

# Recurrent Abdominal Pain in Children: A Review

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## Abstract:

*Recurrent abdominal pain (RAP) in children is a common pediatric problem encountered by primary care physicians, medical subspecialists and surgical specialists. It is usually functional that affects 10-20% of school age children. The term recurrent abdominal pain represents a description and not a diagnosis. Many diseases can cause recurrent abdominal pain, but, in clinical practice, most children presenting with this symptoms have no evidence of disease. They are said to have functional abdominal pain; however, they often require evaluation and treatment to allay fears and improve their quality of life. This review addresses some of the issues related to epidemiology, etiology, management and prognosis of recurrent abdominal pain.*

## Introduction:

Recurrent abdominal pain (RAP) is defined as at least 3 separate episodes of abdominal pain that occur in a 3-months period. These episodes are often severe, and the child is not able to do his or her normal activities<sup>1</sup>. It is perhaps the most common painful health problem in school-aged children. J Apley, a British pediatrician, studied abdominal pain among children extensively and observed that approximately 10% of school aged children get recurrent episodes of abdominal pain. Affected children and their families experience distress and anxiety that can interfere with their ability to perform regular activities.

## Epidemiology:

In general, population-based studies suggest that RAP is experienced by 10-15% of school-age children<sup>2</sup>. Epidemiological studies in Asia have reported similar prevalence. Boey and his colleagues studied RAP among school children in Malaysia and found a prevalence of 10.2% (urban 8.2-9.6%, rural 12.4%)<sup>3,4</sup>. Similarly, Rasul and Khan reported RAP in 11.5% of Bangladesh school children<sup>5</sup>. Cohort studies from India and Pakistan suggest that RAP is most likely to have an organic cause (up to 82% of cases), with giardiasis being the most common underlying condition<sup>14,15</sup>, while in Sri Lanka, commonest organic etiology is constipation<sup>16</sup>. However, another Indian cohort and a Sri Lankan cohort showed that non-organic RAP is more prevalent (74% and 76%, respectively)<sup>16</sup>. In Malaysia, both urban and rural population-based cohorts had a similar prevalence of RAP at 9.6% and 11%, respectively<sup>3</sup>.

## Etiology:

The origin of abdominal pain is complex and does not lend itself to a single model of causation. In the four decades since Apley's seminal research, conceptual models of RAP have evolved and become more complex<sup>1</sup>. Walker (1999) identified three distinct periods in this evolution. Studies conducted before the 1980s were characterized by a dualistic view of abdominal pain. When no organic etiology was identified, abdominal pain was assumed to be psychogenic. In the 1980s, the focus of research shifted to non-organic causes of RAP, including a host of psychosocial factors. Conceptual models emerging in this decade were increasingly multivariate in nature. They recognized that the cause of RAP may not be either organic or psychogenic, but possibly a function of normal (i.e., non-pathological) biological mechanisms. In the 1990s, the research focus shifted to the identification of individual differences among children with RAP and the interact mode RAP are multivariate and acknowledge the contributions of a variety of biological, psychological, and social factors<sup>16</sup>.

## Organic Cause:

Numerous organic disorders lead to abdominal pain; Possible causes that should be considered based on the history, physical examination and testing, are acid reflux, constipation, lactose intolerance, parasitic infections of the small and large intestines, Helicobacter pylori infection, inflammatory bowel diseases (IBD) such as Crohn's disease and ulcerative colitis, celiac disease inflammation of the liver (hepatitis), gall bladder problems, an inflamed pancreas, an intestinal obstruction, appendicitis, and many more rare disorders.

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Table I: Abdominal Pain-Related Functional Gastrointestinal Disorders.

