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Brian A. McFerron and Shamaila Waseem

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Brian A. McFerron, MD,*
Shamaila Waseem, MD*

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Educational Gap

Chronic abdominal pain in childhood accounts for 2% to 4% of office visits to primary care clinicians and 50% to pediatric gastroenterologists. Differentiation among organic gastrointestinal, organic non-gastrointestinal, and functional gastrointestinal disorders can be difficult, but specific criteria are available.

Objectives

After completing this article, readers should be able to:

1. **Develop a differential diagnosis of chronic abdominal pain in children.**
2. **Be aware of alarming signs and symptoms that could indicate organic disease.**
3. **Differentiate the four abdominal pain–associated functional gastrointestinal disorders in children as outlined by the Rome III criteria.**
4. **Discuss the role of acid peptic disorders as it pertains to chronic abdominal pain in children.**
5. **Discuss the role of lactase deficiency as it pertains to chronic abdominal pain in children.**
6. **Determine when referral to a pediatric specialist is warranted.**

Introduction

Chronic abdominal pain in childhood is encountered frequently by primary care physicians, subspecialists, and surgical specialists alike. This symptom accounts for 2% to 4% of office visits to primary care clinicians and 50% of office visits to pediatric gastroenterologists. (1)(2) Chronic abdominal pain is defined by the American Academy of Pediatrics' 2005 clinical report as "long-lasting intermittent or constant abdominal pain that is functional or organic." (3) Chronic abdominal pain in children ignites significant anxiety in both patients and their families. In addition, the economic impact on health care is substantial. Furthermore, the short- and long-term effects on school attendance, academic performance, and peer interaction cannot be understated. The exact prevalence of chronic abdominal pain is not known. However, it has been suggested that 13% to 17% of the pediatric population experience chronic abdominal pain. (1) Of note, there are many organic gastrointestinal (GI) conditions that can lead to chronic abdominal pain (ie, inflammatory bowel disease, esophagitis, chronic pancreatitis, gallbladder disease). These conditions are listed in Table 1 and will not be discussed in detail in this article.

Functional abdominal pain is not a specific diagnosis but rather a description for a variety of symptoms. By definition, children who have abdominal pain lack serologic, mucosal, radiographic, and structural evidence of disease. The Rome Foundation is an independent organization that provides support for activities designed to create scientific data and educational information to assist in the diagnosis and treatment of functional gastrointestinal disorders (FGIDs) (http://www.romecriteria.org). Based on the Rome III criteria, there are currently four categories of abdominal pain–associated FGIDs in children: functional dyspepsia, irritable bowel syndrome (IBS), abdominal migraine, and childhood functional abdominal pain (Table 2). This article will focus on the diagnostic evaluation, pathogenesis, and treatment of

Abbreviations

CBT: cognitive behavioral therapy
FGID: functional gastrointestinal disorder
GI: gastrointestinal
IBS: irritable bowel syndrome

*Division of Pediatric Gastroenterology/Hepatology and Nutrition, Riley Hospital for Children at Indiana University Health, Indianapolis, IN.

Table 1. Differential Diagnosis of Chronic Abdominal Pain in Children

Organic gastrointestinal (GI) disorders
- Acid peptic disease (ie, esophagitis, gastritis, peptic ulcer disease)
- Infectious causes (ie, parasitic)
- Eosinophilic disease (eg, esophagitis, gastritis, enteropathy)
- Gallbladder disease (eg, cholelithiasis, cholecystitis, choledochal cyst)
- Pancreatic disorders (acute/chronic pancreatitis, pseudocyst)
- Chronic hepatitis
- Inflammatory bowel disease
- Polyps
- Foreign body
- Surgical disorders (eg, hernia, intussusception, appendicitis)
- Carbohydrate malabsorption
- Constipation
- Tumor

Organic non-GI disorders
- Respiratory inflammation/infection
- Recurrent urinary tract infection (pyelonephritis, cystitis)
- Ureteropelvic junction obstruction
- Nephrolithiasis
- Gynecologic disorders
- Porphyria
- Diabetes mellitus
- Lead poisoning
- Collagen vascular disease
- Sickle cell disease
- Trauma

Functional GI disorders
- Irritable bowel syndrome
- Abdominal migraine
- Functional dyspepsia
- Childhood functional abdominal pain

GI=gastrointestinal.

the abdominal pain–associated FGIDs. In addition, the role of acid peptic disorders and lactase deficiency in chronic abdominal pain will be discussed.

