcers, or joint symptoms. Labs done at the PMD's office included a normal CBC, ESR, albumin, TSH and celiac panel. The most likely diagnosis is:

A. IBD
B. Celiac Disease
C. Functional Abdominal Pain
D. Salmonella enteritis
E. Appendicitis

Functional Abdominal Pain

- School-age children
  - 13-17% of adolescents have abdominal pain at least weekly
- No alarm symptoms
  - Vomiting, bloody diarrhea
  - Weight loss
  - Waking at night with pain or to stool
- Normal screening labs
  - CBC, ESR, CMP, CRP, Lipase (Stool Calprotectin)
- Reassurance
- Medications
  - Dietary changes, probiotics (Activia yogurt), melatonin, peppermint oil, amitriptyline, Anti-spasmodics
- Cognitive Behavioral Therapy

Functional Abdominal Pain

- Chronic abdominal pain in children is not usually caused by organic disease
- Diagnosis focuses on alarm symptoms by means of history and physical examination
- Additional diagnostic evaluation is not required in children without alarm symptoms
- Reassurance is the primary therapy in functional abdominal pain
- Primary goal of treatment is resumption of normal lifestyle, not eradication of abdominal pain
- A specific intervention cannot be recommended owing to lack of evidence of a benefit effect

GERD

PPI

- Tremendous rise in use of PPI in children over last 15 years
  - Especially in infants <12 months
- PPIs are extremely effective acid suppression
- Preponderance of evidence that PPI *do not*
  - Reduce GER sx in infants
  - Decrease infant crying & irritability
- Growing concerns over risks associated with PPI use

PPI

A 5-month-old infant presents with a history of vomiting between 10 and 20 times a day. She is growing and developing normally. There is no blood in the vomitus, no respiratory symptoms, and no history of apnea. The parents are frustrated from cleaning up after the baby vomits and want something done. Physical examination and UGI results are normal.

- Of the following, the MOST accurate statement about this patient is that she

A. is at increased risk of sudden infant death syndrome
B. is likely to develop an esophageal stricture in later life
C. probably will outgrow the condition by 1 year of age
D. should be referred for a head computed tomography scan
E. should undergo endoscopy to rule out eosinophilic esophagitis

PPI

A 5-month-old infant presents with a history of vomiting between 10 and 20 times a day. She is growing and developing normally. There is no blood in the vomitus, no respiratory symptoms, and no history of apnea. The parents are frustrated from cleaning up after the baby vomits and want something done. Physical examination and UGI results are normal.

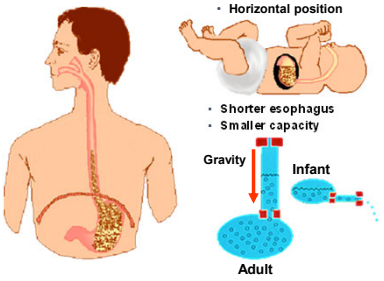
- Of the following, the MOST accurate statement about this patient is that she

A. is at increased risk of sudden infant death syndrome
B. is likely to develop an esophageal stricture in later life
C. probably will outgrow the condition by 1 year of age
D. should be referred for a head computed tomography scan
E. should undergo endoscopy to rule out eosinophilic esophagitis

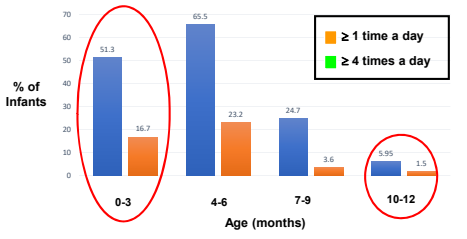
GER vs. GERD

- Gastroesophageal Reflux (GER)
  - Physiologic phenomenon that occurs at all ages to allow depressurization of stomach
- Gastroesophageal Reflux Disease (GERD)
  - A pathological condition that is present when reflux of gastric contents causes troublesome symptoms and/or complications

Esophageal Capacitance

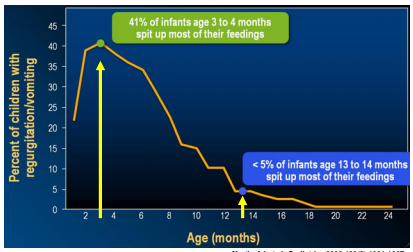


Prevalence of Regurgitation in Infancy



Adapted from Nelson et al, *Arch Pediatr Adolesc Med* 1997;151:569

Natural History of GER in < 2 years old



Martin AJ et al. *Pediatrics* 2002;109(6):1061-1067.

