FUNCTIONAL CONSTIPATION

SOME BASICS OF EVALUATION AND MANAGEMENT

COSC CONFERENCE
11/12/2015
FUNCTIONS OF THE DIGESTIVE SYSTEM

- Chopper
- Throttle
- Fuel pipe
- Blender; reservoir + Acid sterilizer
- Enzyme supplier+
- Neutralizer
- Catalytic surface+
- Absorptive surface
- Emission control device
- Residue combustor
- Detergent supplier
- Fuel tank opener
- Dessicator and pelleteer

Healthier Kids, Stronger Families.
POOP HAPPENS

WHAT HAPPENS IF IT DOES NOT HAPPEN?
What percentage of the stool coming from food?

Fiber content and bacterial mass, which make up one half of the dry weight of stool, are probably the major components of these fecal solids. The other half is from SHEDDED intestinal epithelial cells.
HOW THE STOOL LOOKS LIKE?

- **Slow gut transit**
  - Type 1: Separate hard lumps
  - Type 2: Sausage-like but lumpy
  - Type 3: Sausage-like but with cracks in the surface
  - Type 4: Smooth and soft
  - Type 5: Soft blobs with clear-cut edges

- **Rapid gut transit**
  - Type 6: Fluffy pieces with ragged edges, a mushy stool
  - Type 7: Watery, no solid pieces

HOW THE POOP IS FORMED IN THE COLON

• Liquid small intestinal content reaches the colon through ileo-cecal valve
• It may contain up to 3-5% of the digested nutrients that makes colonic bacteria healthy and happy (our colon is the incubator for our bacteria)
• They ferment the nutrient and form short chain fatty acids
• Short chain fatty acids can re-absorb and provides additional calories. Butyric acid is the main metabolic fuel for the colonic epithelial cells.
• As the content moves down the consistency changes.
• The **distal third of the colon** is the main site of water re-absorption. The stool normally formed here.
• The typical colonic transit time range 24-96 hours
WHAT IS THE DEFINITION OF CONSTIPATION?

THERE IS NO SINGLE GOOD DEFINITION

Rome III criteria: functional Constipation

• 2 or more of the following in a child with a developmental age of at least 4 years with insufficient criteria for diagnosis of IBS:
  • Two or fewer defecations in the toilet per week
  • At least one episode of fecal incontinence per week
  • History of retentive posturing or excessive volitional stool retention
  • History of painful or hard bowel movements
  • Presence of a large fecal mass in the rectum
  • History of large diameter stools which may obstruct the toilet

ROME III DOES NOT HAVE A DEFINITION OF WHAT IS NORMAL!!

MY “OWN” PRACTICAL DEFINITION- INCOMPLETE FECAL EVACUATION!
Functional Constipation

Infant & toddler (<4 yrs. of age)

Must include 1 month of at least 2 of the following in infants up to 4 years of age:
1. Two or fewer defecations per week
2. At least 1 episode per week of incontinence after the acquisition of toileting skills
3. History of excessive stool retention
4. History of painful or hard bowel movements
5. Presence of a large fecal mass in the rectum
6. History of large-diameter stools that may obstruct the toilet

Children (>4 yrs. of age)

Must include 2 months of 2 or more of the following with insufficient criteria for diagnosis of IBS:
1. Two or fewer defecations in the toilet per week
2. At least 1 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 that may obstruct the toilet
Frequency of stools

• Normal defecation
  – Infants: 4 per day (range 1 - 7x/day)
  – Children (2 years old): 1.2 - 2x day
  – Adults: 3 per week - 3 per day
  • Pattern attained by ~4 years of age

Based on published papers
• Lemoh JN. Arch Dis Child 1979.
• Weaver LT. Arch Dis Child 1984.
“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)
  - 250 million dollar a year spent for OTC constipation medications

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

---

• Loening-Baucke V. Gastroenterology 1993.
• Fleisher PR. Pediatric Annals 1976.
THE KEY ELEMENTS OF POTTY TRAINING TO PREVENT CONSTIPATION

MY SUBJECTIVE NOTES:

