The evaluation and management of recurrent abdominal pain in childhood

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Abstract

Recurrent abdominal pain is a common symptom in children. It presents a diagnostic and management challenge. Underlying organic disease is rare but important to correctly identify. Most children with recurrent abdominal pain have a functional gastro-intestinal disorder. There are several recognized patterns of functional gastro-intestinal disorder affecting children. A combination of biological, psychological and social factors contribute to the aetiology of pain. Management is centred on identifying and modifying factors that may be contributing to the symptoms. The prognosis for functional gastro-intestinal disorder is generally good, though there is an increased chance of somatising and psychiatric disorders developing later in life.

Keywords child; functional gastro-intestinal disorder; recurrent abdominal pain

Introduction

Abdominal pain is a common symptom in children. Indeed, brief self limiting episodes of abdominal pain without apparent pathological cause could be considered to be part of normality in healthy children.

To the medical practitioner, recurrent abdominal pain (RAP) presents some particular challenges. It is a cause of significant anxiety to children and their families. Many adults associate abdominal pain with sinister diagnoses such as acute appendicitis or GI malignancy. There is therefore an (often unspoken) tension between doctor and family regarding the need to find a physical cause for the pain. The physical examination is usually normal. Laboratory tests and imaging are mainly useful for excluding organic causes and providing reassurance, rather than providing a proven physical cause for the pain.

A further challenge arises from by the large number of clinicians who may be involved in the child's care. Children with RAP may present to their general practitioner, at an emergency department, or a school nurse or doctor, and may be referred on to an acute general or community paediatrician, paediatric gastroenterologist, dietician, allergist, psychiatrist or psychologist. Each of these clinicians may have a different perspective on children with RAP. The prolonged nature of the condition means children are often seen by several different practitioners, and may receive conflicting advice.

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Epidemiology

Recurrent abdominal pain is defined as two or more episodes of abdominal pain occurring within 3-month period severe enough to interfere with normal activity. This definition dates back to Apley's initial writings on the subject in 1958. There is a wide variation in estimates of prevalence of the condition. Variation can be explained by different sampling techniques and variable self-reporting rates. 7–10% seems a reasonable estimate.

RAP is most common in school age children. The peak incidence appears to be between ages 5 and 8 years, with a second peak in adolescence. Some studies suggest a slightly higher incidence in girls.

Aetiology

RAP is a symptom, not a disease. In the great majority of cases no identifiable pathological cause is found. There are many unusual or rare conditions that can present with RAP, and it is impossible to provide a comprehensive list. Table 1 presents the organic causes most likely to be encountered in UK practice. In many of these conditions there will be other accompanying symptoms which point to the diagnosis.

It can be seen from the table that features that point towards an underlying identifiable pathological cause for RAP are:

- Unusual site of pain e.g. right upper quadrant, iliac fossa
- Unusual pattern of pain e.g. persistent worsening pain
- Weight loss
- Fever and/or major systemic symptoms
- Chronic diarrhoea and/or blood in stool

Patients reporting these 'red flag' features should be investigated thoroughly for an underlying pathological cause. Patients without these features are highly likely to have a functional gastro-intestinal disorder (FGID).

FGID symptoms often present in particular recognizable patterns. These are categorized by the Rome III diagnostic criteria. Disorders are divided into the following groups:

- A: Functional oesophageal disorders
- B: Functional gastroduodenal disorders
- C: Functional bowel disorders
- D: Functional Abdominal pain syndrome
- E: Functional gallbladder and sphincter of Oddi disorders
- F: Functional anorectal disorders
- G: Childhood functional GI disorders: infant/toddler
- H: Childhood Functional GI disorders: child/adolescent

The categories most relevant for paediatric practice are G and H, though in adolescence there is some cross over with the recognized adult patterns of symptoms. This scope of this review does not cover the functional infant disorders such as infant colic and infant functional constipation, but will instead concentrate on the disorders that cause RAP in children and adolescents. These are:

- Functional dyspepsia

All of the following, at least once per week for at least 2 month:

Persistent or recurrent pain or discomfort centred 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 (i.e. not irritable bowel syndrome).