Causes of Chronic Abdominal Pain

The differential diagnosis of chronic abdominal pain is broad and includes both organic GI, organic non-GI, and FGIDs (Table 1). Perhaps most vital when evaluating a child afflicted with chronic abdominal pain is recognition of warning signs and symptoms elicited from a comprehensive history and physical examination (Table 3). Children who present with these symptoms and physical findings require prompt evaluation and possible referral. FGIDs are not uncommon; however, a diligent evaluation is paramount, even if suspicion is high, to exclude organic conditions.

Functional Gastrointestinal Disorders

Pathogenesis

The cause of abdominal pain–associated FGIDs in children is not completely understood. It is thought, however, that the origin is multifactorial and involves the enteric nervous system, central nervous system, visceral hypersensitivity to pain, psychological factors, and abnormal responses to both normal and abnormal physiologic stimuli. (2) A genetic origin for these conditions has been proposed; however, research in this area has just begun.

Visceral Hyperalgesia

Hypersensitivity to pain is believed to be an underlying feature of this category of FGIDs. It seems that there is a heightened nociceptive response to both physiologic and noxious stimuli in these patients. The origin of visceral hyperalgesia has been postulated by Miranda et al (2), who reported that "animal and human data suggest that there are at least 4 putative mechanisms that may help explain the development of visceral hypersensitivity following early life pain or stress: sensitization of central (spinal) neurons, sensitization of primary sensory neurons, impaired stress response (hypothalamic-pituitary-adrenal axis), and/or altered descending inhibitory control." Mechanisms proposed include increased nerve signaling, increased expression of receptors and related molecules, decreased nerve-firing threshold, and altered central nervous system modulation. Moreover, 5-hydroxytryptophan plays a critical role in the regulation of GI motility, secretion, and sensation. These changes are hypothesized to modify the relation between the enteric and central nervous systems or the "brain–gut" axis. In addition, FGIDs are associated with patients who experience early life events, such as infants operated on for pyloric stenosis, children with Henoch-Schönlein purpura, and children with cow milk protein allergy. (4)

Although these mechanisms and early life events can predispose patients to the development of visceral hyperalgesia, not all individuals will develop symptoms.

The Role of Motility

The role of GI motility in this subset of disorders cannot be understated. In the context of functional disorders,

Table 2. Rome III Criteria for Abdominal Pain–Related Functional GI Disorders in Children

Functional dyspepsia
- Diagnostic criteria[a] must include all of the following.
  - Persistent or recurrent pain or discomfort centered in the upper abdomen (above the umbilicus)
  - Not relieved by defecation or associated with the onset of a change in stool frequency or stool form (ie, not irritable bowel syndrome)
  - No evidence of an inflammatory, anatomic, metabolic, or neoplastic process that explains the patient's symptoms

Irritable bowel syndrome
- Diagnostic criteria[a] must include both of the following:
  - Abdominal discomfort[b] or pain associated with two or more of the following at least 25% of the time:
    - Improvement with defecation
    - Onset associated with a change in frequency of stool
    - Onset associated with a change in form (appearance) of stool
  - No evidence of an inflammatory, anatomic, metabolic, or neoplastic process that explains the patient's symptoms

Abdominal migraine
- Diagnostic criteria[c] must include all of the following:
  - Paroxysmal episodes of intense, acute periumbilical pain that lasts for ≥1 hour
  - Intervening periods of usual health lasting weeks to months
  - The pain interferes with normal activities
  - The pain is associated with two of the following:
    - Anorexia
    - Nausea
    - Vomiting
    - Headache
    - Photophobia
    - Pallor
  - No evidence of an inflammatory, anatomic, metabolic, or neoplastic process that explains the patient's symptoms