<b>Functional dyspepsia</b>	Functional abdominal pain or discomfort in the upper abdomen
<b>Irritable bowel syndrome</b>	Functional abdominal pain associated with alteration in bowel movements
<b>Abdominal migraine</b>	Functional abdominal pain with features of migraine (paroxysmal abdominal pain associated with anorexia, nausea, vomiting, or pallor as well as a maternal history of migraine headache)
<b>Functional abdominal pain</b>	Abdominal pain without demonstrable evidence of a pathologic condition, such as an metabolic, infectious, inflammatory, or neoplastic disorder; functional abdominal pain may present with symptoms typical of functional dyspepsia, irritable bowel syndrome, abdominal migraine, or functional abdominal pain syndrome
<b>Functional abdominal pain syndrome</b>	Functional abdominal pain without the characteristics of dyspepsia, irritable bowel syndrome, or abdominal migraine

**Functional Gastrointestinal Disorders:**

Until a decade ago ‘functional gastrointestinal disorder’ was a label used for the conditions with uncertain etiology, and was a diagnosis of exclusion. In 1999 the pediatric Rome II criteria (Table I) introduced the term abdominal pain related-functional gastrointestinal disorders (AP-FGIDs); which include functional dyspepsia (FD), irritable bowel syndrome (IBS), abdominal migraine (AM), functional abdominal pain (FAP) and functional abdominal pain syndrome (FAPS). According to Caplan, et al. validation of pediatric Rome II criteria was done<sup>6</sup>. They found that more than half the patients classified as having functional problems met at least one pediatric Rome II criteria for FGID. Children with AP-FGIDs report significantly lower quality of life scores compared to healthy peers and AP-FGIDs are ranked as second in causing school absence. In 29.1% of patients with recurrent abdominal pain, pain persists even for more than 5 years, despite frequent medical attention.

The pathogenesis underlying AP-FGIDs remains unclear. It is thought to involve abnormalities in the enteric nervous system (ENS), a rich and complex nervous system that envelops the entire gastrointestinal tract. A dysregulation of this brain-gut communication plays an important role in the pathogenesis of functional abdominal pain. It is now believed that adults and children with functional bowel disorders, rather than having a baseline motility disturbance, may have an abnormal bowel reactivity to physiologic stimuli (meal, gut distension, hormonal changes), noxious stressful stimuli (inflammatory processes), or psychological stressful stimuli (parental separation, anxiety)<sup>16</sup>.

Additionally, adult patients with functional bowel disorders attending gastrointestinal clinics were often found to have psychological disturbances regardless of the final diagnosis. It was concluded that psychological factors may have been more important in determining health-seeking behavior than the cause of the symptom<sup>17</sup>. There is growing evidence to suggest that functional abdominal pain disorders may be associated with visceral hyperalgesia, a decreased threshold for pain in response to changes in intraluminal pressure<sup>18,19</sup>. Mucosal inflammatory processes attributable to infections, allergies, or primary inflammatory diseases may cause sensitization of afferent nerves and have been associated with the onset of visceral hyperalgesia<sup>20</sup>.

Moreover, studies conducted in the United States and Europe reported that psychological symptoms, low socio-economic status, parental gastrointestinal complaints and single parent- and immigrant-households are associated with chronic abdominal pain in children. To overcome drawbacks in Rome II criteria, they were revised and modified in 2006, and Rome III criteria were developed. Table II summarizes the Rome III criteria for pediatric FGID. Using Rome III criteria, a recent study in Sri Lanka has reported FGID in 93% of patients with non-organic RAP. Of them, 45.2% had functional abdominal pain<sup>12</sup>. Therefore, it is important to consider FGID in the differential diagnosis of RAP early in the evaluation.

**Emotional/ Behavioral Stress:**

There is evidence suggesting that the presence of anxiety, depression or behavior problems is not useful in distinguishing between functional abdominal pain and abdominal pain of other causes. There is

evidence that patients with recurrent abdominal pain have more symptoms of anxiety and depression (internalizing emotional symptoms) than do healthy community controls. In contrast, there is evidence that children with recurrent abdominal pain do not

**Clinical Features:**

The primary feature of FAPS is abdominal pain. Usually, the pain is located around the umbilicus, however the pattern or location of abdominal pain is not always predictable. The pain may occur suddenly

Table II: Rome III Diagnostic Criteria for Pediatric Functional Bowel Disorders.