Pathological causes of recurrent abdominal pain in children, distinguishing clinical features and investigation findings

System	Disease	Distinguishing features which may be present in history and on examination	Investigations and imaging
GI tract	Inflammatory bowel disease	Weight loss Systemic upset Diarrhoea Blood in stool	Anaemia Raised inflammatory markers Hypoalbuminaemia
	Coeliac disease	Loose stool Steatorrhoea Weight loss Muscle wasting	Anaemia Elevated coeliac antibodies
	IgE mediated food allergy	History of other allergy Clear relation to ingestion of food Accompanying rash, vomiting and diarrhoea	Positive food challenge
	Gastritis	Epigastric pain worse after eating Pain relieved by antacids Rarely bloodstained vomiting Epigastric tenderness	Anaemia (rarely) Positive test for *H. Pylori* (Carbon Urea breath test or stool antigen)
	Oesophagitis	Epigastric pain radiating to chest	
	Chronic GI infection eg TB	Loose stool Weight loss Systemic upset eg fever, malaise	Raised inflammatory markers
	GI tumour (usually lymphoma)	Insidious onset, progressively worsening May have features of recurrent intussusception Weight loss	Anaemia Mass on ultrasound Abdo X-ray may show paucity of gas in affected area.
Nephro-urological	Recurrent UTI	Dysuria, urinary frequency, loin pain, fevers, change in nature of urine (blood, cloudy, offensive smell)	Urine dipstick positive for leukocytes and nitrites
	Renal tract stone	Severe colicky loin pain, unilateral, radiates to groin	Urine dipstick positive for blood
	Obstructive uropathy	Suprapubic and/or loin pain	Urinalysis variable depending on cause Ultrasound shows dilated urinary tract
Hepatobiliary and pancreatic	Gall stones and biliary colic	Right upper quadrant pain Jaundice Underlying haematological disorder	Blood film may reveal red cell disorder Ultrasound shows stones and dilated biliary system
	Chronic hepatitis	Right upper quadrant pain and tenderness Enlarged liver Jaundice	Disordered liver function tests
	Pancreatitis	Older child Pre-existing biliary disease Mumps infection Pain radiates to back Vomiting and anorexia	Raised plasma amylase Pancreas abnormal on ultrasound (though often difficult to see) or CT/MRI
Central nervous System	Spinal tumour, transverse myelitis	Severe band of pain Long tract neurological signs in the legs Bladder and bowel dysfunction	

(*continued on next page*)

Table 1 (*continued*)

System	Disease	Distinguishing features which may be present in history and on examination	Investigations and imaging
Peritoneum and Retroperitoneum	Abscess	Progressive worsening pain Systemic upset with fever, malaise, weight loss etc Tenderness on palpation. Mass palpable	Raised inflammatory markers Mass seen on ultrasound
	Malignancy e.g. lymphoma, sarcoma	Progressive worsening pain Systemic upset with fever, malaise, weight loss etc Mass palpable	Mass seen on ultrasound or CT/MRI
Gynaecological	Imperforate hymen, haematometrium	Peri/post pubertal girl Cyclical pain Primary amenorrhoea	Abnormal appearance of GU system on ultrasound
	Ovarian cyst	Low loin/Iliac fossa pain	Ovarian cyst seen on ultrasound
Lymphatic	Mesenteric adenitis	Fever Symptoms suggestive of viral infection	Mesenteric lymph nodes seen on ultrasound
Psychiatric	Anorexia nervosa	Low BMI Relative bradycardia Muscle wasting and lack of body fat	Sinus bradycardia on ECG

Table 1

No evidence of an inflammatory, anatomic, metabolic or neoplastic process that explains the symptoms.

- Irritable bowel syndrome

Both of the following, at least once per week for at least 2 months:

Abdominal discomfort 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 subject's symptoms.

- Abdominal migraine.

All of the following, two or more times in a 12 month period.

A hypothetical example of a biopsychosocial formulation for functional gastro-intestinal disorder

	Biological	Psychological	Social
Predisposing	Family history of migraine	Anxious personality type	High academic performer at school with high pressure to succeed
Precipitating	Viral gastroenteritis affected whole family	Upset as did not achieve expected grade in school test.	Missed a week of school with diarrhoea Other children taunted child on return to school
Perpetuating	Multiple recent dietary manipulations in response to symptoms	Grandparent became seriously ill with terminal diagnosis Mother spending a lot of time away from home Child very concerned about grandparent	School absence and lack of coping strategy for return to school Disengagement from social interaction
Resilience	No evidence of organic disease on examination or investigation. Otherwise well child. Finds paracetamol helpful	Optimistic outlook Interest in leisure activity (dance) Recognizes link between feeling stressed and pain	Supportive school nurse and teachers Network of supportive friends Caring parents, stable home life

Table 2

Paroxysmal episodes of intense, acute periumbilical pain for at least one 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 subject's symptoms

- Childhood functional abdominal pain

All of the following at least once per week for at least 2 months.