Treating Infants for GERD with PPI Does Not Reduce Crying & Irritability

	Cry fuss time in min/24 hour (mean ± SD)			
	Baseline	Period 1	Period 2	Combined*
Omeprazole (n=15)	246 ± 105	203 ± 113	179 ± 129	191 ± 120
Placebo (n=15)	287 ± 132	204 ± 87	198 ± 115	201 ± 100
Total (n=30)	267 ± 119†‡	203 ± 99†	188 ± 121‡	

Moore et al. *J Pediatr.* 2003;143(2):219-23.

Lansoprazole showed no improvement in crying, back arching, wheezing or regurgitation as compared to placebo in a randomized, controlled trial.

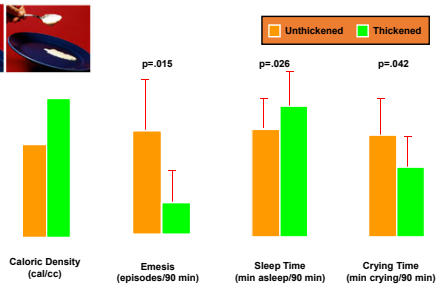
Orenstein et al. *J Pediatr.* 2009;154(4):514-20.

Managing Infants with Recurrent Vomiting

- History & Physical exam generally sufficient
- Parental education
  - Warning signals
  - Reassurance
- Consider
  - Thickened formula
  - Hypoallergenic formula
- **Pharmacotherapy not recommended**
- If no resolution by 18-24 months
  - Consider Upper GI series
  - Consider pediatric GI referral

Rudolph et al. *J Pediatr Gastroenterol Nutr* 2001;32:S1.
Photo courtesy of Alejandro F. Flores, MD.

Effect of Thickening Milk Formula Feedings With Rice Cereal



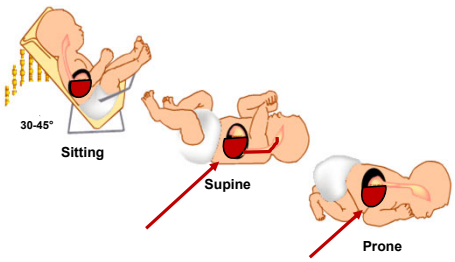
Effect of Thickening Feeds on GER

- 14 RCT parallel or cross-over trials

CONCLUSIONS. This meta-analysis shows that thickened food is only moderately effective in treating gastroesophageal reflux in healthy infants. *Pediatrics* 2008;122:e1268–e1277

Hovarth et al. *Pediatrics* 2008;122:1268-1277.

Prone Positioning and GER



Adapted from Ramenofsky & Leape, *J Pediatr Surg* 1981;16:374-8

Effect of Sleep Position on GER in Infants and SIDS Mortality

	Reflux Index[1] (% time pH <4)	SIDS Mortality [2] (per 1000 live births)	Reflux Index Odds Ratio	SIDS Mortality Odds Ratio [3]
Supine	15.3	0.05*	2.3	1.0
Left side	7.7	0.05*	1.1	3.5†
Right side	12.0	0.05*	1.8	3.5†
Prone	6.7	4.4	1.0	13.9

[1] Tobin et al, *Arch Dis Child* 1997;76:254
[2] Skadberg et al, *J Pediatr* 1998;132:340
[3] Oyen et al, *Pediatrics* 1997;100:613

*Mortality rate for all non-prone positions combined
†Combined odds ratio

Allergic Gastroenteropathy

- Symptoms of cow's milk protein allergy (CMPA) may be identical to GERD
- Risk factors for CMPA include familial history of atopy, infant eczema, symptoms of crying with swallowing
- Initiate 2-week trial of hydrolysate formula

D'Netto MA et al. *J Pediatr* 2000 ;137(4):480-486.