Childhood functional abdominal pain
- Diagnostic criteria[a] must include all of the following:
  - Episodic or continuous abdominal pain
  - Insufficient criteria for other functional GI disorders
  - No evidence of an inflammatory, anatomic, metabolic, or neoplastic process that explains the patient's symptoms

Childhood functional abdominal pain syndrome
- Diagnostic criteria[a] must satisfy criteria for childhood functional abdominal pain and have, at least 25% of the time, one or more of the following:
  - Some loss of daily functioning
  - Additional somatic symptoms such as headache, limb pain, or difficulty sleeping

Reprinted with the permission of the Rome Foundation (http://www.romecriteria.org). GI=gastrointestinal.
[a] Criteria fulfilled at least once per week for at least 2 months before diagnosis.
[b] "Discomfort" means an uncomfortable sensation not described as pain.
[c] Criteria fulfilled two or more times in the preceding 12 months.

the cause of abdominal pain is postulated to be due to strong contractions and/or the resultant sensation of pain from distension of the GI tract. Visceral hyperalgesia in the setting of distension has been well documented in patients who have IBS as well as in patients who have functional dyspepsia. In two studies, inflation of a balloon in the stomach of those who had functional dyspepsia and the rectosigmoid region in patients who had IBS caused greater discomfort at lower balloon volumes than in healthy controls. (5)(6) Furthermore, mild dysmotility (ie, mild delayed gastric emptying) may be seen in patients with FGIDs (ie, functional dyspepsia).

Psychological/Sociologic Factors

Underlying psychological factors as well as heightened psychological responses to stimuli seem to play a role in the pathogenesis of the abdominal pain–associated FGIDs. The stress response as a result of underlying anxiety, depression, and other positive and negative stimuli is thought to modify GI motility. Caregiver anxiety is also

Table 3. **Alarming Signs and Symptoms**

• Weight loss	• Family history of GI disease
• Recurrent oral ulcers	• Dysphagia
• Bilious emesis/hematemesis	• Anemia
• Unexplained fevers	• Leukocytosis
• Nocturnal symptoms	• Hypoalbuminemia
• Melena	• Unexplained rashes
• Hematochezia	• Chronic unexplained diarrhea
• Occult GI blood loss	• Acute abdomen (rebound, guarding)
• Joint symptoms	• Elevated inflammatory markers (ESR,CRP, platelets)
• Dysuria/hematuria/flank pain	• Jaundice/scleral icterus
• Delayed puberty	• Anal skin tags, fissures
• Linear growth failure	• Referred pain to back, shoulders

CRP=C-reactive protein; ESR= erythrocyte sedimentation rate; GI=gastrointestinal.
Adapted from Collins BS, Thomas DW. Chronic abdominal pain. *Pediatr Rev.* 2007;28(9):325.

a contributing factor. Children who have recurrent abdominal pain and have parents with IBS report more GI symptoms, more physician visits for GI symptoms, and have more school absences compared with children who have recurrent abdominal pain but whose parents do not have IBS. It is a common misconception that further testing aids in alleviating anxiety. Negative test results do not reassure the child's parents; rather, tests reinforce the parents' fear of an unknown organic disease, which makes it harder to introduce the concept of a functional disorder afterward. (7) The judicious ordering of laboratory studies, radiographic evaluations, and procedures should be limited to those children who have alarming symptoms (Table 3). Moreover, as with many disorders both organic and nonorganic, a biopsychosocial approach to diagnosis and treatment is most beneficial for the patient.

Other Proposed Mechanisms

Research of FGIDs in both adults and children is expanding rapidly. Adult IBS in particular has received a great deal of attention. Recent studies have examined small bowel bacterial overgrowth, acute infectious disorders that result in chronic changes, and enteric serotonin pathways as potential causes.

