Treating Functional Gastrointestinal Disorders in Children and Adolescents

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The Argument

GI symptoms are the most common physical complaints for kids and adolescents.

Our increased understanding of ANS physiology makes it clear why this is true in modern western societies.

Pediatric Gastroenterologists

- Are very receptive to mind-gut explanations
- Have little to offer their patients with functional disorders

We have very effective, evidence based, treatments

- HRVB+ACT or CBT
This study provides a comprehensive picture of the prevalence of FGIDs in a representative sample of children in the US. The sample included a significant proportion of minorities, who have been underrepresented in previous FGID prevalence research.

In the population studied, almost one quarter (23.1%) of children and adolescents qualified for at least one FGID according to Rome III diagnoses.


“…FGIDs are highly prevalent in US children and adolescents. Functional constipation and abdominal migraine are the most common of these disorders in children and adolescents. In addition, presence of FGIDs is associated with lower quality of life for children.” (p.4)

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Prevalence of Functional Gastrointestinal Disorders in Children and Adolescents

The majority of prevalence research in children and adolescents is reported in Table V (available at www.jpeds.com). The prevalence of FGID in children and adolescents is shown in Table II.

**Table II. FGID prevalence in children and parents**

<table>
<thead>
<tr>
<th>FGID</th>
<th>Child/adolescent prevalence</th>
<th>Parent prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any FGID</td>
<td>219 (23.1%)</td>
<td>324 (34.1%)</td>
</tr>
<tr>
<td>Functional constipation</td>
<td>122 (12.9%)</td>
<td>67 (7.1%)</td>
</tr>
<tr>
<td>Abdominal migraine</td>
<td>87 (9.2%)</td>
<td>N/A</td>
</tr>
<tr>
<td>Aerophagia</td>
<td>41 (4.3%)</td>
<td>N/A</td>
</tr>
<tr>
<td>IBS</td>
<td>27 (2.8%)</td>
<td>133 (14.0%)</td>
</tr>
<tr>
<td>Nonretentive fecal incontinence</td>
<td>17 (1.8%)</td>
<td>N/A</td>
</tr>
<tr>
<td>Cyclic vomiting syndrome</td>
<td>10 (1.1%)</td>
<td>N/A</td>
</tr>
<tr>
<td>Functional abdominal pain syndrome</td>
<td>8 (0.8%)</td>
<td>N/A</td>
</tr>
<tr>
<td>Functional abdominal pain</td>
<td>3 (0.3%)</td>
<td>N/A</td>
</tr>
<tr>
<td>Functional dyspepsia</td>
<td>2 (0.2%)</td>
<td>165 (17.4%)</td>
</tr>
<tr>
<td>Rumination</td>
<td>0 (0.0%)</td>
<td>N/A</td>
</tr>
<tr>
<td>Functional diarrhea</td>
<td>N/A</td>
<td>45 (4.7%)</td>
</tr>
</tbody>
</table>

N/A, not applicable.

This study found similar prevalence rates of IBS, aerophagia, and abdominal migraine as reported in previous studies. FAP and functional dyspepsia were reported with lower prevalence in this study than in previous studies, and cyclic vomiting syndrome and nonretentive fecal incontinence were more prevalent in this study compared with past research. The reasons for this are...
“Functional gastrointestinal disorders are a complex of clinical entities characterized by disorder in function at the level of the gastrointestinal tract or in the central processing of information originating in the gastrointestinal tract. The etiology is multifactorial. Alterations of gut motility, visceral hypersensitivity, neural function, intestinal inflammation without anatomical lesion, and the gut-brain axis are implicated in the disease”

**Introduction:** Functional GI disorders (FGIDs) are common in adults and children. Psychological factors play an important role in the onset and maintenance of FGIDs and in explaining the associated disability. Psychological treatments such as Cognitive Behavioral Therapy and Hypnotherapy have been found efficacious in FGIDs but Integrating psychological treatments into traditionally medically-oriented care can be challenging.”
In the Clinic

Glucagon-like peptide-1 (GLP-1) is a regulatory peptide released from EC cells in the gut wall in response to the presence of luminal carbohydrates and lipids. GLP-1 is derived from different processing of the proglucagon gene, the same gene that is expressed in the pancreas and that gives rise to glucagon. GLP-1 is involved in regulation of the blood glucose level via stimulation of insulin secretion and also results in a reduced appetite. Agonists of the GLP-1 receptor improve insulin sensitivity in diabetic animal models and human subjects. Administration of GLP-1 analogues also reduces appetite and food intake and delays gastric emptying. Responses that collectively contribute to improving glucose tolerance. Long-acting analogues for the GLP-1 receptor, such as exenatide, have been approved for the treatment of type 2 diabetes.