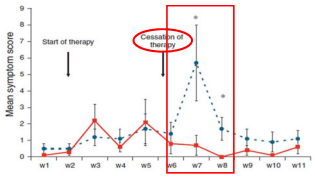
Eosinophilic Esophagitis (EoE) or PPI-Responsive Esophageal Eosinophilia (PPI-REE)

- EoE is a clinicopathological diagnosis of an allergic esophagitis characterized by submucosal eosinophilic infiltrates
- 1/3 patients with suspected EoE achieve clinical and histological remission on PPI therapy (PPI-REE)
- Treatment for suspected EoE includes high dose PPI for 8 weeks followed by EGD

Molina-Infante J et al. *Aliment Pharmacol Ther* 2013;37:1157-64.

How to Stop PPI

Dyspeptic Symptom Development After Discontinuation of PPI



Dotted Blue line – Pantoprazole
Red line - Placebo

Niklasson A et al. Am J Gastroenterol 2010;105:1531-7

Potential Risks of Prolonged Acid Suppression

- Infections:
  - C. Difficile
  - Small bowel bacterial overgrowth
  - Other enteric infections
  - Pneumonia and other respiratory infections
- Necrotizing enterocolitis and candidemia
- Effects of vitamins and mineral absorption
  - Iron
  - Calcium
  - Magnesium
  - Vitamin B12
- Gastric fundic gland polyps
- Interstitial nephritis (rare, idiosyncratic reaction)
- Myocardial infarction and Dementia

Diagnostic Approach in Suspected GERD

- History and physical examination
- Empirical medical therapy

- Upper GI series
- Esophageal pH / Impedance monitoring
- Upper Endoscopy

Colon Motility, Defecation and Constipation: No Easy Way Out!

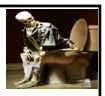
Spectrum of Motility Disorders

Physiologic GER	⟷	Achalasia
Dyspepsia	⟷	Gastroparesis
IBS	⟷	Pseudo-obstruction
Functional Fecal Retention	⟷	Hirschsprung Disease

Defecation Disorder

- Related visits for a perceived defecation disorder
  - 3% of general pediatric outpatient visits
  - 25% of Pediatric GI consultations
- Beyond the neonatal period, the most common cause of constipation is:
  - Functional constipation
    - Idiopathic constipation
    - Functional fecal retention
    - Fecal withholding

Quality of Life



- 148 constipated children (mean age 9.4 years)
- Child and parents completed the Pediatric QoL Inventory
- Scores showed lower quality of life than children with IBD and GERD
- Outcome: call to health care providers to treat constipation promptly and aggressively

Youssef et al. JPGN, 2005

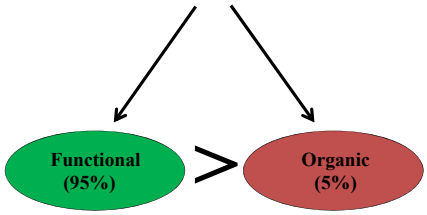
Long term outcome

Among patients referred to pediatric gastroenterologists:

- 50% will recover without laxatives after 6-12 months
- 10% are well while taking laxatives
- 40% will still be symptomatic despite use of laxatives
- 50% & 80% of the children are recovered after 5 and 10 years
  - with the vast majority of patients no longer taking laxatives
- 30% of children followed beyond puberty continue to have constipation and/or fecal incontinence

Tabbers et al - J Pediatr Gastroenterol Nutr. Feb 2014
van Ginkel R et al Gastroenterology 2003

