Recurrent abdominal pain in childhood

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Recurrent abdominal pain is a frequent presenting complaint in general practice, general paediatric clinics and paediatric gastroenterology clinics. Since its first description in 1958,¹ the condition has remained poorly understood with a multitude of factors being implicated in causation. The symptoms tend to be vague and investigations seldom show organic disease. Treatment strategies vary and have little basis in evidence.

PREVALENCE

The symptom of abdominal pain in childhood is so common that few children go through school years without experiencing it at some stage. As many as half of all children with recurrent abdominal pain do not see a doctor about it,² although their pain is often as severe as in those who do; presumably the patient or family regard the symptoms as trivial, because of mild severity or transient nature. Usually, it is only when the pain impacts on the functioning of the child or family that medical help is sought.

Apley defined the syndrome of recurrent abdominal pain in childhood as three episodes of abdominal pain occurring in the space of three months, severe enough to affect daily activities.¹ These criteria were intended to eliminate trivial cases and focus on functional impairment. In Apley's original study, the prevalence of recurrent abdominal pain in a population of schoolchildren was 10%. In subsequent studies using his criteria the prevalence ranged from 11% to 45%.^{2–5} The width of this range is probably attributable to differences in age, geographical area and social factors and methodology. Nevertheless, recurrent abdominal pain is clearly no less troublesome now than when Apley described it in 1958.

CLASSIFICATION BY SYNDROME

Apley's definition implied that clinicians and researchers should consider recurrent abdominal pain as a single entity. However, many people have found the criteria too wide for useful application and subclassify by symptomatology and cause.

In 1997, a consensus meeting defined criteria for 'functional gastrointestinal disorders' in infancy and childhood and adolescence.⁶ Revised in 1999, these 'Rome II' criteria (Box 1) classify abdominal pain disorders as functional dyspepsia, irritable bowel syndrome, functional abdominal pain, abdominal migraine and aerophagia. This classification, though yet to be validated, is expected to be useful both clinically and in research on the principle that subgroups of patients with similar symptoms are likely to have similar underlying aetiologies. Hence, further investigation in these subgroups may yield individual treatment options. In a prospective series of 107 children who met Apley's criteria for recurrent abdominal pain, Walker *et al.*⁷ were able to group 73% according to the Rome II criteria. However, the fact that 27% of the patients could not be classified is a weakness and critics say that Rome II should be reserved for research until further validated.⁸

AETIOLOGY

Cases with no clear organic cause

Apley's original hypothesis was that an underlying psychological abnormality predisposed to physical pain. Pursuing this idea McGrath *et al.*⁹ studied psychological variables including stress and personality in 30 children with recurrent abdominal pain and 30 age and sex-matched controls. They found no significant differences between the two groups. Raymer *et al.*¹⁰ reported low self-esteem and psychological distress in children with non-organic recurrent abdominal pain, but these traits were shared by children with an organic cause for recurrent abdominal pain (Crohn's disease), and there were no psychological differences between the two groups. Other researchers however have shown clearly that psychological distress accompanies recurrent abdominal pain and stressful life events have been associated with an increased incidence of the condition.¹¹ Campo *et al.*¹² found that anxiety and depressive disorders were more prevalent in paediatric patients with recurrent abdominal pain than in age-matched controls.

Visceral hyperalgesia

It has been postulated that psychological stress leads to changes in the 'brain–gut axis', altering the perception of visceral sensation. This may lead to a phenomenon known

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Box 1 Classification of recurrent abdominal pain by symptomatology, according to Rome II criteria