Episodic or continuous abdominal pain.

Insufficient criteria for other FGIDs.

No evidence of an inflammatory, anatomic, metabolic, or neoplastic process that explains the subject's symptoms

- Childhood functional abdominal pain syndrome

Satisfies criteria for childhood abdominal pain plus one or more of the following:

Some loss of daily function.

Additional somatic symptoms such as headache, limb pain, or difficulty sleeping.

Initial management

History

A focussed history must be taken. This must elucidate the nature of the pain, site and radiation, frequency and duration of attacks, associated symptoms, triggers, aggravating and relieving factors and an exploration of general health. The child's social and family setting should be identified at this stage. The effects of the pain on function should be explored, including school absence and lack of participation in usual leisure activities. A family history of recurrent abdominal pain and other recurrent pain syndromes (e.g. headaches, migraines) should be sought.

Examination

A full sensitive examination is important at the first consultation. This should assess the nutritional status of the child (weight, skin, hair, nails, pallor) and any signs of acute illness (tachycardia, tachypnoea, dehydration). The abdominal examination should include gentle palpation to establish tenderness and guarding, and deep palpation for masses.

It is useful to establish whether the child is experiencing pain at the time of examination. A child who reports pain (and often central tenderness) at the time of the examination, but who has no abdominal rigidity, is active and mobile, and in whom deep palpation is possible with distraction, is more likely to have FGID than an organic cause for pain. Paradoxically, a child with FGID may appear to have extreme pain behaviours, writhing around and crying out with pain. It is often noticed that these behaviours increase in the presence of the parent or medical staff. Children with organic causes of pain tend to lie still, and will tolerate palpation but with evidence of discomfort (flinching of face, rolling away from the palpating hand, tensing the abdominal wall).

Useful information can be gained from observing how the child moves in the clinic, how they get onto the couch, whether they can sit up and lie down with ease, and how they behave in the waiting area.

Differential diagnosis

At this stage the clinician should be in a position to formulate a differential diagnosis, and rank the respective likelihood of FGID and organic causes of pain. If any red flags have been identified or an organic cause of pain is felt likely, this should prompt urgent targeted investigation.

Discussion with child and family

In the absence of red flags, and with findings that suggest FGID as the most likely diagnosis the clinician should begin the process of informing the child and family of the diagnosis. This is an important part of the therapeutic process. It should be explained that not all abdominal pain is a marker of underlying disease, and that in most children with recurrent abdominal pain, no organic cause is found. Useful ways of phrasing this could be along these lines:

'Sometimes our bodies make us feel pain to tell us there is something serious wrong, such as a broken leg or a heart attack. But sometimes we feel pain from our bodies when there is nothing serious wrong, such as a headache or backache at the end of a long day. For reasons we don't fully understand, children are particularly likely to get tummy aches even when there is nothing-serious wrong inside. As your doctor I will check to make sure there is nothing serious wrong, and see what I can do to help make these pains go away, and help you cope with them when they do come'.

This sets the scene for the likely outcome that no underlying cause will be found, whilst not dismissing the pain or implying that it is 'all in the mind'. It reassures the child and family that their symptoms are real and being taken seriously.

Investigations

No investigations are necessary in a child with no red flags and symptoms that clearly fit one of the categories of FGID. However, investigations are often helpful to reassure the clinician that no organic pathology is present, and to reassure the family that all is being done to look for underlying disease. It is important not to over-investigate, and the potential harmful effects of invasive investigation must be taken into account.

The following basic investigations can be considered in children with persistent RAP

- Urine dipstick, microscopy, and culture
- Full blood count
- Liver function tests
- CRP and/or ESR

These investigations, in combination with history and examination, will be adequate to identify the large majority of underlying organic diseases.

Further investigations may be indicated, tailored to the particular case. For each test the relative risks and benefits should be considered.