Constipation



Organic Causes

- **Altered anatomy**
  - Imperforate anus
  - Anal stenosis
  - Anteriorly placed anus
  - Presacral teratoma
- **Neurogenic**
  - Spinal cord abnormalities
  - Cerebral palsy
- **Intestinal nerve & muscle disorders**
  - Hirschsprung disease (1:5000)
  - Pseudo-obstruction
- **Altered physiology**
  - Hypothyroidism
  - Drugs
  - Electrolyte/mineral imbalances
  - Lead
  - Infant botulism
  - Cystic fibrosis
  - Celiac disease
  - Slow transit/colonic inertia
  - Genetic syndromes

ROME IV criteria
Functional constipation

2 or more of following occurring at least once per week for at least 1 month, in child at least FOUR years of age with insufficient criteria for dx of IBS

- 2 or fewer defecations in the toilet per week
- At least 1 episode of fecal incontinence per week
- Hx of retentive posturing or excessive volitional stool retention
- Hx of painful or hard bowel movements
- Presence of a large fecal mass in the rectum
- Hx of large diameter stools that can obstruct the toilet

Expert Rev Gastroenterol Hepatol. 2017 Mar;11(3):193-201.

Causes of Functional Constipation

- Result of complex interaction involving:
  - Child's development
  - Gastrointestinal physiology
  - Situational occurrences
  - Dietary intake
  - Psychogenic causes
  - Parental expectations

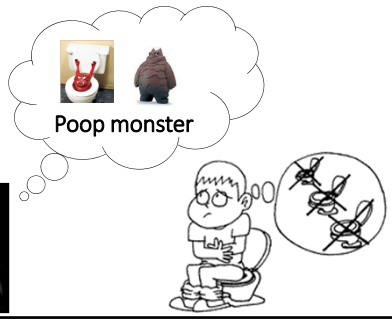
Mason et al, The Nurse Practitioner July 2004

Avoiding Defecation

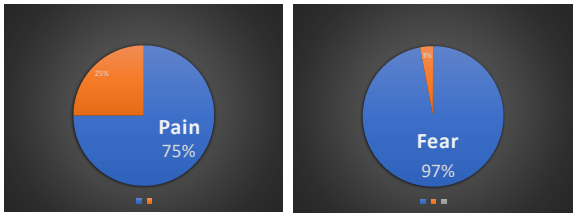
Constipation likely develop with

- Introduction of solid food
- Toilet training
- School

Unpleasant Defecating Experience

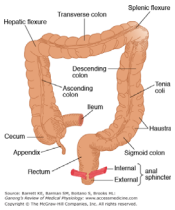


Clinical features - Functional Fecal Retention

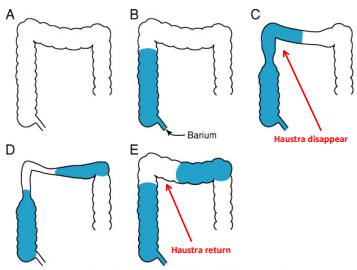


Function of Large Intestine

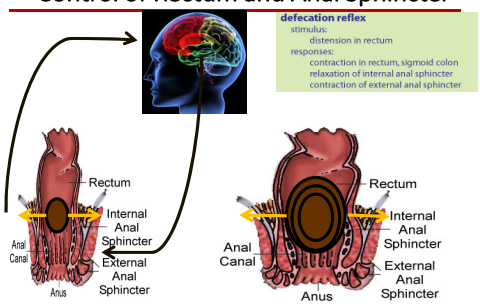
- Storage of feces
- Absorption of water and any remaining nutrients
- Mass movement of fecal material from cecum and colon to the rectum



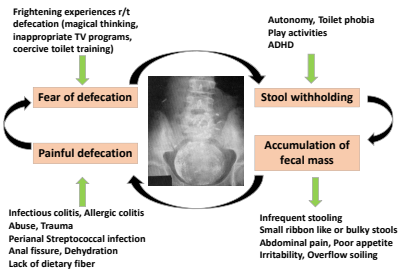
Mass movement (HAPCs)



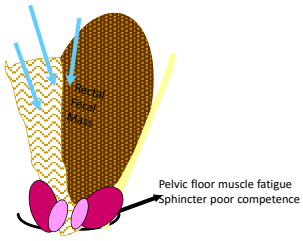
Defecation
Control of Rectum and Anal Sphincter



The Vicious Poop Cycle



With-holding & rectal fecal mass leads to overflow fecal incontinence



"A thorough history and physical examination is generally sufficient to allow the practitioner to establish whether the child requires further evaluation or has functional constipation"

NASPGHAN guideline on Constipation

If the history and physical are consistent with a diagnosis of functional fecal retention a trial of empiric therapy is indicated.

