CONSTIPATION IN CHILDREN

DR. HOSSAIN IBRAHIM AGEEL
PEDIATRIC GASTROENTEROLOGIST
PEDIATRIC DEPARTMENT
KFCH – JAZAN
Objectives

- Normal defecation mechanism
- Pathogenesis of chronic constipation
- Etiology of chronic constipation
- Evaluation of a child with chronic constipation
- Red flag signs mandating referral to specialists
- Treatment of chronic constipation
- Complications
- Role of pediatric gastroenterologist
Prevalence

- Common problem in childhood
- The worldwide prevalence rates 1% - 30%
- 3 to 5 percent of all visits to pediatricians
- 25 percent of pediatric GI consults
- Peak prevalence is during preschool years
- No gender effect on the prevalence
ANATOMY OF ANORECTAL REGION

- Major structures include:
  - External anal sphincter
  - Puborectalis muscle
  - Internal anal sphincter
  - Rectum
NORMAL DEFECATION MECHANICS

1. Feces move into and distend the rectum, stimulating stretch receptors there. The receptors transmit signals along afferent fibers to spinal cord neurons.

2. A spinal reflex is initiated in which parasympathetic motor (efferent) fibers stimulate contraction of the rectum and sigmoid colon, and relaxation of the internal anal sphincter.

3. If it is convenient to defecate, voluntary motor neurons are inhibited, allowing the external anal sphincter to relax so feces may pass.
NORMAL DEFECATION MECHANICS

Continence requires:
- Contraction of puborectalis
- Maintenance of anorectal angle
- Normal rectal sensation
- Contraction of sphincter

Defecation requires:
- Relaxation of puborectalis
- Straightening of anorectal angle
- Relaxation of sphincter
Normal stool patterns

- **Normal stool frequency**
  - The initial bowel movement is within the first 24 hours of birth in 90 percent of normal newborns
  - Approximately 4 stools per day in the 1\textsuperscript{st} week of life
  - Gradually changes to 1-2 stools per day by the age of 4 years with range of 3 per day to 3 per week
  - Breastfed infants can stool with each feeding or only once every 7 to 10 days
Bowel control

• Many children achieve voluntary bowel control between 18 months and 2 years of age
• Majority of children (98%) are toilet trained by 4 years of age
• Girls achieve toilet training slightly earlier than boys
Definition

- Infrequent bowel movements
- Hard stool consistency
- Large stool size

\[\text{Painful defecation}\]
<table>
<thead>
<tr>
<th>Slow Transit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Separate hard lumps, like nuts</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Sausage-like but lumpy</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Like a sausage but with cracks in the surface</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Like a sausage or snake, smooth and soft</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Soft blobs with clear-cut edges</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Fluffy pieces with ragged edges, a mushy stool</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Watery, no solid pieces</td>
</tr>
</tbody>
</table>

Fast Transit
Etiology of constipation

- **Functional constipation:**
  - Constipation without objective evidence of a pathological condition
  - Accounts for > 95% of all constipated children

- **Organic causes:**
  - Disease entities
  - Accounts for less than 5% of all constipation
## Organic causes of chronic constipation

| Anorectal malformation | Imperforate anus  
|                       | Anal stenosis  
<table>
<thead>
<tr>
<th></th>
<th>Anteriorly displaced anus</th>
</tr>
</thead>
</table>
| Neuropathic conditions | Cerebral palsy  
|                       | Spina bifida  
|                       | Tethered cord  
|                       | Spinal cord trauma/tumor  
|                       | Sacral agenesis  
|                       | Neurofibromatosis |
| Intestinal nerve or muscle disorders | Hirschsprung’s disease  
|                                       | Internal Anal Sphinctor achalasia  
|                                       | Intestinal Neuronal Dysplasia  
|                                       | Intestinal pseudo-obstruction |
## Organic causes of chronic constipation

<table>
<thead>
<tr>
<th>Metabolic/systemic causes</th>
<th>Hypothyroidism</th>
<th>Hypokalemia</th>
<th>Hypercalcemia</th>
<th>Celiac disease</th>
<th>Cystic fibrosis</th>
<th>Cow’s milk protein allergy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs/Toxins induced</td>
<td>Opiates</td>
<td>Phenobarbital</td>
<td>Anti-cholinergics</td>
<td>Anti-depressants</td>
<td>Chemotherapeutic agents</td>
<td>Sucralfate</td>
</tr>
</tbody>
</table>
Infantile dyschezia

• Occur in infants less than 6 months of age
• 10 minutes of straining and crying followed by successful passage of a soft stool
• Child otherwise is healthy and thriving
• Resolve spontaneously
• Mechanism: failure to relax pelvic floor and inadequate abdominal muscle tone.
• No intervention is needed
• Reassurance is key
Functional Constipation

- Painful stool
- Stool withholding
- Constipation
PAINFUL STOOL

- Too busy
- Changes in routine
- Intercurrent illness
- Toilet training
- Stressful events
Withholding behaviors:

• Squatting.
• Crossing ankles.
• Stiffening of the body.
• Holding onto furniture or mother.
• Flushing, sweating and crying.
• Hiding during defecation in a corner.
PATHOGENESIS OF FUNCTIONAL CONSTIPATION

- Painful stool
- Voluntary withholding of feces
- Prolonged fecal stasis with fluids resorption
- Rectal dilation
- Larger and harder stool
- Urge to defecate disappears
Complications of chronic constipation

- Fecal incontinence
- Chronic abdominal pain
- Urinary complication such as urinary incontinence and UTI
- Toxic megacolon
- Psychosocial issues
Presentation of functional constipation

When?