1. THE STOOLING IS A CONDITIONAL REFLEX
2. IF THE MOM PUTS THE TODDLER TO THE POTTY AFTER THE SAME MEAL HE/SHE WILL DEVELOP A REGULAR PATTERN

PLUS

3. IF THE CHILD GETS AGE APPROPRIATE FIBER AND DAILY FLUID HE/SHE UNLIKELY WILL HAVE CONSTIPATION.

4. IF THE MOM RECOGNIZES AND ACTS TIMELY IF A CHILD HAS ACUTE CONSTIPATION HE/SHE WILL NOT BE SEEN BY US WITH THIS PROBLEM!
POTTY TRAINING ACHIEVED IF THE CHILD CONNECTS THE RECTAL SENSATION WITH THE ACTION OF STOOLING!!
HOW TO POOP?

**Normal**
- Stool
- Rectum
- Sphincter Muscle
- Anus

**Chronic Constipation**
- More stool forms and backs into colon.
- Soft stool
- Large stool gets stuck (impacted)
- Enlarged Dialated Rectum
- Anus

**Proper stooling**
- Throat closed
- Diaphragm Moves down
- Forearm support
- Pelvis
- Proper wall contracts

**Sitting versus Squatting**
- To maintain continence the puborectalis muscle "chokes" the rectum
- Squatting relaxes the puborectalis muscle and straightens the rectum

Healthier Kids, Stronger Families.
Sagittal View of the Anorectum at Rest (Panel A) and during Straining to Defecate (Panel B).

Continence is maintained by normal rectal sensation and tonic contraction of the internal anal sphincter and the puborectalis muscle, which wraps around the anorectum, maintaining an anorectal angle between 80 and 110 degrees. During defecation, the pelvic-floor muscles (including the puborectalis) relax, allowing the anorectal angle to straighten by at least 15 degrees, and the perineum descends by 1.0 to 3.5 cm. The external anal sphincter also relaxes and reduces pressure on the anal canal.
THE DEVELOPMENT OF CONSTIPATION and PROGRESSION TO ENCOPRESIS

Dehydration, Poor diet, Drug, Withholding, stooling only at home, etc.

Withholding behavior in young children

Colonic wall Distension; SMOOTH MUSCLE !!!

Loss of sensation
MEGARECTUM

- Reduced sensation
- Increased size of rectum
- Retained hardening fecal mass
- Smooth muscle hypertrophy
- Reduced anal inhibition
OVERFLOW INCONTINENCE-ENCOPRESIS

OVERFLOW DIARRHEA IF IMPACTION IS TREATED WITHOUT CLEAN-OUT!!
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

WHAT IS THE PHYSIOLOGIC POSITION FOR STOOL EVACUATION?

Squatty Potty

I’ve just defecated.

An unnatural posture involving tension and strain

The relaxed, natural squatting posture
1. PERIUMBILICAL ABDOMINAL

It happens in the middle and end of the meal = gastrocolic reflex

2. POSTPRANDIAL SINGLE VOMITING

He/She is able to eat again shortly after !!

The reasons not reporting stooling problem:
“PRIVACY”, “SHY” TO TALK ABOUT STOOL, I DO NOT LOOK AT MY STOOL- “it is disgusting…”
Functional vs. Organic

- **Organic causes - fewer than 5% of children with constipation**
  - Anatomic anal malformations
  - Metabolic and endocrine anomalies
  - Spinal cord abnormalities
  - Intestinal nerve and muscle disorders
  - Abnormal abdominal musculature
  - Connective tissue disorders
  - Drugs
    - Opiates, Phenobarbital, Antacids, Sucralfate, Bismuth, Iron, Cholestyramine, Psychotropics, Anticholinergics

Tunnessen, WJ. Signs and Symptoms in Pediatrics. 1999
Functional vs. Organic

• Other
  – Lead ingestion
  – Vitamin D Intoxication
  – Botulism
  – Cow’s milk protein intolerance
Organic Causes of Constipation

