Intractable constipation in children: A challenging problem

Seksit Osatakul
Department of Pediatrics, Faculty of Medicine, Prince of Songkla University
Hat Yai, Songkhla, Thailand
Associate Professor Seksit Osatakul is currently Head of the Division of Pediatric Gastroenterology, Department of Pediatrics, Faculty of Medicine, Prince of Songkla University, Thailand. He obtained both M.D and the Thai Board of Pediatrics from the Faculty of Medicine, Ramathibodi Hospital, Mahidol University, then he trained in pediatric gastroenterology and hepatology at the Royal's Children Hospital, Brisbane, Australia. His area of interest is functional GI disorders, particularly defecation disorders in children. He was the President of Thai Pediatric Society of Gastroenterology and Hepatology between 2014-2016.
Disclosure

No conflict of interest
Objectives: To discuss

1. How to approach childhood intractable constipation
2. The diagnosis and management of intractable constipation, caused by defecation disorder as well as slow colonic transit
Intractable constipation: Definition

- Constipation not responding to optimal conventional treatment for at least 3 months.

*ESPGHAN and NASPGHAN. JPGN 2014;58:258-74.*
A case study: A 12-years old girl

- A 6-years history of constipation
- Defecated every 1-2 weeks, hard stools, spending >30 mins in the toilet, sometimes needing digital evacuation, with abdominal pain and loss of appetite
- Failure of treatment with milk of magnesia, senokot, bisacodyl, and tegaserod
- Very anxious about constipation
- Past history and physical examination were unremarkable
- Normal initial investigation
How should we do for this patient?
Chronic treatment-resistant constipation: How to approach

1. Proper laxative dosage
2. Compliance
3. Child abuse/sexual abuse
4. Occult organic diseases
   - Internal anal sphincter achalasia
   - Spinal defects

Dyssynergic defecation and slow colonic transit are the most common abnormalities underlying intractable constipation.
Colonic transit study in children with intractable constipation

<table>
<thead>
<tr>
<th>Method</th>
<th>Normal</th>
<th>Slow transit</th>
<th>Outlet obstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiopaque markers (N=28) [(Gutierrez C, et al JPN 2002)]</td>
<td>50</td>
<td>13</td>
<td>37^a</td>
</tr>
</tbody>
</table>

^a64% showed dyssynergic defecation by anorectal manometry (ARM)
Intractable constipation (based on colonic transit study)

1. Slow colonic transit
2. Outlet obstruction (dyssynergic defecation)
3. Normal

Southwell BR. JPGN 2011; 53(Suppl 2):S1-86
Dyssynergic defecation in children

Theories to explain:

- Children may condition themselves to contract the EAS and close the anus in response to the urge to defecate.
- Could be due to painful bowel movements, trials to postpone defecation, faulty learning.

Abnormal defecation dynamics are considered to be a behavior, rather than a pathophysiological disorders.

What defects could lead to slow colonic transit constipation?

Primary alteration of colonic motility

- Low substance P (tachykinin) – smooth muscle contraction
- Abnormalities in nitric oxide syntase and VIP – smooth muscle relaxation
- Loss of interstitial cell of Cajal – intestinal pacemakers


Secondary to massive chronic fecal retention

Colonic and anorectal functional testing

Defecatory function
  Balloon expulsion test
  EMG
  Anorectal manometry
  Defecography

Colonic function
  Colonic transit
    Radiopaque markers
    Scintigraphy
    Colonic manometry
    Wireless motility capsule
Diagnostic procedures in disordered defecation

1. **Balloon expulsion test**
   A 4-cm-long balloon, filled with 50 mL of warm water is placed in the rectum.
   - Positive - Fails to expel a rectal balloon by 1-3 mins
   - Sensitivity 50%, false positive 0-16%
   - 78% agreement with ARM
   

2. **EMG – Recording myoelectrical activity of the ext. anal sphincter**

3. **Anorectal manometry (ARM)**
   Providing a comprehensive assessment of anorectal pressure activity, RSR, rectal sensation
   - False positive 22-26%
   
Anorectal manometry
Pattern of defecation dynamics

Normal defecation

Abnormal defecation
Colonic transit study
Radiopaque marker technique

Single capsule (Sitz Mark)

Colonic inertia
Dyssynergic defecation

Multiple capsules

Radionuclear technique

Colonic inertia
Dyssynergic defecation


Colonic manometry

Indication:
1. To confirm colonic inertia
2. Help in planning surgical interventions (ACE, diverting ileostomy, re-anastomosis of a diverted colon, colonic resection)