<p><b>H2a. Diagnostic criteria* for functional dyspepsia</b></p> <p>Must include all of the following:</p> <ol style="list-style-type: none"> <li>1. Persistent or recurrent pain or discomfort centered in the upper abdomen (above the umbilicus).</li> <li>2. Not relieved by defecation or associated with the onset of a change in stool frequency or stool form (i.e., not irritable bowel syndrome).</li> <li>3. No evidence of an inflammatory, anatomic, metabolic, or neoplastic process that explains the subject's symptoms.</li> </ol>
<p><b>H2b. Diagnostic criteria* for irritable bowel syndrome</b></p> <p>Must include all of the following:</p> <ol style="list-style-type: none"> <li>1. Abdominal discomfort (an uncomfortable sensation not described as pain) or pain associated with 2 or more of the following at least 25% of the time:             <ol style="list-style-type: none"> <li>(a) Improved with defecation</li> <li>(b) Onset associated with a change in frequency of stool; and</li> <li>(c) Onset associated with a change in form (appearance) of stool.</li> </ol> </li> <li>2. No evidence of an inflammatory, anatomic, metabolic, or neoplastic process that explains the subject's symptoms.</li> </ol>
<p><b>H2c. Diagnostic criteria† for abdominal migraine</b></p> <p>Must include all of the following:</p> <ol style="list-style-type: none"> <li>1. Paroxysmal episodes of intense acute periumbilical pain that lasts for 1 hours or more.</li> <li>2. Intervening periods of usual health lasting weeks to months.</li> <li>3. The pain interferes with normal activities.</li> <li>4. The pain is associated with 2 or more of the following: anorexia, nausea, vomiting, headache, photophobia, pallor.</li> <li>5. No evidence of an inflammatory, anatomic, metabolic, or neoplastic process that explains the subject's symptoms.</li> </ol>
<p><b>H2d. Diagnostic criteria* for childhood functional abdominal pain</b></p> <p>Must include all of the following:</p> <ol style="list-style-type: none"> <li>1. Episodic or continuous abdominal pain.</li> <li>2. Insufficient criteria for other functional gastrointestinal disorders.</li> <li>3. No evidence of an inflammatory, anatomic, metabolic, or neoplastic process that explains the subject's symptoms.</li> </ol>
<p><b>H2d1. Diagnostic criteria* for childhood functional abdominal pain syndrome</b></p> <p>Must include childhood functional abdominal pain at least 25% of the time and 1 or more of the following:</p> <ol style="list-style-type: none"> <li>1. Some loss of daily functioning</li> <li>2. Additional somatic symptoms such as headache, limb pain, or difficulty in sleeping</li> </ol>
<p><b>H1c. Diagnostic criteria* for aerophagia</b></p> <p>Must include at least 2 of the following:</p> <ol style="list-style-type: none"> <li>1. Air swallowing.</li> <li>2. Abdominal distension due to intraluminal air.</li> <li>3. Repetitive belching and/or increased flatus.</li> </ol>

\* Criteria fulfilled at least once per week for at least 2 months before diagnosis.

† Criteria fulfilled 2 or more times in the preceding 12 months.

have higher levels of conduct disorder and oppositional behavior (externalizing emotional symptoms) compared with healthy community controls. There are no data on whether emotional/behavioral symptoms predict symptom severity, course or response to treatment. There is evidence suggesting that children with recurrent abdominal pain are at risk of later emotional symptoms and psychiatric disorder.

or slowly increase in severity. The pain may be constant or may increase and decrease in severity. Some children with functional abdominal pain may experience dyspepsia, or upper abdominal pain associated with nausea, vomiting, and/or a feeling of fullness after just a few bites (early satiety). Others may experience abdominal pain with bowel movements. Pain that is usually relieved by bowel movements, or associated with changes in bowel

movement habits (mainly constipation, diarrhea, or constipation alternating with diarrhea) is the classic irritable bowel syndrome (IBS) (Table II). However, many diseases can cause chronic abdominal pain.