• Hirschsprung disease
  – 1 in 5000 live births, male:female ratio of 4:1
  – Absence of ganglion cells in the myenteric, submucosal plexus
  – Affects a short segment in the rectosigmoid in approximately 75% of patients, entire colon in approximately 10% of patients
  – 90% of affected do not pass meconium in 1st 24 hours of life
  – Can present with bilious vomiting, abdominal distension, fever, explosive and sometimes bloody diarrhea (enterocolitis)
  – Short segment disease may go undiagnosed until childhood
• **Hirschsprung disease**
  
  – Contracted anal sphincter and rectum, rectum usually devoid of stool
  
  – May have explosive discharge of foul-smelling liquid stool with withdrawal of finger on rectal exam
  
  – Gold standard for diagnosis is rectal biopsy
  
  – Anorectal manometry - no relaxation of internal anal sphincter
  
  – Barium enema may show transition zone (except total colonic and ultra-short segment disease)
Organic Causes of Constipation

• **Intestinal Pseudo-Obstruction**
  – Impaired intestinal and colonic motility in the absence of a mechanical obstructive lesion
  – Neuropathic and myopathic causes
    • Intestinal neuronal dysplasia, visceral myopathy/neuropathy of intestine
  – Majority of affected children have urologic abnormalities-megacystis microcolon hypoperistalsis syndrome
  – In moderate form with subacute presentation, 70% have constipation
Organic Causes of Constipation

• **Cystic fibrosis**
  – Meconium ileus is the presenting problem in 10 to 20% of newborns with CF
  – Distal ileal obstructive syndrome or "meconium ileus equivalent"

• **Hypothyroidism**
  – Congenital or acquired hypothyroidism
  – Growth delay, altered school performance, lethargy, cold intolerance, constipation, dry skin, brittle hair

• **Celiac disease**
  – 20% of the celiac cases over 2 years of age
Approach

• History
  – Psychosocial history
    • Interactions with family, peers
    • Possibility of abuse
    • Uses school restrooms or not
  – Medications
    • Previous treatments for constipation
  – Diet
  – Development
  – Family history-Hirschsprung’s, thyroid, CF, celiac disease
A thorough history and complete physical examination are usually adequate to accurately diagnose functional constipation.
Thorough physical examination (including deep palpation for stool mass)

Anorectal examination

- Anal position
- Skin tags, anal fissures, evidence of trauma
- Perianal sensation
- Presence of anal wink: reflexive contraction of the external anal sphincter upon stroking of the skin around the anus. Absence is suspicious of neurological problem (spine, reflex arch)
- Anal tone (It can be low with megarectum)
- Size of rectum (dilated and empty indicates hard stool above your finger)
- Rectal mass (can be stool, polyp, duplication cyst, etc)
- Amount, consistency, location of stool in rectum
- Explosive stool on withdrawal of finger (short segment Hirschsprung’s disease)
- Stool hemoccult
Medical work-up

• History and physical exam - 1st visit

• Labs:
  – Serum Calcium
  – TSH/T4
  – Celiac panel
  – Lead level
  – CBC

• Imaging

• Manometry

If not improving
Approach if no improvement

• CBC
  – E.g. anemia in celiac disease associated with constipation
• Thyroid panel
• Urinalysis and urine culture
  – E.g. UTI’s due to the mechanical effects of the distended rectum compressing on the bladder
• **Plain abdominal film** to document retained stool when the physical examination is equivocal
• Unprepped barium enema (If suspicion of Hirschsprung’s disease)
• Colonic transit studies *(Sitz marker study)*
• **MRI** of the lumbosacral spine
• Anorectal and colonic manometry (at Motility center)

A total of 130 children with intractable constipation and 28 with nonretentive fecal incontinence underwent **MRI** that revealed that 3% had **lumbosacral spine abnormalities** and the neurologic examination revealed no abnormalities in these patients.