High amplitude propagating contraction (HAPCs)
# Treatment of intractable constipation in children

<table>
<thead>
<tr>
<th>Dyssynergic defecation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biofeedback therapy</td>
</tr>
<tr>
<td>Measures to decrease anal sphincter tone</td>
</tr>
<tr>
<td>Anal sphincter botulinum toxin injection</td>
</tr>
<tr>
<td>Anal dilatation</td>
</tr>
<tr>
<td>Anal sphincter myectomy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Slow colonic transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colonic irrigation</td>
</tr>
<tr>
<td>Transanal irrigation</td>
</tr>
<tr>
<td>Antegrade colonic enema (ACE)</td>
</tr>
<tr>
<td>Ostomy</td>
</tr>
<tr>
<td>Colectomy</td>
</tr>
<tr>
<td>Electrical stimulation</td>
</tr>
<tr>
<td>Sacral nerve stimulation</td>
</tr>
<tr>
<td>Transcutaneous interferential therapy</td>
</tr>
</tbody>
</table>
Colonic irrigation

**Indication:** Slow transit constipation with severe fecal incontinence

**Transanal irrigation**

**Antegrade colonic enema (ACE)**

**Lt. ACE (LACE)**

**Long-term FU:**
30-80% - improvement in colonic manometry post ACE

15-35% - discontinued ACE


Electrical stimulation

Mechanism: Inhibition of sympathetic nerve

Sacral N. stimulation

Transcutaneous electrical stimulation (TES)


How efficacious are these treatment?
A Cochrane review in biofeedback treatment in pediatric functional constipation

<table>
<thead>
<tr>
<th>Study</th>
<th>Biofeedback</th>
<th>Conventional</th>
<th>Odds Ratio (Fixed)</th>
<th>Weight (%)</th>
<th>Odds Ratio (Fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 12-month follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cox 1998</td>
<td>12/31</td>
<td>4/27</td>
<td>5.5</td>
<td></td>
<td>3.63 [1.01, 13.12]</td>
</tr>
<tr>
<td>DaWla 1992</td>
<td>8/10</td>
<td>11/11</td>
<td>2.4</td>
<td></td>
<td>3.33 [0.47, 23.47]</td>
</tr>
<tr>
<td>Loening-Baucke 1988</td>
<td>5/8</td>
<td>1/4</td>
<td>1.0</td>
<td></td>
<td>5.00 [0.34, 73.77]</td>
</tr>
<tr>
<td>Loening-Baucke 1990</td>
<td>11/22</td>
<td>16/19</td>
<td>1.29</td>
<td></td>
<td>0.19 [0.04, 0.83]</td>
</tr>
<tr>
<td>Nolan 1998</td>
<td>10/14</td>
<td>9/15</td>
<td>5.2</td>
<td></td>
<td>1.67 [0.35, 7.88]</td>
</tr>
<tr>
<td>Wald 1987</td>
<td>13/24</td>
<td>10/26</td>
<td>9.2</td>
<td></td>
<td>1.89 [0.61, 5.93]</td>
</tr>
<tr>
<td>van der Piltz 1996</td>
<td>46/92</td>
<td>38/92</td>
<td>39.6</td>
<td></td>
<td>1.42 [0.79, 2.54]</td>
</tr>
<tr>
<td>van der Piltz 1996a</td>
<td>16/34</td>
<td>17/32</td>
<td>19.3</td>
<td></td>
<td>0.78 [0.30, 2.06]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>235</td>
<td>226</td>
<td>100.0</td>
<td></td>
<td>1.34 [0.92, 1.94]</td>
</tr>
<tr>
<td>Total events 121 (Biofeedback), 101 (Conventional)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for heterogeneity chi-square = 12.43 of 7 p = 0.09 1 = 43.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect z = 1.53 p = 0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

02 18-month follow-up

<table>
<thead>
<tr>
<th>Study</th>
<th>Biofeedback</th>
<th>Conventional</th>
<th>Odds Ratio (Fixed)</th>
<th>Weight (%)</th>
<th>Odds Ratio (Fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>van der Piltz 1996</td>
<td>43/92</td>
<td>40/92</td>
<td>70.2</td>
<td></td>
<td>1.42 [0.79, 2.53]</td>
</tr>
</tbody>
</table>

(Continued...)