Diagnosis

Recognition of abdominal pain–associated FGIDs is difficult. A unique diagnostic tool to aid in confirmation does not exist. Comprehensive history and physical examination are of the utmost importance. Again, specific laboratory, radiographic, endoscopic, and surgical procedures should be reserved for those children who require further evaluation as deemed necessary by either the primary care physician or the specialist. Education of the patient and family about FGIDs cannot be overemphasized and should begin as the evaluation is initiated, especially if suspicion is high. In most cases, explanation of the pathophysiology of FGIDs helps alleviate the concerns related to symptoms and also lays the groundwork for reasonable expectations of the patient and family.

Treatment

In children who meet the criteria for diagnosis of FGIDs, treatment is multifactorial, with the aim of diminishing abdominal pain and associated symptoms. Treatment should begin with education, as mentioned earlier. Identifying potential triggers and eliminating them is crucial. The approach to the patient should be multidisciplinary, including medical treatment for pain, psychological treatment with cognitive behavioral therapy (CBT), and dietary modifications. Treatment of pain associated with FGIDs can include antispasmodic agents such as dicyclomine, tricyclic antidepressants, and selective serotonin reuptake inhibitors. Tricyclic antidepressants and selective serotonin reuptake inhibitors can be particularly beneficial for those patients who have comorbid anxiety or depression.

A time-limited trial of acid suppression (ie, proton pump inhibitor therapy) can be considered; however, the medication should be discontinued if there is no improvement in symptoms. Peppermint oil has been reported to be beneficial in children who have IBS. In one study, GI symptoms, including abdominal pain, improved after a 2-week course of peppermint oil capsules dosed on the basis of weight. Although data are conflicting, a time-limited empiric trial of peppermint oil may be beneficial. (8)

CBT includes relaxation training, cognitive restructuring, guided imagery, self-monitoring, educational support, and modifying family response to illness. CBT has been shown to be very effective in the treatment of the abdominal pain–associated FGIDs. Although anecdotal, dietary modifications can include avoidance of irritating foods such as tomato-based foods, citrus-containing foods, caffeinated and carbonated drinks, and greasy and spicy foods. Probiotics also have been shown to be helpful in the treatment of FGIDs, but their mechanism of action is not clear. Based on a single randomized controlled trial of IBS in children, the 2010 American Academy of Pediatrics Clinical Report concluded that probiotics, specifically *Lactobacillus GG*, may be of benefit in children. However, a firm recommendation could not be made without further confirmatory studies. (9)

Functional Dyspepsia

Functional dyspepsia is defined according to the Rome III criteria as persistent or recurrent pain or discomfort (>2 months) centered in the upper abdomen (above the umbilicus). This pain is not relieved by defecation or associated with the onset of a change in stool frequency or stool form, as seen in IBS (Table 2). Children report a variety of symptoms, including epigastric pain relieved by meals, bloating, postprandial fullness, early satiety, and nausea. A recent history of a preceding viral illness with symptoms as described here could be consistent with postviral gastroparesis. Small, frequent meals, as well as time-limited empiric trials of acid-suppressing or prokinetic medication, may be helpful in these patients. Persistence of symptoms beyond 2 months would necessitate referral to a pediatric gastroenterologist for further evaluation.

Irritable Bowel Syndrome

IBS is defined according to the Rome III criteria as abdominal discomfort or pain associated with two or more of the following at least 25% of the time: improvement with defecation, alteration in stool frequency, and variation in form of stool (Table 2). This disorder is categorized further as constipation-predominant IBS, diarrhea-predominant IBS, and combined IBS (alternating constipation- and diarrhea-related IBS). A biopsychosocial approach should be followed and must include an assessment of potential contributing psychological or sociologic stressors. Most clinicians agree that there is a large population of children who do not fulfill the criteria for IBS despite reporting similar symptoms. Some of these children most likely suffer from stool withholding because they report intermittent abdominal pain and constipation. Standard therapy for this subset of patients includes increasing dietary fiber and water intake, which improves transit through the gut. In addition, osmotic laxatives can be considered if dietary modification fails to provide adequate relief of symptoms in those patients who have constipation-predominant IBS. In most cases, treatment of constipation will relieve symptoms.