Therefore, any structural, organic, or chemical disease should be excluded. Patients with RAP often have pain-related behaviors. First, they often deny a role for psychosocial stressors. However, pain may diminish when patients are engaged in distracting activities but increase when they are discussing a psychologically distressing issue. Second, they express pain through verbal and nonverbal methods. They urgently report intense symptoms disproportionate to the available clinical and laboratory data. Third, they seek health care frequently. They often visit the emergency room and request analgesics. Fourth, they request diagnostic studies or even exploratory surgery to determine the organic origin of their condition. Fifth, they focus attention on complete relief of pain rather than on adapting to having a disease. Sixth, they take on limited personal responsibility for self-management. In addition to these features, distinct psychopathologies are usually found in patients with FAPS, including depressive disorders, anxiety disorders, and somatoform disorder.

higher pretest probability or prevalence of organic disease and may justify the performance of diagnostic tests. Alarm symptoms or signs include, but are not limited to, involuntary weight loss, deceleration of linear growth, gastrointestinal blood loss, significant vomiting, chronic severe diarrhea, persistent right upper or right lower quadrant pain, unexplained fever and family history of inflammatory bowel disease. The ‘red flag’ signs have long been used by clinicians to guide themselves to identify children who need further investigations and the salient ones on history and examination are noted in Table III <sup>7,8</sup>.

**Investigations:**

Investigations may be required to exclude particular conditions suggested by the history and examination. It is useful to pursue further diagnostic testing only in the presence of alarm symptoms<sup>9</sup>. Laboratory studies may be unnecessary if the history and physical examination clearly lead to a diagnosis of functional abdominal pain. However, a complete blood cell count, sedimentation rate, stool test for parasites (especially Giardia), and urinalysis are reasonable screening studies. If inflammatory bowel disease is suspected the sedimentation rate is often elevated. The finding of an abnormal sedimentation rate would make one look

Table III: “Red Flags” In History and Examination of Recurrent Abdominal Pain.

<b>History: Red Flags</b>	
Weight loss	Persistent right upper or right lower quadrant pain
Unexplained fevers	Pain radiating to the back
Unexplained rashes	Arthritis
Persistent vomiting	Recurrent oral ulcers
Dysphagia/odynophagia	Anal/perianal ulcers
Hematemesis	Nocturnal symptoms (waking with diarrhea and/or vomiting)
Bilious emesis	Delayed puberty
Chronic diarrhea (> 2 weeks)	Deceleration of linear growth velocity
Hematochezia/melena	
<b>Physical Exam: Red Flags</b>	
Decline in weight/height parameters	Abdominal mass
Pallor or anemia	Localized tenderness
Abdominal distension	Perianal fissures or ulcers
Organomegaly (hepatosplenomegaly)	Positive hemoccult stool test

**History and Physical Exam:**

A complete history should be taken including social and dietary history and look for red flag symptoms and signs (Table III), Conduct a thorough physical exam, including rectal exam with stool hemoccult OR perianal exam with hemoccult of stool brought in by patient/family and review of the child’s growth. Children with recurrent abdominal pain are more likely than children without recurrent abdominal pain to have headache, joint pain, anorexia, vomiting, nausea, excessive gas and altered bowel symptoms. The presence of alarm symptoms or signs suggests a

further for an inflammatory, infectious, or neoplastic disorder. If indicated, an ultrasound examination of the abdomen can give information about kidneys, gallbladder, and pancreas; with lower abdominal pain, a pelvic ultrasonogram may be indicated.

An upper gastrointestinal tract x-ray series is indicated if one suspects a disorder of the stomach or small intestine. Helicobacter pylori infection does not seem to be associated with RAP. In patients with symptoms suggestive of gastritis or ulcer an H. pylori test (serum or fecal) may be performed to document the infection.

Esophagogastroduodenoscopy is indicated with symptoms suggestive of persistent upper gastrointestinal pathology. In the absence of this suspicion, esophagogastroduodenoscopy is unlikely to identify an abnormality and is usually not necessary.

#### **Management:**

The family and the child with functional RAP may worry about the inability to identify an organic cause and may be resistant to a diagnosis of nonorganic disease. After a thorough history and physical examination the most important component of the treatment is reassurance of the children and family members<sup>10</sup>. Specifically, they need to be reassured that no evidence of a serious underlying disorder is present. Acknowledgment that the child's pain is real but not life-threatening is essential. When understood and accepted, this reassurance concludes the child and family's search for a physical cause and allows them to move into the next stage of learning to cope.

