Functional abdominal pain disorders in children

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Background
Paediatric functional abdominal pain disorders (FAPDs) encompass a heterogenous group of medical conditions characterised by chronic abdominal pain that cannot be fully explained by another medical condition. It is important to have a structured approach to assessing patients as FAPDs can pose diagnostic challenges.

Objective
This article summarises the clinical assessment, investigations and management of paediatric patients presenting with chronic abdominal pain suggestive of FAPDs. It discusses the importance of a biopsychosocial approach to FAPDs, outlining the recommended approach to assessing and managing patients in a primary care setting.

Discussion
A diagnosis of FAPD can often be made from a thorough clinical assessment without the need for extensive investigations or referrals that can perpetuate the anxiety of patients and their family. However, it is important to identify the presence of red flag features that raise the possibility of more serious causes that must not be missed.

CASE

A boy, aged nine years, presents with chronic abdominal pain with irregular bouts of exacerbations over the last eight months. This has become increasingly disruptive, causing absences from school. His parents are concerned given the uncertain explanations from numerous healthcare practitioners consulted over several weeks.

Upon review, a thorough clinical assessment was deemed unremarkable. Routine blood tests including coeliac serology and ultrasound of the abdomen were ordered by the family physician, which were unremarkable. Ultimately, referral to a gastroenterologist prompted a diagnosis of functional abdominal pain, allowing appropriate management to commence. Patient education and a strong therapeutic relationship resulted in a steady recovery of the child's symptoms. Invasive investigations like endoscopy were not deemed necessary in the absence of red flags.

Functional abdominal pain disorders

Functional abdominal pain disorders (FAPDs) are a heterogenous group of medical conditions characterised by abdominal pain that cannot be fully attributed to another medical condition.[1] These conditions are now better described as a subset of the disorders of gut–brain interaction (DGBI).[2] Paediatric FAPDs affect approximately 13.5% of children worldwide[3] and can have a significant effect on their overall wellbeing.[4] Table 1 outlines the diagnostic criteria for the four subtypes of FAPDs.

Although the exact aetiology of FAPDs is unclear, it appears to be multifactorial, involving a complex interplay between genetic and environmental factors. In addition to changes in gut motility, visceral hypersensitivity to the physiological distension in the stomach and intestines is thought to produce the pain and discomfort experienced in FAPDs.[5] Recently, the role of the *microbiota*–gut–brain axis has gained growing interest given its implication in the development, hence management, of FAPDs.[5] It describes the pathological consequences resulting from complex interactions between the gut microbiota, immune system, central neurochemistry and human behaviour.[5] Additionally, it is not uncommon to find FAPDs clustered within families, implying hereditary factors.[6,7]

Aim

This article focuses on the clinical assessment, investigation and management

of children presenting with chronic abdominal pain associated with symptoms suggestive of FAPDs. It summarises the approaches to diagnose and manage patients holistically to optimise their symptom control and quality of life.

Clinical assessment

Children with FAPDs have often seen numerous healthcare practitioners, causing considerable distress within the family who are keen for a definitive diagnosis. A thorough history of the abdominal pain and associated symptoms is essential and can be facilitated by a symptom diary. Exploring the past medical history, specifically identifying any autoimmune diseases and family history of conditions including inflammatory bowel disease (IBD), coeliac disease and migraine headaches, is helpful.[8] Where appropriate, a gynaecological history must be elicited for female patients given that symptoms can overlap with FAPDs. The presence of 'red flag' features (Box 1) must prompt consideration of serious underlying organic diagnoses.

Evaluating psychosocial stressors, participation in school and family relationships identifies perpetuating factors and offers opportunities for intervention. Evaluating parents' and carers' attitudes and responses to their child's symptoms is important as this significantly affects outcomes.[8,9] Additionally, anxiety and depression are common in children with FAPDs, affecting approximately 50% of patients.[10] Functional impairment secondary to FAPDs is directly proportionate to the severity of psychological symptoms; therefore, proactively screening for this is recommended.[10] Psychological distress also increases the likelihood of FAPD symptoms persisting into adulthood.[11,12]

The initial examination includes growth assessments (including serial measurements), pubertal staging, assessment of hydration and abdominal examination. A rectal examination should only be performed if indicated (eg rectal bleeding, significant anorectal pain) and with consent.