For the subset of children with diarrhea-predominant IBS, limiting carbohydrates (ie, fructose) as well as nonabsorbed carbohydrates (ie, sorbitol) will be beneficial. Recently, a diet low in fermentable oligo-, di-, and mono-saccharides and polyols has been shown to reduce symptoms of IBS. (10)(11) This diet includes restriction of fructo-oligosaccharides (eg, wheat, onion, garlic), galacto-oligosaccharides (eg, legumes), and polyols (eg, sugar-free gums, some fruits and vegetables).

In cases refractory to dietary therapy, slowing down motility with drugs such as diphenoxylate/atropine may be needed to improve quality of life. Again, identification and avoidance of food irritants and other triggers (ie, stressful situations, anxiety) will help provide relief to the majority of patients who have IBS. Even simple modifications, such as a school note from the physician for bathroom breaks whenever needed, help alleviate symptoms in some cases.

Abdominal Migraine

Abdominal migraine is defined according to the Rome III criteria as paroxysmal episodes of intense, acute periumbilical abdominal pain lasting 1 hour or more (Table 2). Distinguishing abdominal migraine from other disorders is the period of usual health between episodes. To meet criteria for diagnosis, two or more of the following must accompany the abdominal pain: anorexia, nausea, vomiting, headache, photophobia, and pallor. Commonly, a history of classic migraine will be derived from the patient's family history. The diagnosis of abdominal migraine should be reserved for those patients in whom other potential serious causes of paroxysmal abdominal pain have been ruled out.

Treatment is both supportive and preventative. Again, avoiding food and beverages (ie, caffeinated drinks) that are known triggers is helpful in many patients. Other stimuli include change in sleep patterns, stress, bright or flickering lights, and prolonged fasting. For those patients in whom episodes remain frequent, prophylactic medication can be used, such as propranolol and cyproheptadine. Sumatriptan can be used as abortive therapy for pain and nausea symptoms.

Functional Abdominal Pain

A subset of children exists that does not meet criteria for the other abdominal pain–associated FGIDs (Table 2). These children experience episodic or continuous abdominal pain for 2 months or longer. Children who have functional abdominal pain and 25% of the time have some loss of functioning or further somatic complaints are classified as having childhood functional abdominal pain *syndrome*. Treatment involves reducing or eliminating symptoms as well as restoring the normal routine, including a return to the usual activities and school. In these patients, identifying risk factors and starting CBT early on have proven to be effective in pain relief for the majority of patients. (12) An empiric trial of a tricyclic antidepressant or selective serotonin reuptake inhibitor may aid in alleviation of symptoms.

Role of Acid Peptic Disorders in Chronic Abdominal Pain

The cause of acid peptic disorders is due to the loss of the normal balance between protective (bicarbonate secretion, mucus layer) and aggressive factors (acid, bile acids, caustic substances) within the upper GI tract. This imbalance can lead to esophagitis, gastritis, gastric ulcer, duodenitis, and duodenal ulcer formation. Removal of the offending substance (if present) and a time-limited empiric trial of acid suppression are useful in these patients. After discontinuation of acid suppression, if symptoms return, referral to a pediatric gastroenterologist is indicated.

The incidence of these disorders in children afflicted with chronic abdominal pain is not known. Many children will still meet criteria for one of the abdominal pain–associated FGIDs. Dyspepsia can be perceived by the patient as symptoms resulting from disordered digestion of food. Bloating, early satiety, nausea, and vomiting are other symptoms that may be reported. Sixty percent of patients with dyspeptic symptoms have functional or nonulcer dyspepsia, but the other 40% have structural or biochemical disease. Differentiation of acid peptic disorders from functional dyspepsia may be difficult. For this reason, other alarming symptoms (Table 3) should be reviewed carefully.

Certain clinical patterns can be helpful in determining the diagnosis of dyspepsia. Peptic ulcer disease–related symptoms usually occur 2 to 5 hours after meals or on an empty stomach. Symptoms also may occur at night (11 PM to 2 AM) when the circadian stimulation of acid secretion is maximal. The ability of alkali, food, and antisecretory agents to produce relief suggests the role of acid in this process. Gastroesophageal reflux disease can be suspected when symptoms of dyspepsia are accompanied by predominant complaints of heartburn and regurgitation. Functional biliary pain, characterized by a low gallbladder ejection fraction, also can present with dyspeptic symptoms, predominantly epigastric abdominal pain. Carney et al (13) reported that children who have abdominal pain, nausea, and a gallbladder ejection fraction of less than 15% are more likely to report resolution of symptoms after a cholecystectomy.