History

- Detailed description of current problem
- Past Medical /surgical Hx
- Family & social Hx
- Medication use
- Detailed diet Hx
- Prior treatments

Red Flags

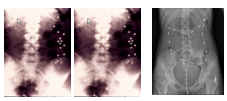
- Delayed passage of meconium
- No withholding
- No soiling
- Failure to thrive
- Abnormalities in sacral area
- Neurological/genetic problems
- No response to conventional treatment (!)

Physical Examination

- General assessment
  - Children: growth and development
- Complete physical exam:
  - Abdomen
  - Anal exam
    - Skin tags/fissures
    - 4 quadrant anal wink
    - Anal placement
    - Rectal exam – not required

Testing

- **Anatomy**
  - Abdominal X-ray
  - Barium enema
  - MRI of spine
  - MRI of pelvic floor
- **Metabolic**
  - Blood work
    - Thyroid function
    - Calcium
    - Lead
    - Celiac panel
  - Stool studies
    - Claprotectin
    - Occult
- **Function**
  - Sitzmark study
  - Rectal biopsy
    - Suction
    - Full thickness
  - Anorectal manometry
  - Colonic manometry
  - Defecography
  - Balloon expulsion



Hirschsprung Disease: History: When did problems begin?

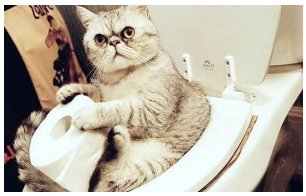
Passage of meconium in 1st 48 hours of life? → ? Hirschsprung disease

- 90% of normal full term infants pass their first meconium stool within 24 hours of birth, 99% in 48hr
- Delayed passage of meconium is common in preterm infants
- 10% of patients with Hirschsprung's disease pass meconium in the first 24 hours and 40-60% pass meconium in the first 48 hours after birth.
- **NORMAL passage of meconium does not exclude the possibility of Hirschsprung disease**

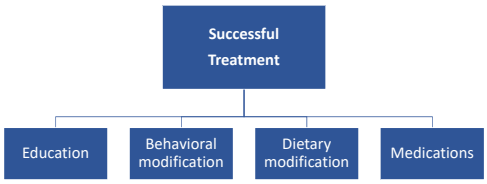
Differentiating Functional Constipation (FC) from HD

	Functional Constipation	Hirschsprung's Disease
Starts at birth	no	yes
Fecal incontinence	often	rare
Rectal fecal mass	yes	no
Retentive posturing	yes	no
Passage of large stools	often	rare
Anal fissures	common	rare

Cat in the Toilet - The Final Act!



Management of Functional Constipation



Management of Functional Constipation: Education

- Demystification of constipation, including an explanation of the pathogenesis
- If fecal soiling is present, to remove negative attributions
- Parents to understand that soiling from overflow incontinence is not a willful and defiant maneuver
- Parents are encouraged to maintain a consistent, positive, & supportive attitude in all aspects of Tx
- **Repeat** the education and demystification processes

Management of Functional Constipation: Behavioral modification

- Toilet sitting at regular intervals is essential
- Reward system reinforces positive behavior
- Caregiver diary of the child's bowel habits aids monitoring
- Clinic f/u by telephone or office visit

Baker SS, et al. *J Pediatr Gastroenterol Nutr.*1999;29:612-626

Management of Functional Constipation: Dietary Modification

- Fluids = maintenance
- Fiber = age + 5 grams daily
  - NASPGHAN: evidence **does not** support the use of fiber supplements or extra fluid in the treatment of functional constipation
- Limit milk and cheese
- Avoid high fat and fast food
- NASPGHAN: evidence **does not** support the use of pre- or probiotics in the treatment of childhood constipation