Brazzelli M, Griffiths P. Cochrane Review 2001
### Current Surgical Management of Pediatric Idiopathic Constipation

52 reports published during 1966-2014

<table>
<thead>
<tr>
<th>Procedure (no. of study)</th>
<th>Success (%)</th>
<th>Complications (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botox injection (2 non - RCTs)</td>
<td>78-100</td>
<td>N/S</td>
</tr>
<tr>
<td>Myectomy (8 non - RCTs)</td>
<td>75-91</td>
<td>N/S</td>
</tr>
<tr>
<td>Anal dilatation vs. placebo (1)</td>
<td>86 vs. 74(^a)</td>
<td>N/S</td>
</tr>
<tr>
<td>Botox vs. myectomy (1)</td>
<td>85(^a)</td>
<td>N/S</td>
</tr>
<tr>
<td>ACE (25 non - RCTs)</td>
<td>33-100</td>
<td>5-100</td>
</tr>
<tr>
<td>Colectomy (10 non - RCTs)</td>
<td>22-100</td>
<td>6-60</td>
</tr>
<tr>
<td>Ostomy (5 non - RCTs)</td>
<td>83-95</td>
<td>10-25</td>
</tr>
</tbody>
</table>

N/S, not specified; \(^a\) comparable

Case study: progression

Barium enema

Colonic transit study
Case study: progression

Balloon expulsion test:
Failed 50 ml. water-filled balloon expulsion

Anorectal manometry:
Diagnosis: Dyssynergic defecation

How do you treat this patient?

A. Biofeedback
B. Botox injection of IAS
C. Anal dilatation
D. Anal sphincter myectomy
E. Antegrade colonic enema
Treatment

Biofeedback Techniques

Training

Diaphragmatic breathing exercise
Relaxing the anal sphincter through trial and error with the help of therapists and visual feedback

Biofeedback device: anorectal manometry
No. of sessions: usually 4-6 sessions; each session lasts 0.5-1 hr.

Bisacodyl 2 tabs hs., MOM 30 ml hs.
2nd BF - Relaxed the anal sphincter almost all attempts

Clinical – 2-3 bowel movements/wk.

Rx : MOM 30 ml hs., bisacodyl 1 tab hs.
After 2\textsuperscript{nd} BF

2 wk

No abdominal pain
3 bowel movements/wk.
Rx: - Bisacodyl 1 tab in alternate day
   MOM 30 ml hs.
   - No more BF

6 wk

Passing stool within 5 mins everyday
MOM and bisacodyl were discontinued by herself

18 wk

Still improved

1 year (the last FU)

Having daily bowel movement
No abdominal pain
Management of intractable constipation: Summary

Constipation refractory to optimal medical treatment

- R/O spinal cord defect, IAS achalasia
- child/sexual abuse

Barium enema, ARM, colonic transit study

Defecation dyssynergia

- Rx option: Botox injection or biofeedback
  - Success
  - FU
  - Failure

Slow transit constipation

- Rx option: transanal irrigation or ACE
  - Failure
  - Colonic manometry
    - Rx option: temporary ostomy (< 6 y), colonic resection, ostomy
  - Success
  - FU, consider colonic manometry before discontinuation

Adapted from ESPGHAN and NASPGHAN guidelines. JPGN 2014.
Thank You
What happens to children with intractable constipation who receive ACE
ACE may improve colonic motility (CM)

<table>
<thead>
<tr>
<th>Study</th>
<th>Baseline abnormal CM (n)</th>
<th>Normalization of CM after ACE (n; %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirot A, et al. (N=7)</td>
<td>6</td>
<td>5 (83)</td>
</tr>
<tr>
<td><em>J Ped Surg 2009</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rodriguez L, et al. (N=40)</td>
<td>34</td>
<td>13 (38)</td>
</tr>
<tr>
<td><em>Neurogastroenterol Motil 2013</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Is it possible to discontinue ACE?

<table>
<thead>
<tr>
<th>Study</th>
<th>Discontinued Ace (n; %)</th>
<th>Mean FU (yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaffray B (N = 80)</td>
<td>12 (15)</td>
<td>8.8</td>
</tr>
<tr>
<td>King SK, et al. (N = 42)</td>
<td>15 (35)</td>
<td>2.6</td>
</tr>
<tr>
<td>Rodriguez L, et al. (N = 40)</td>
<td>11 (27)</td>
<td>4</td>
</tr>
</tbody>
</table>

*J Ped Surg 2009*  
*Neurogastroenterol Motil 2013*