Another pain pattern is chronic pain emanating from the abdominal wall. This disorder frequently goes unrecognized or is confused with visceral pain, often leading to extensive diagnostic testing before an accurate diagnosis is achieved. The diagnosis usually can be established on the basis of the history and physical examination. A response to treatment with a topical or local anesthetic agent can provide confirmation. Nonsteroidal anti-inflammatory drug–induced dyspepsia is not uncommon. Careful history can reveal the cause, and use of the drug should be discontinued whenever possible. If needed, concomitant use of a proton pump inhibitor with nonsteroidal anti-inflammatory drugs has been proven beneficial in reducing symptoms.

Helicobacter pylori infection can lead to significant damage to the upper GI tract, specifically the stomach and duodenum. However, discovery of *H pylori* in the setting of abdominal pain does not indicate a causal relationship between the two factors. (14) Routine screening for *H pylori* in children who have functional abdominal pain is not recommended.

Role of Lactose Intolerance in Chronic Abdominal Pain

Lactose intolerance is defined in the American Academy of Pediatrics' clinical report as "a clinical syndrome of 1 or more of the following: abdominal pain, diarrhea, nausea, flatulence, and/or bloating following ingestion of lactose containing food substances" (15). Intolerance to lactose-containing foods (primarily dairy products) is common. In Europe and the United States, the prevalence is 7% to 20% in white adults and is as high as 80% to 95% among Native Americans, 65% to 75% among Africans and African Americans, and 50% in Hispanic individuals.

Congenital lactase deficiency is rare. Primary lactase deficiency, which is due to reduced genetic expression, can develop in children. The age of onset and prevalence varies among ethnic groups. Secondary lactase deficiency can occur after an insult (ie, gastroenteritis, celiac disease,

inflammatory bowel disease) that causes mucosal injury. Symptoms in all cases are due to low intestinal lactase levels and the resulting malabsorption.

Patients who have FGIDs such as IBS have been found to have increased symptoms with lactose ingestion. A 5-year prospective study evaluated a lactose-restricted diet in patients who had lactose malabsorption and IBS. (16) The study demonstrated improvement in both short- and long-term symptoms as well as a reduction in outpatient visits by 75%. Due to the similarities in symptoms of both IBS and lactose intolerance, an empiric trial of a lactose-free diet can be tried as part of the evaluation. The diagnosis can be confirmed with a lactose breath hydrogen test or disaccharidase analysis from small intestine biopsy samples taken during an upper endoscopy.

Treatment with dietary changes include reduced dietary lactose intake, substitution of alternative nutrient sources to maintain energy and protein intake, administration of a commercially available enzyme substitute, and maintenance of calcium and vitamin D intake. Although lactose intolerance can cause abdominal pain, the exact prevalence of lactase deficiency in children who have chronic abdominal pain is not known. In a single-center, retrospective study, Croffie et al (17) reported that less than 1% of children who had recurrent abdominal pain were found to have lactase deficiency. The discovery of lactase deficiency during evaluation for chronic abdominal pain should be presented to the patient and family as a potential cause for the symptoms. However, it should also be conveyed that despite treatment for lactose intolerance, the symptoms could remain, and a direct causal relationship between the two cannot always be made.

Conclusions

Chronic recurrent abdominal pain in children is a common presenting complaint to primary care physicians and subspecialists alike. Initial evaluation should begin with a comprehensive history and physical examination. Providers should be aware of the common causes of chronic abdominal pain in children. Furthermore, knowledge of concerning signs and symptoms will help guide potential evaluation, management, and referral. A large percentage of children who have chronic abdominal pain will meet criteria for one of the abdominal pain–associated FGIDs. The Rome III criteria can serve as a diagnostic tool with this subset of children. Treatment of this class of FGIDs is multifactorial. The biopsychosocial model is helpful for the provider, patient, and family alike.