- Coeliac antibody screen.

Indicated if there is pallor, weight loss, change in stool frequency or form, microcytic anaemia, a family history of coeliac disease, or a clear relationship between symptoms and the ingestion of wheat products (and a resolution of symptoms when wheat is excluded from the diet).

- Abdominal/pelvic ultrasound scan

An abdominal ultrasound scan may play an important therapeutic role in reassuring child and family about the absence of serious underlying organic disease. For most children with RAP the scan will be normal. This low incidence of abnormal scans may lead some radiologists to feel that the scan is not indicated. However, a normal scan is often a useful step in moving forward with the management of the child.

- Plain abdominal radiograph

A plain abdominal X-ray is seldom a useful investigation. It can show a megarectum in cases of severe childhood constipation, and might rarely show other rare pathology such as stone or calcification within a mass. It exposes the child to a significant dose of radiation and is unlikely to provide any information that cannot be gained from an ultrasound scan. An X-ray is not needed to diagnose childhood constipation.

- *Helicobacter pylori* testing

H. pylori infection in the stomach can be identified using a radio-labelled carbon urea breath test or testing for antigen in the stool. Serological tests are less helpful. They have a high sensitivity but lower specificity, leading to false positive results. Serology does not distinguish between current and previous *H. pylori* infection.

The link between *H. pylori* infection and childhood RAP is unclear. Testing should be reserved for children with symptoms of upper GI inflammation such as epigastric pain after eating. Having detected *H. p*ylori on testing, it is difficult to argue that it should not be actively treated. However, it must be borne in mid that eradication of *H. pylori* may not lead to resolution of RAP symptoms.

- Upper GI imaging, endoscopy and biopsy

Invasive testing with contrast radiology, endoscopy and biopsy should be reserved for children with clear symptoms suggestive of gastritis that have not resolved with simple medical management, or if indicated by other tests e.g. positive coeliac antibody screen.

Symptom diary

The child and family should be asked to keep a symptom diary to look for associations between attacks of pain and environmental stimuli, particular settings or emotional states. The child should record both what they were doing and what they were feeling when the pain came on. They should note the duration of the attack and any effect on function e.g. missed school, need to stop activity.

Review of a symptom diary at subsequent appointments can help the clinician with open discussions about non-organic pain syndromes.

Follow up

At the follow up appointment the child's progress and the pattern of symptoms should be reviewed. Any new symptoms or red flags for organic disease should be sought. The child should be weighed and measured to ensure no faltering of growth. The investigation results should be available and shared with the child and family.

The symptom diary should be reviewed if available, and the child and family should be encouraged to discuss any connections they have noted between symptoms and possible trigger factors. These might include such things as dietary triggers, emotional triggers such as stress and anxiety, situational triggers such as a particular lesson at school, and chronological triggers such as the pain always occurring on a particular day.

At this stage it is usually possible to ascribe a diagnosis. Rarely, an organic disease will have been identified, and appropriate management and onward referral will be made e.g. inflammatory bowel disease referred on to a paediatric gastroenterologist. For the majority of children the diagnosis will be one of the recognized patterns of FGID from the Rome III classification as listed above.

Ongoing management of FGID

The cause of FGID is unascertained. However the clinician may be able to offer assistance that can relieve the symptoms and allow the child to resume normal or near normal functioning.

Use of a biopsychosocial model may help to frame interventions and assist the family in understanding the condition. In this model it is proposed that combination of biological, psychological and social factors come together in one patient. Some of these factors predispose the child to FGID, some trigger the onset of FGID and some lead to perpetuation of the condition. A hypothetical example is shown in Table 2.

It is important to recognize factors which promote resilience, which can then be developed to allow the child to manage their symptoms. This may be possible within the time restricted setting of a general practice or general paediatric clinic or may require involvement of other healthcare professionals, often a child psychologist.

Pharmacological management of FGID

- Functional dyspepsia

Simple antacids may be helpful. Alginate preparations are often tried. H2 receptor antagonists are widely used though their efficacy in FGID is unclear. Proton pump inhibitors are not licensed for this indication in children. Despite this, proton pump inhibitors are increasingly widely used in the paediatric population, without clear evidence of efficacy.

- Irritable bowel syndrome

Peppermint oil or antispasmodics such as hyoscine butylbromide and mebeverine hydrochloride may provide symptomatic relief.