#### **Dietary management:**

Data on dietary intervention are scarce and deal mainly with fiber supplementation and lactose exclusion. Whereas dietary fibre supplementation is a recognized strategy for management for childhood constipation, its value in recurrent abdominal pain is uncertain. The two randomized trials comparing fiber treatment with placebo have yielded conflicting results<sup>22,23</sup>. The data on lactose-free diets are likewise inconclusive, and a Cochrane review calls for 'well-designed trials of all recommended dietary interventions'<sup>24</sup>.

A sensible course, despite lack of published evidence, is to recommend healthy eating including plenty of fruit and vegetables, regular sensible meals and plenty of fluids. This should be coupled with a daily routine with plenty of physical activity.

#### **Symptom-based pharmacological therapies:**

In some cases, symptom-based pharmacological therapies are helpful. Medications for functional abdominal pain are best prescribed judiciously as part of a multifaceted, individualized approach to relieve symptoms and disability. It is reasonable to consider the time-limited use of medications that might help to decrease the frequency or severity of symptoms. Treatment might include acid reduction therapy for pain associated with dyspepsia; antispasmodic agents, smooth muscle relaxants, or low doses of psychotropic agents for pain or nonstimulating laxatives or antidiarrheals for pain associated with altered bowel pattern.

#### **Cognitive-behavioural therapy:**

In many instances, all that is needed from the doctor is acknowledgment of the symptoms and reassurance that there is no serious underlying organic disease.

Sanders et al., compared this approach (standard paediatric care) with cognitive-behavioural therapy and found that both groups improved, though the response was somewhat better in the cognitive-behavioural therapy group<sup>21</sup>. They suggested that psychological intervention may have a role in difficult cases.

#### **Family Functioning:**

Education of the family is an important part of treatment of the child with functional abdominal pain. It is often helpful to summarize the child's symptoms and explain in simple language that although the pain is real, there is most likely no underlying serious or chronic disease. It may be helpful to explain that recurrent abdominal pain is a common symptom in children and adolescents, yet few have a disease. Functional abdominal pain can be likened to a headache, a functional disorder experienced at some time by most adults, which very rarely is associated with serious disease.

It is important to provide clear and age-appropriate examples of conditions associated with hyperalgesia, such as a healing scar, and manifestations of the interaction between brain and gut, such as the diarrhea or vomiting children may experience during stressful situations is recommended that reasonable treatment goals be established, with the main aim being the return to normal function rather than the complete disappearance of pain. Return to school can be encouraged by identifying and addressing obstacles to school attendance.

#### **Prognosis:**

Many of the studies on prognosis relate to hospital practice not primary care<sup>10</sup>. It is generally more likely that children with recurrent abdominal pain will develop chronic abdominal symptoms in adulthood and as many as 30% may continue thus. Many will continue to suffer from IBS<sup>11,12</sup>. There is evidence that children with recurrent abdominal pain are more likely to have emotional and psychiatric disorders later in life. Generally speaking, however, follow-up studies show that parental factors rather than the psychological characteristics of the child are more important when predicting persistence of abdominal pain.

#### **Conclusion:**

Recurrent abdominal pain (long-standing intermittent or constant abdominal pain) is common in children and adolescents. In most children, recurrent abdominal pain is functional—that is, without objective evidence of an underlying organic disorder. Yet an important part of the physician's job is to determine which children have an organic disorder. A review of the current evidence, however, indicates

that there are no studies showing that pain frequency, severity, location or effects on lifestyle help to discriminate between functional and organic disorders. There have been few studies of the treatment of recurrent abdominal pain in children. There is inconclusive evidence that a lactose-free diet decreases symptoms or that a fiber supplement decreases the frequency of pain attacks. There is inconclusive evidence of the benefit of acid suppression with H<sub>2</sub>-receptor antagonists to treat children with dyspepsia. There is also evidence that cognitive/behavioral therapy may be useful in improving pain and disability outcome in the short term.

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