Summary

- Research suggests that 13% to 17% of the pediatric population report chronic abdominal pain. Careful attention to potential warning signs is paramount. Prompt referral is indicated if warning signs are present.
- For those patients with suspected functional gastrointestinal disorders, research and clinical consensus emphasize that education of the patient and family is important. Discussion of the etiology of functional gastrointestinal disorders should start at the beginning of the evaluation if suspicion is high.
- Limiting radiographic and serologic evaluation to those patients with concerning signs and symptoms has been shown to decrease caregiver anxiety. Moreover, ordering further evaluation can perpetuate the belief that an organic cause is present.
- Based on strong research evidence, cognitive behavioral therapy has been shown to be beneficial in the treatment of functional gastrointestinal disorders.
- Based on research evidence, although *Helicobacter pylori* infection and lactase deficiency can lead to abdominal pain, the frequency of these findings in children who have chronic abdominal pain is low. Routine screening for both entities is not recommended in children who have chronic abdominal pain.

References

1. Di Lorenzo C, Colletti RB, Lehmann HP, et al; AAP Subcommittee; NASPGHAN Committee on Chronic Abdominal Pain. Chronic abdominal pain in children: a technical report of the American Academy of Pediatrics and the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. *J Pediatr Gastroenterol Nutr*. 2005;40(3):249–261

2. Nurko S, Di Lorenzo C. Functional abdominal pain: time to get together and move forward. *J Pediatr Gastroenterol Nutr*. 2008;47(5):679–680

3. Di Lorenzo C, Colletti RB, Lehmann HP, et al; American Academy of Pediatrics Subcommittee on Chronic Abdominal Pain; NASPGHAN Committee on Abdominal Pain. Chronic abdominal pain in children: a clinical report of the American Academy of Pediatrics and the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. *J Pediatr Gastroenterol Nutr*. 2005;40(3):245–248

4. Saps M, Bonilla S. Early life events: infants with pyloric stenosis have a higher risk of developing chronic abdominal pain in childhood. *J Pediatr*. 2011;159(4):551–554.e1

5. Chang L, Munakata J, Mayer EA, et al. Perceptual responses in patients with inflammatory and functional bowel disease. *Gut*. 2000;47(4):497–505

6. Bouin M, Lupien F, Riberdy-Poitras M, Poitras P. Tolerance to gastric distension in patients with functional dyspepsia: modulation by a cholinergic and nitrergic method. *Eur J Gastroenterol Hepatol*. 2006;18(1):63–68

7. Gieteling MJ, Bierma-Zeinstra SM, Passchier J, Berger MY. Prognosis of chronic or recurrent abdominal pain in children. *J Pediatr Gastroenterol Nutr*. 2008;47(3):316–326
8. Charrois TL, Hrudey J, Gardiner P, Vohra S; American Academy of Pediatrics Provisional Section on Complementary, Holistic, and Integrative Medicine. Peppermint oil. *Pediatr Rev*. 2006;27(7):e49–e51
9. Thomas DW, Greer FR; American Academy of Pediatrics Committee on Nutrition; American Academy of Pediatrics Section on Gastroenterology, Hepatology, and Nutrition. Probiotics and prebiotics in pediatrics. *Pediatrics*. 2010;126(6):1217–1231
10. Gibson PR, Shepherd SJ. Evidence-based dietary management of functional gastrointestinal symptoms: The FODMAP approach. *J Gastroenterol Hepatol*. 2010;25(2):252–258
11. Staudacher HM, Whelan K, Irving PM, Lomer MC. Comparison of symptom response following advice for a diet low in fermentable carbohydrates (FODMAPs) versus standard dietary advice in patients with irritable bowel syndrome. *J Hum Nutr Diet*. 2011;24(5):487–495
12. Levy RL, Langer SL, Walker LS, et al. Cognitive-behavioral therapy for children with functional abdominal pain and their parents decreases pain and other symptoms. *Am J Gastroenterol*. 2010;105(4):946–956
13. Carney DE, Kokoska ER, Grosfeld JL, et al. Predictors of successful outcome after cholecystectomy for biliary dyskinesia. *J Pediatr Surg*. 2004;39(6):813–816, discussion 813–816
14. Kalach N, Mention K, Guimber D, Michaud L, Spyckerelle C, Gottrand F. Helicobacter pylori infection is not associated with specific symptoms in nonulcer-dyspeptic children. *Pediatrics*. 2005;115(1):17–21
15. Heyman MB; Committee on Nutrition. Lactose intolerance in infants, children, and adolescents. *Pediatrics*. 2006;118(3):1279–1286
16. Vesa TH, Seppo LM, Marteau PR, Sahi T, Korpela R. Role of irritable bowel syndrome in subjective lactose intolerance. *Am J Clin Nutr*. 1998;67(4):710–715
17. Croffie JM, Fitzgerald JF, Chong SK. Recurrent abdominal pain in children—a retrospective study of outcome in a group referred to a pediatric gastroenterology practice. *Clin Pediatr (Phila)*. 2000;39(5):267–274