Functional dyspepsia	<p>At least 12 weeks within the preceding 12 months of:</p> <p><i>Ulcer-like dyspepsia:</i></p> <ul style="list-style-type: none"> • Pain in upper abdomen is predominant symptom <p><i>Dysmotility-like dyspepsia</i></p> <ul style="list-style-type: none"> • Unpleasant, non-painful sensation in upper abdomen is predominant symptom • May be characterized by upper abdominal fullness, early satiety, bloating or nausea <p><i>Unspecified dyspepsia:</i></p> <ul style="list-style-type: none"> • Symptomatic patients whose symptoms do not fulfil criteria for either ulcer-like or dysmotility-like dyspepsia
Irritable bowel syndrome	<p>At least 12 weeks within the preceding 12 months of:</p> <ul style="list-style-type: none"> • Abdominal discomfort that has 2 out of 3 features: <ul style="list-style-type: none"> Relieved with defaecation Onset associated with change in stool frequency Onset associated with a change in form of stool • No structural/metabolic abnormalities to explain symptoms
Functional abdominal pain	<p>At least 12 weeks of:</p> <ul style="list-style-type: none"> • Continuous abdominal pain in a school-aged child • No relation of pain with physiological events (e.g., eating) • Some loss of daily functioning • The pain is not feigned • Insufficient criteria for other functional gastrointestinal disorders that would explain the abdominal pain
Abdominal migraine	<p>In the preceding 12 months, 3 or more paroxysmal episodes of intense, acute, midline abdominal pain lasting 2 hours to several days, with intervening symptom-free intervals lasting weeks to months; and:</p> <ul style="list-style-type: none"> • No evidence of metabolic, gastrointestinal, and central nervous system structural or biochemical diseases • 2 of the following features: <ul style="list-style-type: none"> Headache during episodes Photophobia during episodes Family history of migraine Headache confined to one side only An aura, consisting of visual disturbances, sensory symptoms or motor abnormalities
Aerophagia	<p>At least 12 weeks in the preceding 12 months of 2 or more of:</p> <ul style="list-style-type: none"> • Air swallowing • Abdominal distension due to intraluminal air • Repetitive belching and/or increased flatus

as 'visceral hyperalgesia'. Di Lorenzo *et al.*¹³ demonstrated visceral hyperalgesia in small groups of children with recurrent abdominal pain or irritable bowel syndrome, and also found high rates of anxiety in these groups.

Biopsychosocial model

Another focus of attention is the psychological environment within the family. The biophysical model proposes that recurrent abdominal pain is the child's response to biological factors, governed by an interaction between the child's temperament and the family and school environments. Crushell *et al.*¹⁴ postulated that the child's symptoms might be influenced by the parental conceptual

model of illness. Investigating families of patients with severe recurrent abdominal pain requiring hospital admission they found that the child was more likely to have recovered at follow-up if his or her parents had attributed symptoms to psychological factors. These workers therefore concluded that acceptance by parents of a biopsychosocial model of illness is an important factor in resolution of symptoms.

Organic disease

Since Apley's day, advances in medical investigations have allowed more complete assessment for underlying organic

disease: whereas in his original population only 8% had an identifiable 'organic' cause for their pain,^{1,15} a recent study in Bristol found an organic cause in as many as 30% of children presenting with recurrent abdominal pain.¹⁶ This difference could have several explanations. Firstly, the researchers used investigations not available to Apley in 1958 such as *Helicobacter pylori* serology. Secondly, the study population consisted of children referred to hospital, whereas Apley's were schoolchildren undergoing routine medical assessment. Thirdly, many organic abnormalities may be incidental findings—e.g., minor gastritis on endoscopy.

Infection with *H. pylori*

Performing upper gastrointestinal endoscopy in 82 children presenting with recurrent abdominal pain, Ashorn *et al.*¹⁷ found evidence of infection with *H. pylori* (based on histology and/or culture) in 22%. Thus, organic disease was much more prevalent than others had supposed, and a sizeable proportion was due to *H. pylori*. However, conflicting evidence has come from other similar studies. Hyams *et al.*¹⁸ looked for *H. pylori* infection in 127 children presenting with dyspepsia and found it in only 5.

Even if *H. pylori* infection were common, there is no strong evidence that it causes pain in the absence of peptic ulceration. Donohue *et al.*¹⁹ reported a 16.7% prevalence of *H. pylori* positive serology in a large sample of urban schoolchildren but there was no relation between positive serology and a history of recurrent abdominal pain.

Gastrointestinal motility disorders

Another postulated organic cause of recurrent abdominal pain, especially the dyspepsia type, is abnormal small-bowel transit. Studying 57 children with symptoms of functional dyspepsia Chitkara *et al.*²⁰ found that 40% had slow small-bowel transit; furthermore, children with fast small-bowel transit were less likely to report pain. They concluded that upper gastrointestinal transit studies may be useful in the evaluation of children with dyspeptic symptoms.