*Evaluation and Treatment of Functional Constipation in Infants and Children: Evidence-Based Recommendations From ESPGHAN and NASPGHAN.* JPN 2014;58: 258-274
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**

http://www.sitzmarks.com/howtointerpretasitzmarkstest.aspx
Radiologist may report it as “Non-obstructive abdomen”.
You cannot trust RADIOLOGY REPORT unless you are specifically asking for fecal impaction

MAY REPORT  FECALOMA

MAY REPORT  IT AS NORMAL
Red flags:

- **History**: fever, anorexia, weight loss, vomiting, bloody diarrhea, constipation since infancy,

- Encopresis without fecal impaction

- **Physical exam**: abnormal perianal exam (erythema, fistula), abnormal anal tone, absence of anal wink, sacral tuft of hair
1. **COLONIC CLEAN-OUT:** (just like for colonoscopy)

2. **KEEP THE STOOL SOFT** (PEG-3350, lactulose, Milk of magnesia)

3. **AGE APPROPRIATE FIBER INTAKE:** age+ 5g/day

4. **AGE APPROPRIATE FLUID INTAKE:**
   
   at least maintenance fluid daily

5. **TOILET TRAINING REGIMEN** (proper stooling position!):

   “Stooling is a conditional reflex” (Pavlovian reflex)
## Treatment Options for Constipation

<table>
<thead>
<tr>
<th>Treatment Option</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
</table>
| **Lubricants/Mineral oils**   | Facilitates bowel movements  
Promotes soft bulk            | Fat-soluble vitamins may not be absorbed  
Patient may become deficient in vitamins A, D, E, K  
Larger doses may cause rectal leakage  
Oil may interact with warfarin and birth control pills |
| **Emollients**                | Penetrates, wets stool  
Often effective for painful anal fissures | May cause bloating and flatulence |
| *(Colace, Dialose, Docusate, Surfak)* |                                                                      |                                                                      |
| **Hyperosmolar laxatives**   | Promotes water retention in stool  
Does not alter electrolyte balance | May cause bloating and flatulence |
| *(GlycoLax, lactulose, Miralax, sorbitol)* |                                                                      |                                                                      |
| **Saline laxatives**         | Softens, bulkens stool  
Rapid acting, used in bowel cleansing | Potentially dangerous electrolyte disturbance, dehydration or hypovolemia; Rare nephrocalcinosis and renal failure possible |
| *(Fleet, Milk of Magnesia, Magnesium Citrate, Visicol)* |                                                                      |                                                                      |
| **Stimulants**               | Increases water in stool  | Prolonged use may lead to peristaltic dependence |
| *(Aloe, Cascara, Castor oil, Correctol, Dulcolax, Ex-Lax, prunes, Senna, Senokot)* |                                                                      |                                                                      |
| **Herbs**                    | May contain polyphenol stimulant laxative or anthranoid stimulant | May lead to colonic peristaltic dependence  
May reduce water absorption in colon |
| *(Green tea)*                |                                                                      |                                                                      |
| **Bulking agents**           | Often relieves constipation  
Absorbs water, bulkens and softens stool | Abdominal bloating, flatulence |
| *(Benefiber, Citrucel, Equilactin, fiberall, fibercon, Konsyl, Metamucil, Modane Bulk, psyllium, Serutan)* |                                                                      |                                                                      |
## CONSTIPATION DRUG DOSES