Management of Functional Constipation: Disimpaction

Management of Functional Constipation: Maintenance therapy

- Focus is to prevent impaction recurrence
- Tx comprises dietary intervention & laxatives
- Goal of laxative therapy is to ensure painless bowel evacuation at regular intervals
- Many months of laxative therapy may be required before gradual weaning is initiated

Maintenance Therapy

- Osmotic
  - Magnesium hydroxide
  - Lactulose
  - Sorbitol
  - PEG 3350
- Lubricants
  - Mineral oil
- Stimulants
  - Senokot
  - Bisacodyl

NASPGHAN CONSTIPATION GUIDELINE COMMITTEE
Tabbers et al - J Pediatr Gastroenterol Nutr. Feb 2014 - 58(2):258–274

Oral laxatives	Dosages
Osmotic laxatives	
Lactulose	1–2 g/kg, once or twice/day
PEG 3350	Maintenance: 0.2–0.8 g · kg^{-1} · day^{-1}
PEG 4000	Fecal disimpaction: 1–1.5 g · kg^{-1} · day^{-1} (with a maximum of 6 -
Milk of magnesia (magnesium hydroxide)	2–5 y: 0.4–1.2 g/day, once or divided
	6–11 y: 1.2–2.4 g/day, once or divided
	12–18 y: 2.4–4.8 g/day, once or divided
Fecal softeners	
Mineral oil	1–18 y: 1–3 mL · kg^{-1} · day^{-1}, once or divided, max 90 mL/day
Stimulant laxatives	
Bisacodyl	3–10 y: 5 mg/day
	>10 y: 5–10 mg/day
Senna	2–6 y: 2.5–5 mg once or twice/day
	6–12 y: 7.5–10 mg/day
	>12 y: 15–20 mg /day
Sodium picosulfate	1 mo–4 y: 2.5–10 mg once/day
	4–18 y: 2.5–20 mg once/day
Rectal laxatives/enemas	
Bisacodyl	2–10 y: 5 mg once /day
	>10 y: 5–10 mg once /day
Sodium docusate	<6 y: 60 mL
	>6 y: 120 mL
Sodium phosphate	1–18 y: 2.5 mL/kg, max 133 mL/dose
NaCl	Neonate <1 kg: 5 mL, >1 kg: 10 mL
	>1 y: 6 mL/kg once or twice/day
Mineral oil	2–11 y: 30–60 mL once/day
	>11 y: 60–150 mL once/day

Evaluation and Treatment of Functional Constipation in Infants and Children: Evidence-Based Recommendations From ESPGHAN and NASPGHAN

Journal of Pediatric Gastroenterology & Nutrition
58(2):258–274, FEBRUARY 2014

NASPGHAN Recommendations

***Diagnostic* Recommendations**

(1) The Rome III criteria are recommended for the definition of functional constipation for all age groups.
(2) The diagnosis of functional constipation is based on history and physical examination.
(3) We recommend using alarm signs and symptoms and diagnostic clues to identify an underlying disease responsible for the constipation.
(4) If only 1 of the Rome III criteria is present and the diagnosis of functional constipation is uncertain, a digital examination of the anorectum is recommended.
(5) In the presence of alarm signs or symptoms or in children with intractable constipation, a digital examination of the anorectum is recommended to exclude underlying medical conditions.
(6) The routine use of an abdominal radiograph has no role to diagnose functional constipation.
(7) A plain abdominal radiography may be used in a child in whom fecal impaction is suspected but in whom physical examination is unreliable/not possible.
(8) Colonic transit studies are not recommended to diagnose functional constipation.
(9) A colonic transit study may be useful to discriminate between functional constipation and functional nonretentive fecal incontinence and in situations in which the diagnosis is not clear.
(10) Rectal ultrasound is not recommended to diagnose functional constipation.
(11) Routine allergy testing to diagnose cow's-milk allergy is not recommended in children with constipation in the absence of alarm symptoms.
(12) Based on expert opinion, a 2- to 4-week trial of avoidance of CMP may be indicated in the child with intractable constipation.
(13) Routine laboratory testing to screen for hypothyroidism, celiac disease, and hypercalcemia is not recommended in children with constipation in the absence of alarm symptoms.
(14) Based on expert opinion, the main indication to perform ARM in the evaluation of intractable constipation is to assess the presence of the RAIR.
(15) Rectal biopsy is the gold standard for diagnosing HD.
(16) We do not recommend performing barium enema as an initial diagnostic tool for the evaluation of children with constipation.
(17) Colonic manometry may be indicated in patients with intractable constipation before considering surgical intervention.
(18) The routine use of MRI of the spine is not recommended in patients with intractable constipation without other neurologic abnormalities.
(19) We do not recommend obtaining full-thickness colonic biopsies to diagnose colonic neuromuscular disorders in children with intractable constipation.
(20) We do not recommend the routine use of colonic scintigraphy studies in children with intractable constipation.