Neural regulation of the GI tract is surprisingly complex. The gut is innervated by two sets of nerves, the extrinsic and intrinsic nervous systems. The extrinsic nervous system is defined as nerves that innervate the gut, with cell bodies located outside the gut wall. These extrinsic nerves are part of the autonomic nervous system (ANS). The intrinsic nervous system, also referred to as the enteric nervous system, has cell bodies that are contained within the wall of the gut (submucosal and myenteric plexuses). Some GI functions are highly dependent on the extrinsic nervous system, yet others can take place independently of the extrinsic nervous system and are mediated entirely by the ENS. However, extrinsic nerves can often modulate intrinsic nervous system function (Fig. 26.1).

Extrinsic Nervous System

Extrinsic neural innervation to the gut is via the two major subdivisions of the ANS, namely, parasympathetic and sympathetic innervation (Fig. 26.7). Parasympathetic innervation to the gut is via the vagus and pelvic nerves. The vagus nerve, the 10th cranial nerve, innervates the esophagus, stomach, gallbladder, pancreas, 1st part of the small intestine, colon, and the proximal part of the colon. The pelvic nerves innervate the distal part of the colon and the anorectal region, in addition to other pelvic organs that are not part of the GI tract.

Consistent with the typical organization of the parasympathetic nervous system, the preganglionic nerve cell bodies lie in the brainstem (vagus) or the sacral spinal cord (pelvis). Afferent nerve fibers run in the nerves to the gut (vagus and pelvic nerves, respectively), where they synapse with postganglionic neurons in the wall of the organ, which in this case are intrinsic neurons in the gut wall. There is no direct innervation of these afferent nerves to effector cells within the wall of the gut; the neurotransmitter released is always a neuron in the ENS.

Consistent with transmission in the ANS, the synapse between preganglionic and postganglionic neurons is an obligatory reticulo-synaptic locus. That is, the synapse between preganglionic and postganglionic neurons is mediated via acetylcholine released from the nerve terminal and acting on nicotinic receptors present on the postsynaptic ganglionic neuron, which is excited by its own input (sympathetic afferents) (Fig. 26.7).
Layers of the Alimentary Canal. The wall of the alimentary canal has four basic tissue layers: the mucosa, submucosa, muscularis, and serosa.
FGID in Children

H2b. Irritable Bowel Syndrome

Epidemiology: School-based studies in Columbia and Sri Lanka found a prevalence of IBS of 4.9% and 5.4%, respectively.13-15 IBS prevalence in children across the United States based on parental report ranges from 1.2% to 2.9%.16

The committee recommends that patients with constipation and abdominal pain initially be treated for constipation only. If abdominal pain resolves with constipation treatment, the diagnosis can be reconsidered and further diagnostic workup may be indicated.

Sensitizing medical events:
- Distension
- Inflammation (infection, allergies)
- Motility disorder

Sensitizing psychosocial events:
- Depression
- Anxiety
- Family stress
- Coping style
- Secondary gains
- Abuse history
- Stress

Abdominal pain and other gastrointestinal problems

Figure 1. Pathophysiology of functional abdominal pain disorder. Visceral hypersensitivity leading to disability is shown as the final outcome of sensitizing medical factors that are superimposed on a background of genetic predisposition and early life events.
Conclusions: AP-FGID remains a diagnosis of exclusion and is made clinically from a detailed focused history and exclusion of somatic disease. Use of the Rome IV criteria will clarify lot of uncertainties about the symptoms and investigations should be kept to the minimum and aimed at ruling out other serious pathologies. Most cases of APFGID in children can be successfully managed by an appropriate explanation regarding the diagnosis and time initially spent at explaining and reassuring the child and their families is worth investing for long term success. It is important to explain to the family the expected benefits and possible side effects before commencing any therapy. Although pharmacological therapies have traditionally been more commonly used in clinical practice; nonpharmacological therapies are likely to be better accepted and tolerated by children. Multi-disciplinary team approach is likely to be more successful in difficult cases.
HRV Biofeedback – FAP

Strong evidence of efficacy

- Humphreys & Gevirtz (2006)
- Masters (2006)
  - Combination of HRV & Thermal biofeedback
- Sowder (2010)
  - HRVB reducing FAP in 20 children
  - Restoration of vagal tone
- HRVB is showing promising results

Studies showing 6/min breathing affects esophageal pain thresholds
(CA Botha, et al.)