- Abdominal migraine

Attacks may respond to prompt administration of simple analgesia. The combination of paracetamol and ibuprofen at optimal dosage should be recommended, repeated as necessary throughout the duration of the attack. Codeine may be added to this for additional analgesia.

Antiemetics such as metoclopramide, domperidone or ondansetron may be helpful, particularly when nausea and vomiting are prominent features. Potential side effects should be discussed with the child and family. Triptans are not commonly used to treat abdominal migraine in children.

Prophylaxis may be indicated if the attacks are frequent enough to cause a significant disruption to normal activities. Pizotifen and propranolol can be used and usually have an acceptable side effect profile. A symptom diary is helpful to assess benefit.

- Childhood functional abdominal pain and childhood functional abdominal pain syndrome.

Simple analgesia with paracetamol and ibuprofen should be tried. Many children find little relief from the medications. No other pharmacological treatment has been shown to be effective.

Laxatives are often prescribed on the assumption that constipation underlies the pain. If there is a clear history of functional constipation (see Rome III criteria), then laxatives may be indicated to manage that symptom and prevent overflow and soiling, but they are not beneficial to children with functional abdominal pain without constipation.

Non-pharmacological management of FGID

Use of the biopsychosocial model may be helpful to identify factors that are amenable to modification.

- Biological factors

Dietary manipulation is often tried and some children do seem to get some relief with simple modification of diet. If there is concern that the diet is becoming too restricted, a full dietary assessment by a paediatric dietician is indicated. Abdominal migraine may be triggered by identifiable dietary constituents, which should be excluded.

- Psychological factors

The young person should be encouraged to identify psychological factors that contribute to their symptoms. For many, these will include stress and anxiety. They may express particular anxieties e.g. around the health of other family members, about their parent's relationship, or about their perceived lack of achievement compared with expectation.

If a potentially serious psychological or psychiatric disorder is suspected at this stage (e.g. an eating disorder, obsessive compulsive disorder) then referral on to children's mental health services is indicated. Primary care physicians or general paediatricians may undertake some psychological interventions, depending on their competence, confidence, and available facilities and time. Failure to achieve any progress with symptom control and return to normal functioning should prompt referral to child mental health services for consideration of cognitive behavioural therapy or other intervention.

- Social factors

The young person should be given the opportunity to reflect on their social situation and how this interacts with their symptoms. More mature young people should be offered the opportunity for a consultation without their parent present.

Non-directive questioning may allow them to open up about social factors such as bullying, gang membership, peer coercion into unwanted activities, sexual abuse, witnessing of domestic violence, and physical abuse. Open questions can be followed by more directed questioning to ensure the young person has had every opportunity to disclose any abuse.

If any social concerns are identified, they should be addressed where possible. The family should be told how social issues can predispose, trigger or perpetuate the pain. Any concerns regarding possible abuse must be managed as per local child protection guidelines. Concerns about schooling can be addressed with the parents and education authorities as appropriate.

Prognosis

In children with identified organic disease, the prognosis will depend on the nature of the disease and response to treatment. Children with FGID generally have a good prognosis. Studies suggest around 30% of patients will have persistent symptoms as adults. Long term studies suggest children with FGID have an increased incidence of adult psychiatric disorders such as anxiety and depression. Abdominal migraine has a tendency to resolve around puberty but may recur, or patients may develop classical migraine with headache.

Conclusion

Recurrent abdominal pain is a common symptom in childhood. Underlying organic disease is rare, but important treatable causes must be considered. A thorough history, examination, and a limited number of investigations is adequate to identify important organic disease. In children without organic disease, several patterns of functional pain are recognized according to the Rome III classification. A biopsychosocial approach helps to identify the predisposing, precipitating and perpetuating factors involved in aetiology. Management involves identifying factors amenable to change that will promote resilience to the symptoms. Long term prognosis is guarded, with patients predisposed to ongoing symptoms and adult mental health problems. ◆

FURTHER READING

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WEBSITE

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Practice points

- Organic disease is rarely found in children with recurrent abdominal pain.
- A limited number of investigations should be performed if no red flag symptoms or signs are present.
- Management should centre on identifying biological, psychological and social factors contributing to the symptoms.
- Symptoms may be persistent or recurrent over years, and maintenance of normal function should be a primary aim.