Abdominal migraine

Many researchers have proposed that abdominal migraine accounts for some cases of recurrent abdominal pain. Indeed, the Rome II criteria recognize this as a phenomenon in its own right, affecting 2% of children.⁶ The concept of abdominal migraine is supported by the positive response to anti-migraine treatments such as pizotifen in carefully selected cases.²¹

Food allergies

There is no convincing evidence for food allergy or intolerance as aetiological factors in large cohorts of children with recurrent abdominal pain. Nevertheless some

patients report benefit from dietary restriction—e.g., lactose-free or wheat-free diets—and dietary exclusion is frequently tried by 'alternative' healthcare practitioners. Although adverse food reactions may be implicated in some cases, at present there are no reliable diagnostic investigations other than food challenge.²²

Constipation/incomplete rectal evacuation

Constipation may be a factor in recurrent abdominal pain as part of the irritable bowel syndrome symptom complex. Factors such as incomplete rectal evacuation are important. Lifestyle issues may be relevant, including poor diet, poor fluid intake and lack of exercise.

THERAPEUTIC OPTIONS

In view of the heterogeneity of recurrent abdominal pain and the lack of consensus on pathogenesis, it is not surprising that we lack evidence-based interventions.

Psychological interventions

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. When Sanders *et al.*²³ compared this approach (standard paediatric care) with cognitive-behavioural therapy they found that both groups improved though the response was somewhat better in the cognitive-behavioural therapy group. They suggested that psychological intervention may have a role in difficult cases. The aims of psychological therapy are to modify thoughts, beliefs and behavioural responses to symptoms and the effects of illness. In addition to cognitive-behavioural therapy the modalities include biofeedback, relaxation therapy, coping skills training, hypnosis and family therapy.

Janicke and Finney²⁴ reviewed the published evidence regarding the effectiveness of cognitive-behavioural therapy, operant procedures and fibre treatment as interventions in recurrent abdominal pain. Although none of the treatment approaches met the criteria for well-established interventions, cognitive-behavioural therapy emerged as a 'probably efficacious intervention'. The conclusion of a Cochrane review of published data²⁵ was that there was no evidence for the role of any psychological therapies in attenuating pain in childhood in any conditions other than headache; the reviewers were indeed able to find only two studies for recurrent abdominal pain that met their selection criteria.

Self-hypnosis

Self-hypnosis has been studied in 5 patients by Anbar.²⁶ After a single session of instruction in self-hypnosis 4 lost

their symptoms within three weeks. This approach has yet to be tested in a prospective controlled trial.

Dietary management

Data on dietary intervention are scarce and deal mainly with fibre 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 fibre treatment with placebo^{27,28} have yielded conflicting results. The data on lactose-free diets are likewise inconclusive, and a Cochrane review calls for 'well-designed trials of all recommended dietary interventions'.²⁹

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.

Pharmacological therapy

Although many pharmacological interventions have been tried, few have been formally tested. Simple analgesics and antispasmodics are commonly prescribed. A Cochrane systematic review of pharmaceutical therapies for recurrent abdominal pain³⁰ found only one randomized trial. This compared the effectiveness of pizotifen and placebo in 14 patients with abdominal migraine.²¹ Pizotifen was superior to placebo as a prophylactic drug but the study size is too small to allow firm conclusions. A more recent systematic review³¹ identified further studies, including a double-blind crossover trial of famotidine versus placebo in 25 children with recurrent abdominal pain featuring dyspepsia. A lessening of dyspepsia symptoms by famotidine³² suggested a role for such H₂ antagonists. A further randomized trial assessed the effectiveness of peppermint oil in 50 children aged 8–12 with irritable bowel syndrome.³³ Severity of symptoms was reduced in 76% of the treatment group and only 12% of the placebo group. The different modes of action of these interventions reflect the multiple causation of recurrent abdominal pain and strengthen the case for targeted approaches to management.

OUTCOME/PROGNOSIS

Early follow-up studies,^{34,35} suggested that childhood recurrent abdominal pain continued into adult life in up to 50% of patients. These studies did not include psychological assessment and have been criticized for not applying formal diagnostic criteria. A more recent study showed that, at 5-year follow-up, patients had more psychiatric abnormalities (as well as abdominal pain) than

controls.³⁶ A large detailed cohort study,³⁷ using data from the MRC National Survey of Health and Development, showed that children identified as having had chronic abdominal pain had an excess prevalence of psychiatric disorders in adulthood, particularly anxiety disorders. The study also reported an excess of psychiatric disorder in the families of affected children, but there was no evidence for persistence of abdominal pain into adulthood in these children. Campo *et al.*³⁸ reported similar findings in a retrospective case-control study of adults with a history of childhood recurrent abdominal pain. Using standardized psychological assessments they found more anxiety and other psychological abnormalities than in controls.