PIR Quiz

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1. A 7-year-old boy has had upper abdominal pain 2 to 3 times per week for the past 2 months, causing him to miss 8 days of school during the fall. His pain is not relieved after having a bowel movement. His stools are well formed and have not changed in character since the onset of the pain. Upper endoscopy reveals normal findings. Which of the following diagnoses matches this clinical presentation?

   A. Abdominal migraine
   B. Acid peptic disease
   C. Functional dyspepsia
   D. Inflammatory bowel disease
   E. Irritable bowel syndrome

2. A 11-year-old girl has a history of periods of intense periumbilical pain with nausea and vomiting that last 4 to 6 hours and occur daily for almost a week. These episodes have occurred each fall since she was in the first grade. Typically, she tries to sleep between bouts because the pain is so exhausting. During the remainder of the year, she is well. Her mother reports that she has had nausea and vomiting only once outside of these bouts and that was when everyone in the family had gastroenteritis. Which of the following diagnoses matches this clinical presentation?

A. Abdominal migraine
B. Acid peptic disease
C. Functional dyspepsia
D. Inflammatory bowel disease
E. Irritable bowel syndrome

3. A 13-year-old-girl has had daily abdominal pain that is at least 3/10 in intensity for the past 4 months. Sometimes, the pain is located in either the right or left lower quadrant, but primarily the pain is periumbilical or diffuse. The pain is not associated with her menses, which started when she was 11 years old. Since the onset of her pain, she has developed diarrhea, which she describes as a loose stool after every meal, after which the pain usually lessens. She has had a normal urinalysis and negative pelvic ultrasonography. Which of the following diagnoses matches this clinical presentation?

A. Abdominal migraine
B. Acid peptic disease
C. Functional dyspepsia
D. Inflammatory bowel disease
E. Irritable bowel syndrome

4. A 14-year-old boy had a 3-day bout of gastroenteritis approximately 6 weeks ago. Ever since, he has complained of almost daily epigastric pain that is relieved by eating; however, he feels bloated and even nauseated if he has more than a snack or small meal. He denies constipation or diarrhea. Which of the following diagnoses matches this clinical presentation?

A. Abdominal migraine
B. Acid peptic disease
C. Functional dyspepsia
D. Inflammatory bowel disease
E. Irritable bowel syndrome

5. A 14-year-old mildly overweight girl had recurrent abdominal pain for more than 1 year during toddlerhood. A motility study revealed mildly delayed gastric emptying. For the past 6 months, she has been trying to lose weight by restricting her diet. She has noted that her stools have become harder and less frequent, and she often has diffuse abdominal pain and cramping that is relieved by having a bowel movement. Which of the following diagnoses matches this clinical presentation?

A. Abdominal migraine
B. Acid peptic disease
C. Functional dyspepsia
D. Inflammatory bowel disease
E. Irritable bowel syndrome

Chronic Recurrent Abdominal Pain

Brian A. McFerron and Shamaila Waseem

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