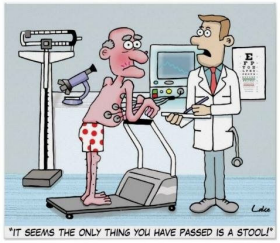
NASPGHAN Recommendations

***Therapeutic* Recommendations**

(21) A normal fiber intake is recommended.
(22) A normal fluid intake is recommended.
(23) We recommend a normal physical activity in children with constipation.
(24) The routine use of prebiotics is not recommended in the treatment of childhood constipation.
(25) The routine use of probiotics is not recommended in the treatment of childhood constipation.
(26) The routine use of an intensive behavioral protocolized therapy program in addition to conventional treatment is not recommended in childhood constipation.
(27) Based on expert opinion, we recommend demystification, explanation, and guidance for toilet training (in children with a developmental age of at least 4 years) in the treatment of childhood constipation.
(28) The use of biofeedback as additional treatment is not recommended in childhood constipation.
(29) We do not recommend the routine use of multidisciplinary treatment in childhood constipation.
(30) We do not recommend the use of alternative treatments in childhood constipation.
(31) PEG with or without electrolytes orally 1 to 1.5 g · kg^{-1} · day^{-1} for 3 to 6 days is recommended as the first-line treatment for children presenting with fecal impaction.
(32) An enema once per day for 3 to 6 days is recommended for children with fecal impaction, if PEG is not available.
(33) PEG with or without electrolytes is recommended as the first-line maintenance treatment. A starting dose of 0.4 g · kg^{-1} · day^{-1} is recommended and the dose should be adjusted according to the clinical response.
(34) Addition of enemas to the chronic use of PEG is not recommended.
(35) Lactulose is recommended as the first-line maintenance treatment, if PEG is not available.
(36) Based on expert opinion, the use of milk of magnesia, mineral oil, and stimulant laxatives may be considered as an additional or second-line treatment.
(37) Maintenance treatment should continue for at least 2 months. All symptoms of constipation symptoms should be resolved for at least 1 month before discontinuation of treatment. Treatment should be decreased gradually.
(38) In the developmental stage of toilet training, medication should only be stopped once toilet training is achieved.
(39) The routine use of lubiprostone, linaclotide, and prucalopride in children with intractable constipation is not recommended.
(40) Antegrade enemas are recommended in the treatment of selected children with intractable constipation.

Conclusions

- Most of the children have Functional Constipation
- Limited or no testing is required prior to initiating empiric therapy
- History and physical exam guide diagnostic testing and management
- In intractable constipation: other diagnostic tests including blood tests, spinal MRI, anorectal and colonic manometry may be useful



Thank you

OKLAHOMA ACADEMY OF FAMILY PHYSICIANS
STRONG MEDICINE FOR OKLAHOMA

EXPLORE HEALTHCARE SUMMIT

BEST CHILDREN'S HOSPITALS U.S.News GASTROENTEROLOGY & GI SURGERY 2023-2024
Oklahoma Children's Hospital OU Health