- Introduction of cereal and solid foods
- Toilet training
- The start of school
Diagnosis of functional constipation

ROME III criteria

Must include at least two or more of the followings:

- Two or fewer stools per week
- At least one episode of fecal incontinence per week
- History of retentive posturing or excessive volitional stool retention (stool withholding)
- History of painful or hard bowel movements
- Presence of a large fecal mass in the rectum
- History of large diameter stools that may obstruct the toilet

- Infants and toddlers < 4 years of age: Duration is one month
- Children and adolescents > 4 years of age: duration is two months
## Evaluation of constipation - History

<table>
<thead>
<tr>
<th>Toilet habit</th>
<th>Associated symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History of chief complaint:</strong></td>
<td><strong>Intestinal symptoms:</strong></td>
</tr>
<tr>
<td>• Age of onset of constipation</td>
<td>• Abdominal pain</td>
</tr>
<tr>
<td>• Stool frequency</td>
<td>• Abdominal distention</td>
</tr>
<tr>
<td>• Stool consistency</td>
<td>• Vomiting</td>
</tr>
<tr>
<td>• Stool size</td>
<td>• Anorexia</td>
</tr>
<tr>
<td>• Painful defecation</td>
<td>• weight loss or poor wt gain</td>
</tr>
<tr>
<td>• Blood in the stool</td>
<td></td>
</tr>
<tr>
<td>• Withholding symptoms</td>
<td><strong>Extra-intestinal:</strong></td>
</tr>
<tr>
<td>• History of encopresis</td>
<td>• Urinary tract symptoms such as frequency, enuresis, and</td>
</tr>
<tr>
<td>• Time of 1\textsuperscript{st} bowel movement</td>
<td>infection</td>
</tr>
<tr>
<td>Other important points in the history to address</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Past medical and surgical history</strong></td>
<td>Including neonatal GI complications such as NEC and prior surgeries</td>
</tr>
<tr>
<td><strong>Dietary</strong></td>
<td>Fluid intake, milk consumption, fiber content of food stuffs</td>
</tr>
<tr>
<td><strong>Family</strong></td>
<td>Constipation, celiac disease, cystic fibrosis, etc.</td>
</tr>
<tr>
<td><strong>Psychosocial</strong></td>
<td>Household structure, stressors, temperament, toilet habits at school</td>
</tr>
<tr>
<td><strong>Developmental</strong></td>
<td>Toilet training history, Developmental</td>
</tr>
<tr>
<td><strong>Medication</strong></td>
<td>Laxatives used and their results, drugs known to cause constipation</td>
</tr>
<tr>
<td><strong>Allergy</strong></td>
<td>Atopic history, food allergy</td>
</tr>
</tbody>
</table>
Physical examination

Must be complete with special attention to:
• Growth parameters
• Skin
• Abdominal examination
• Anal inspection and rectal digital examination
• Back and spine examination
• Neurological examination
Physical examination

General examination
- Vital signs
- Growth parameters
- Skin: Café au lait spots

Abdominal
- Distension
- Tenderness
- Fecal masses
- Bowel sounds

Perianal & Digital rectal
- Position of anus
- Fissures or fistulas
- Perianal erythema
- Presence of soiling
- Perianal sensation
- Presence of anal wink
- Anal sphincter tone
- Size of rectal vault, presence of polyps
- Presence, size and consistency of stool within the rectum

Neurological
- Tone
- Strength
- Reflexes

Back
- Pigmentation
- Sacral dimples
- Tufts of hair
- Mass
RED FLAG SYMPTOMS AND SIGNS

- Abdominal distension and vomiting
- Constipation in age < 3 months
- Delayed passage of meconium
- Empty rectal ampulla
- Explosive passage of stool on rectal examination
- Ano-rectal malformations
- Passage of blood
- Failure to thrive
- Abnormal neurological signs
Therapeutic approach to constipation in children

Constipation

Red flags

Yes → Specialist referral

No → Functional constipation

Treatment

Not effective → Pediatric GI

Effective → Regular followup
Investigations:

Functional constipation: non is required routinely

- Complete blood count (CBC)
- Serum calcium and potassium
- Thyroid function test (T3, T4, TSH)
- TTG antibody with total IgA
- Lead level ?
- Sweat chloride test ?
- Lumbosacral spine X-RAY / MRI
- Barium enema
- Rectal biopsy
Indications:

• Unreliable child’s history
• Unreliable examination
• Child’s refusal of rectal examination
• Traumatic rectal examination
MANAGEMENT

- Education
- Disimpaction
- Maintenance Rx
- Close follow-up

Dietary therapy
Behavioral therapy
Laxatives
1. **Education of the family and patient**

- Physiology of normal defecation.
- Pathogenesis of functional constipation and associated fecal incontinence.
- Remove the negative attributions with soiling.
- Treatment plan should be discussed in details.
- Stress that the problem is often chronic and relapses can occur, requiring long term treatment for months to years
- Stress that the patient should not stop treatment abruptly, as this may lead to relapse.
- Ongoing education and constant support during regular follow-up visits are necessary.
2. **Disimpaction**

Determine if fecal impaction is present

- Hard mass in lower abdomen (abdominal exam)
- Dilated rectum filled with large amount of stool (rectal exam).
- Excessive stool in the colon (KUB).
Treat impaction if present: Rectal or Oral

The most commonly medications used

- Polyethylene glycol with electrolytes solution 25 ml/kg/hour, up to 500 ml/hour until fecal effluent is clear.
- Polyethylene glycol 3350 (PEG) 1.5 g/kg/day for 3 days.
- Phosphate enema 6 ml/kg, up to 135 ml for >2 years.
- Glycerine suppositories 1 suppository for infants and toddlers
3. Maintenance therapy

**Goals**

- Pass one to two soft stools daily.
- Resolution of fecal soiling.
- Allow rectal vault to approach normal size and return of rectal sensation.
Maintenance therapy

Dietary therapy
- Increase fluid intake.
- Trial of cow’s milk free diet.
- Increase dietary fibers including whole grains, fruits, vegetables.

Behavioral therapy
- Toilet-sitting schedules.
- Appropriate toilet hygiene.
- Positive reinforcement.
- Referral to mental health care.

Laxatives
- Osmotic
- Lubricant
- Stimulant
The most commonly used laxatives in children

<table>
<thead>
<tr>
<th>Category</th>
<th>Medication</th>
<th>Usual dosage</th>
</tr>
</thead>
</table>
| **Osmotic laxatives**  | • Lactulose 70% solution  
• Magnesium hydroxide  
• Polyethylene glycol 3350 (PEG) | 1 – 3 ml/kg/day  
1 – 3 ml/kg/day  
0.8 g/kg/day (dilute 17 g/240 ml of liquid) |
| **Lubricant laxatives**| • Mineral oil                                   | 1 – 4 ml/kg/day                                                              |
| **Stimulant laxatives**| • Senna  
• Bisacodyl  
• Docusate sodium  
• Sodium picosulphate | 2.5 – 15 ml/day  
5 – 15 mg/day  
12.5 – 25 mg twice daily  
2.5 – 10 mg at night |
4. Close follow-up and prognosis

• 60% of children with functional constipation respond to conventional therapy by one year.
• 30-50% of children treated persist to have severe symptoms after 5 years of follow-up.
Nonresponsive to conventional therapy

- Mistakes by physicians or children and their parents in the treatment.
- Unrecognized disease
- Associated behavioral problems

- Refer to pediatric gastroenterologist
What can go wrong in the treatment?

Mistakes by physicians

- Not removing the fecal impaction
- Failing to start maintenance therapy
- Giving too low a laxative dose
- Stopping the laxative too soon
- Not providing education
- No regular follow up
Mistakes by parents and children

- Child use of the toilet at regular times for defecation trials is not insisted
- Medication is not given daily
- Discontinuing laxatives early
- Not restarting the laxative after relapse.
Further investigations

- Colonic transit marker studies
- Anorectal and colonic manometry
- Defecating proctography

• These investigations usually are considered by pediatric gastroenterologist if constipation is refractory to treatment.
Other therapy options:

- Biofeedback treatment: an effective therapy for children with anismus (Lack of coordinated relaxation of external anal sphincter while defecation on manometry)

- Surgical treatment: malone antegrade colonic enema

- New laxative: ? Lubiprostone
THE END

Questions ?
Keep in mind

The following slides demonstrate some of the physical findings that might be seen during physical examination which suggest an underlying organic pathology.
General examination

Congenital Hypothyroidism
General examination

Neurofibromatosis
Perianal examination

Streptococcal dermatitis
Perianal examination

- Skin tag
- Anal fissure
Perianal examination

Imperforate anus
Ectopic Anus: Anterior Displaced anus
Back examination

Meningocele
Back examination

Myelomeningocele
Back examination

Capillary hemangioma
Back examination

Midline dermal sinus
Back examination

Midline hair tufts
Back examination

Midline lipoma
TETHERED SPINAL CORD
Case scenario

- History: Infant with significant constipation from neonatal period, especially with delayed passage of meconium.
- Physical exam: Empty rectal vault on rectal exam with gush of stool.
Hirschsprung’s disease

Transition Zone with proximal dilated colon and contracted distal colon
Hirschsprung’s disease

Submucosa

Myenteric

Presence of ganglions

Aganglionic segment