The above observations suggest that childhood recurrent abdominal pain can be a precursor for anxiety disorders in later life. This would support the model of 'somatosensory amplification' described by Barsky *et al.*³⁹ which states that anxious children perceive novel bodily perceptions as threatening and are thus more likely to report somatic symptoms than controls (biopsychosocial model). The findings also indicate that recurrent abdominal pain should not be dismissed as a transient reaction to adverse stress. The implications for the future have to be considered, along with careful assessment of the patient for evidence of stress and anxiety disorders that may become more prominent or generate other somatic symptoms in later life.

RECOMMENDED CLINICAL APPROACH

The following recommendation is based on the published evidence and on personal experience.

1. Exclude organic disease

In taking the history and examining the child, the clinician's first task is to rule out the wide range of organic disorders that may present with recurrent abdominal pain (Box 2).

In the absence of likely underlying organic disease, it is useful to elicit features known to be associated with childhood recurrent abdominal pain such as psychological stress and anxiety. Many of these will become apparent when a detailed social history is taken. Typical social factors leading to psychological stress are bereavement, altered peer relationships, school problems and illness in a family member. It is important not just to ask about illnesses in the family but also to ask about how those illnesses impact on the family. This part of the assessment may also reveal a family history of anxiety disorders, or an anxious temperament in the child.

2. Classify by symptomatology and target the investigations

The next logical step is to attempt to classify the symptoms according to the Rome II criteria (Box 1). Although not

Box 2 Symptoms and causes of organic recurrent abdominal pain

Symptoms suggestive of organic disease	Important organic causes
Age less than 5 years	Gastro-oesophageal reflux/oesophagitis
Constitutional problems	Peptic ulcer disease
Fever	<i>H. pylori</i> infection
Weight loss	Food intolerance
Delayed growth	Celiac disease
Rashes	Inflammatory bowel disease
Arthralgia	Constipation
Vomiting—particularly if bilious	Urinary tract disorders
Nocturnal pain that wakes the child	Dysmenorrhoea
Pain away from the umbilicus	Pancreatitis
Urinary symptoms	Hepatobiliary disease
Family history:	Anatomical abnormalities
Inflammatory bowel disease	(e.g. Meckel's diverticulum, malrotation)
Peptic ulcer disease	
Perianal disease	
Bloody stool (gross or occult)	

strictly validated, these help the clinician to target further investigation and management. The mainstay of management is reassurance. In cases where the symptoms impact on the child's and family's functioning enough to warrant further investigation, I suggest beginning with the following: full blood count; erythrocyte sedimentation rate/C-reactive protein; renal and liver function; coeliac antibody screen; urine microscopy and culture. Investigations such as ultrasound, barium radiology, and endoscopy may be indicated when symptoms dictate or when there are pointers from tests of blood or urine.

3. Treatment

The mainstay of treatment is reassurance with an emphasis on rehabilitation. Therefore, the first step is to acknowledge to the family and child that the pain is a real symptom. It is then necessary to recognize and treat any underlying or contributing factors, including a tendency to constipation. Avoid excessive medications such as non-steroidal anti-inflammatory drugs (NSAIDs). Promote a healthy diet and lifestyle. Assessment with a dietitian may be helpful. It is worthwhile identifying dietary triggers and suggesting alternatives. If the patient has an anxious temperament, consider psychological therapy. Many families are looking for an explanation for the symptoms and need to have discussed with them the inseparability of physical and psychological causes of symptoms. Rehabilitation should be goal-based, with simple targets such as optimizing school attendance, a graded exercise programme and reduction of NSAIDs. The choice should be followed up until symptoms

resolve and to give an opportunity for any psychiatric comorbidity to emerge.

CONCLUSIONS

Because hard evidence on either aetiology or management remains scarce, clinicians must adopt a pragmatic approach. We now see that Apley's original criteria for recurrent abdominal pain encompass a large heterogeneous group, likely to have many different and interacting aetiologies. A symptom-based subclassification such as that proposed by the Rome group should be helpful in both clinical management and research.

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