



Understanding GI Pain in Children

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One of the most frequent, and often hardest to treat symptoms that we see in pediatric gastrointestinal (GI) clinics is pain. Sometimes this pain has a clear origin, while other times, it does not. We call these functional GI disorders (FGIDs).

FGIDs are disorders that occur because of abnormal functioning of the GI tract, which can affect motility, sensation, and brain–gut communication.

GI Pain

To understand how pain works, it helps to know how the brain processes different types of pain. The skin and muscles use the somatic nervous system, which helps the brain pinpoint where pain is coming from. The intestines, however, use the visceral nervous system, so the brain often perceives pain as spread across a larger area. This makes it harder for the brain to identify the exact source of the pain.

Risk Factors

Infection is one common risk factor for GI pain. In some people, symptoms from a virus or infection can continue even after the infection has cleared. Recent studies suggest that some infections and inflammation may affect cells that help regulate movement throughout the digestive system.

Inflammation – redness, swelling, and warmth caused by injury or immune response.
Colon—large intestine.

When these normal functions are disrupted, intestinal movement and barrier function can change. The intestinal barrier helps absorb water and nutrients while protecting the body from harmful pathogens. Changes in this barrier can stretch the intestines and make them more sensitive to pain.

Additional risk factors can include:

- **Stress:** Stress triggers the vagal tone, increasing corticosteroid production and alters the way our intestinal barrier functions.
- **Hypermobility:** Patients who suffer from hypermobility, either from Ehler's Danlos Syndrome or other connective tissue disorders are at high risk of developing FGIDs. 84% of patients with hypermobility have signs of FGID. It is believed that this condition drives pain due to abnormal vagal tone and altered connective tissue (where the nerve fibers live in our intestine).
- **Chronic inflammatory conditions like IBD**
- **Chronic functional disorders like constipation**
- **Changes in the microbiome:** Scientists are still studying whether having an imbalance of bacteria in your colon can cause FGIDs. These changes can worsen intestinal barrier function by increasing production of metabolites or gases which worsen pain, and can stretch the intestine.
- **Gender:** Females are more likely to develop an FGID. Researchers believe this is due to a combination of factors, including hormonal changes and differences in gut-brain signaling. Enterochromaffin cells help regulate movement and the detection of stretch in the intestine and may also play a role. Hyperactivation of these cells may contribute to hypersensitivity.

Enterochromaffin cells- specialized cells in the lining of the digestive tract that release serotonin, a chemical that helps control digestion, nausea, and vomiting.

Reducing pain signals

Different treatments and medications are available that might help with visceral hypersensitivity and regulating bowel function.

Improving vagal tone

Many approaches can help improve the vagal tone, in part by developing tolerance/coping mechanisms, and in part through chemical or electrical signaling. The bulk of therapeutic interventions in FGIDs also fall into this space.

Vagal tone - Vagal tone is a way of “measuring” how well the vagus nerve communicates between the brain and the digestive tract.

Our vagus nerve helps regulate digestion, reduce stress, and influence pain signals. When vagal tone is disrupted, people may experience more digestive symptoms and more sensitivity to pain.

1. **Avoid drawing attention to pain.** One wildly confusing element to pain disorders is the impact of attention. Pain is a subjective experience, meaning two people can experience pain differently, even with the same trigger. Imagine stubbing your toe while playing soccer when you kick the ball and score a goal. Now imagine you stub your toe just as hard, while getting up at night walking to the bathroom. Most people instinctively know the second one hurts more. This is not because the toe injury changed, it's because of the context and attention to it. In the first case, scoring the goal helps redirect the attention away from pain. Positive feelings can help reduce the interpretation or perception of pain. This often confuses parents as they notice their child tolerate pain better when doing fun things like hanging out with friends or playing video games but not school or other less engaging activities. This is a very common way our bodies can regulate pain and other signals. Enjoyable experiences and resulting endorphins have excellent pain regulatory effects. Redirection of attention helps to improve vagal tone and lower how much pain a person experiences.
2. **Therapy:** Typically, it is recommended to use a combination of cognitive behavioral therapy (CBT) and acceptance and commitment therapy (ACT). Interestingly, studies have shown that educating and supporting parents can be just as effective as therapy for kids. This can help improve vagal tone by providing context for pain and improving reactions to pain signaling.
3. **Neuromodulators:** The use of neuromodulators have been shown to improve vagal tone, as they help reduce pain sensitivity.

4. **Vagus nerve stimulation:** Electrical stimulation of the vagus nerve has been shown to be quite effective in improving FGIDs. Electrical stimulation can improve pain sensitivity as well as movement and intestinal function.
5. **Complementary and alternative therapies** such as biofeedback, meditation, yoga, acupuncture/pressure, and many other interventions have been shown to improve vagal tone.
6. **POTS Interventions:** Many patients with functional GI disorders also have postural orthostatic tachycardia syndrome (POTS). For patients with POTS, lifestyle interventions, consuming more salt, and medications that smooth autonomic nervous response like beta blockers can be highly effective.

Any treatments should be discussed thoroughly with the patient and sure it is something they want to participate in. Activities which center attention away from abdominal pain are quite effective at helping to control pain.

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