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>COMPOSITION</th>
<th>DOSAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleet ENEMA</td>
<td>Na-phosphate, Na-biphosphate</td>
<td>30 ml/5 kg BW; 135 ml over 20 kg</td>
</tr>
<tr>
<td>Fleet Phospho Soda-oral</td>
<td>Na-phosphate, Na-biphosphate</td>
<td>colon prep: 48 ml after 10 yrs (&gt;8 ounces of water)</td>
</tr>
<tr>
<td>Lactulose (66%)</td>
<td>undigestible disaccharide</td>
<td>1-3 ml/kg BW/day (b.i.d)</td>
</tr>
<tr>
<td>Sorbitol (70%)</td>
<td>polyalcoholic sugar</td>
<td>2-11 yrs: 2 ml/kg &gt;12 yrs: 30-150 ml 1-3 ml/kg BW/day (b.i.d)</td>
</tr>
<tr>
<td>Mineral oil</td>
<td>converted into hydroxy fatty acids</td>
<td>1-3 ml/kg BW/day (b.i.d.)</td>
</tr>
<tr>
<td>Milk of magnesia</td>
<td>Mg-hydroxide</td>
<td>1-3 ml/kg BW (b.i.d.)</td>
</tr>
<tr>
<td>Miralax</td>
<td>Polyethylene-glycol</td>
<td>0.8-1 g/kg/day, b.i.d.</td>
</tr>
<tr>
<td>Senna syrup</td>
<td></td>
<td>1-5 yr: 5 ml q.d. or b.i.d. 5-15 yr: 10 ml q.d. or b.i.d</td>
</tr>
<tr>
<td>Dulcolax</td>
<td>Bisacodyl tannex</td>
<td>3-12 years: 0.3 mg/kg/day orally &gt;12 yrs: 5-15 mg Q.D. orally Suppository: 5 - 10 mg/day</td>
</tr>
<tr>
<td>Docusate (Colace)</td>
<td>Dioctyl Ca- or Na sulfosuccinate</td>
<td>&lt;3 yrs: 10-40 mg/day (1-4x) 3-6 yrs: 20-60 mg/day 6-12 yrs: 40-150 mg/day</td>
</tr>
<tr>
<td>Castor oil</td>
<td>Oleum ricini</td>
<td>Infant: 1-5 ml or (15 ml/m² D.D.) 2-11 yr: 5-15 ml Q.D. &gt;12 yrs: 15-60 ml Q.D.</td>
</tr>
<tr>
<td>Malt soup extract or Karo syrup</td>
<td></td>
<td>5-10 ml in 2-4 oz of water or fruit juice b.i.d. (Breast-fed) 7.5-30 ml/day to bottle fed babies</td>
</tr>
</tbody>
</table>

### MANAGEMENT

1. Always start with clean-out
2. Keep the stool soft with stool softener
3. Improve fiber intake (age+5g/day)
4. Appropriate fluid intake
5. Teach how to POOP.
6. Build regular stooling pattern
A normal **FIBER** intake is recommended (age + 5 grams/day, max 25g)

A normal **FLUID** intake is recommended (at least maintenance fluid)

We recommend a normal **PHYSICAL ACTIVITY** in children with constipation.

The routine use of **PREBIOTICS** is not recommended in the treatment of childhood constipation.

The routine use of **PROBIOTICS** is not recommended in the treatment of childhood constipation.

*Evaluation and Treatment of Functional Constipation in Infants and Children: Evidence-Based Recommendations From ESPGHAN and NASPGHAN. JPGN 2014;58: 258-274*
At potty training age: “in the developmental stage of toilet training, medication should only be stopped once toilet training is achieved.”

In potty trained children “for least for 2 months and all symptoms of constipation symptoms should be resolved for at least 1 month before discontinuation of treatment. Treatment should be decreased gradually”

My endpoint:
NORMAL DAILY FLUID AND FIBER INTAKE and DEVELOPED A REGULAR STOOLING PATTERN

THEN

SLOW TAPERING OF STOOL SOFTENER
To the rescue!!!

Direct stimulant
It works within 15-60 minutes
What Is the Prognosis and What Are Prognostic Factors in Children With Functional Constipation?

- primary care physicians tend to undertreat childhood constipation, delay in treatment, defined as time between age at onset and first presentation at the department of pediatric gastroenterology, is negatively related to recovery.
- duration of symptoms <3 months before presentation had a positive effect on recovery.
- recovery rates of 50% after 5 years of follow-up without laxatives after 6 to 12 months.

Evaluation and Treatment of Functional Constipation in Infants and Children: Evidence-Based Recommendations From ESPGHAN and NASPGHAN. JPGN 2014;58: 258-274
ANORECTAL MANOMETRY

Indications

1. Diagnose non-relaxing internal anal sphincter
2. Assess anorectal motility in children with chronic constipation and/or fecal incontinence with persistent symptoms despite treatment
3. Persistent symptoms (incontinence or obstruction) after surgery for Hirschsprung disease and to evaluate need for botulinum injection to sphincter
4. Evaluate anorectal function in patients with imperforate anus repair
5. Biofeedback therapy
The Poo in You - Constipation and Encopresis Educational Video

by GI Kids

1 year ago • 459,868 views

If your child is having problems with soiling accidents (encopresis, "poo accidents," "poo-ing" in pants), you're certainly not alone. This is one of the most common problems seen by both...