- Clinical replication series (Stern, Guiles, & Gevirtz, 2014)
  - 11 out of 24 patients were diagnosed with FAP
  - HRVB utilized to train their ANS through diaphragmatic breathing
  - Full remission = 63.6%
  - Partial remission = 36.4%
  - Avg. 10 sessions/range = 4-19 HRVB sessions
Mediational Model of IBS

- Early Developmental Factors
- Genetics
- Ruminative Worry
- Autonomic disruption, SNS & PNS
- Abdominal Pain, diarrhea, constipation, bloating, etc.
- Social & Cultural Factors
- Central and Spinal Pain Modulation

"hysteria"
Improvement in Vagal Tone Pre to Post Intervention

Delta Low Frequency to High Frequency Ratio

| .5 | .4 | .3 | .2 | .1 | -.0 | -.1 | -.2 | -.3 |

Delta Pain Intensity

10 | 8 | 6 | 4 | 2 | 0 | -2

$r = .54$

$r^2 = .29$
Intake - Psychoeducation

- Be sensitive and validating
  - Why are they sent to a psych Dr.? Does my dr. think I'm crazy?
  - "If something is happening in the mind, its happening somewhere in the body"

- Buy-In is extremely important.
  - For pediatrics – parental buy-in makes a big difference.
  - Need to explain what is happening
    - Validates that there is something physical
    - And gets them to believe why biofeedback will help
    - Without buy-in there is treatment resistance and non-compliance with homework
    - Explanation should be technical enough to satisfy adults, yet simple and concise enough for kids
Intake Assessment (self-report)

❖ GI Symptoms
❖ History of Illness
❖ Family History
❖ Moderators
❖ Prior treatments
❖ Psycho-Social
   ❖ Social support
   ❖ Family stress
❖ Tendencies toward anxiety – Coping Strategies
   ❖ Avoidance patterns
   ❖ Control
   ❖ Perfectionism
   ❖ Automatic thoughts towards stressful situations
❖ Nijmegen – many symptoms of anxiety overlap with hyperventilation
❖ Symptom monitor checklist
Intake Assessment (Physiology)

- **Capnometry**
- **HRV**
  - Baseline
  - Stressor – Opp for psychoeducation
  - Recovery – additional sign vagal strength
- **Assess Resonant Frequency Breath Rate**
Session 2

❖ Teach diaphragmatic breathing
❖ Connect patient and reassure
❖ Equipment & screen education
❖ Use breathing amplitude to help with diaphragmatic breathing
❖ Slow down to match RFR
❖ Introduce music and homework
THINGS TO DO TODAY
1. inhale
2. exhale
3. inhale
4. exhale
5. inhale
6. exhale
7. inhale
8. exhale
9. inhale
10. exhale
11. inhale
12. exhale
13. inhale
14. exhale
Fig. 1. J&J Screen showing HR, Resp,temp, Skin Cond, and a spectral analysis. Peak valley differences are about 14 B/M (79-65), LF is .1.
Session 3 and on

❖ Homework check-in
❖ Catch and Correct - Be cognizant of whether or not they are matching with their breath
  • Fast exhale (want it to be longer than inhale)
    • Pursed lip exhale
    • Also verbally or gesturally walk them through speed “breath in/breathe out”
  • Broken breathing
  • Breathing backwards
  • Powerful breath

❖ 10 minutes of breathing with Breath-sync©
  ❖ Now available free: https://rgevirtz.wixsite.com/mysite
  ❖ Encouragement, Encouragement, Encouragement!!!!
Magnificent Megan

Hi, my name is Emily. I'm in third grade. When I came in first grade I had a very bad stomach ache, I (calls her) helped me.

She helped her and made an appointment with a girl named Megan. She taught me how to breathe with my stomach. She helped me a lot after a few weeks I felt like a new person. Now I never want to leave school.

I want to tell you thank you so much you helped me very much.

Thank you!

I never would be as happy as I am now.