Although FAPDs can be diagnosed without extensive investigations, the Rome IV diagnostic criteria specify the importance of identifying and excluding any underlying organic causes.[1] As a thorough clinical assessment is usually sufficient to exclude organic causes, investigations should only be performed if indicated and must be targeted to likely diagnoses (Box 2). Unnecessary and costly investigations or referrals can perpetuate the anxiety experienced by the child and their family.[13] Routine investigations include urinalysis and stool sample analysis. Biochemical panel and inflammatory markers might be considered. Coeliac serology and faecal calprotectin can be performed where indicated (eg there is a family history of coeliac disease or IBD or symptoms suggestive of IBD).[8] Although these are less invasive means of investigating important differentials, their limitations must be acknowledged. This includes the significant day-to-day variation of faecal calprotectin, and the need for specialist advice if testing children aged less than four years.[14] Depending on the presentation, lipase, iron studies, urease breath test for

Table 1. Rome IV diagnostic criteria for the subtypes of paediatric functional abdominal pain disorders

FAPD subtype	Diagnostic criteria
Functional dyspepsia	At least one of the following symptoms on more than 4 occasions per month, for more than 2 months: • postprandial fullness • early satiation • epigastric pain/burning not related to defecation
Irritable bowel syndrome	Abdominal pain on more than 4 occasions per month, for more than 2 months, in addition to at least one of the following symptoms: • pain associated with defecation, but not relieved with management of constipation (if present) • change in frequency and/or appearance of the stool
Abdominal migraine	Presence of all of the following symptoms on more than one occasion over a minimum of 6 months: • paroxysmal abdominal pain persisting for at least an hour • recurrences occur after weeks to months • pain significantly impairs daily functioning • patterns and symptoms are predictable for each patient • pain associated with at least two of the following: – anorexia – nausea – vomiting – headache – photophobia – pallor
Functional abdominal pain – not otherwise specified	Presence of all of the following on more than 4 occasions per month: • intermittent or persistent abdominal pain not associated exclusively with activities such as eating or menstruation • does not meet the diagnostic criteria for any other FAPD above

The diagnostic criteria are as detailed by the Rome Foundation.[1]

FAPD, paediatric functional abdominal pain disorders.

Adapted from Rome Foundation. Appendix A: Rome IV Diagnostic criteria for FGIDs. A. Esophageal disorders. Rome Foundation, 2021. Available at https://theromefoundation.org/rome-iv/rome-ivcriteria, with permission from the Rome Foundation, Inc.

Box 1. Red flag features of chronic abdominal pain affecting children

- Down-trending or stagnant growth pattern (height and/or weight)
- Delayed puberty
- Vomiting (persistent, frequent, bile- or blood-stained)
- Dysphagia or odynophagia
- Persistent diarrhoea (especially if worse at night)
- Gastrointestinal bleeding, unexplained iron deficiency or anaemia
- Localised and/or persistent pain, especially in the right lower or upper quadrant
- Perianal disease
- Unexplained fever
- Arthritis
- Family history of inflammatory bowel disease, coeliac disease or peptic ulcer disease

Adapted from Nightingale S, Sharma A. Functional gastrointestinal disorders in children: What is new? J Paediatr Child Health 2020;56(11):1724–30, with permission from John Wiley and Sons.[8]

Box 2. Investigations to consider in a child presenting with abdominal pain

Routine investigations:

- urinalysis
- stool sample analysis
- microscopy, culture and sensitivity
- ova, cysts and parasites (if suspected)
- ± biochemical tests (FBC, UEC, LFT)
- ± inflammatory markers (CRP)

Targeted investigations if clinically indicated:

- *Helicobacter pylori* testing (urease breath test or stool analysis)
- coeliac serology
- faecal calprotectin
- serum lipase
- iron studies
- STI screen
- pregnancy test (females)
- abdominal ultrasound
- endoscopy ± biopsy

CRP, C-reactive protein; FBC, full blood count; LFT, liver function test; STI, sexually transmissible infection; UEC, urea, electrolytes and creatinine.

Helicobacter pylori, pregnancy test and sexually transmissible infection (STI) screen might yield useful information.[14]

Invasive investigations (eg endoscopy) are limited in their use in the diagnosis of FAPDs as they often detect small macroscopic and histological changes that lack clinical significance; therefore, it is always best to seek specialist advice.[5] Abdominal ultrasound has a low yield in diagnosing chronic abdominal pain, but can be used to exclude intra-abdominal mass if abnormal examination findings are present.[14] Abdominal X-rays are not routinely performed for non-specific abdominal pain.[14]

By definition, FAPDs are characterised by abdominal pain that cannot be *fully* attributed to another medical condition;[1] however, it is important to note that FAPDs have been found to coexist with organic conditions such as IBD and lactose intolerance.[5] It is also possible for different FAPDs to co-exist in the same patient;[5] therefore, efforts must be made to appreciate whether any potential organic causes, if found, can *fully* explain the symptoms experienced.

Management of FAPDs

Managing FAPDs requires a biopsychosocial approach; therefore, developing a strong therapeutic relationship and providing multidisciplinary care is essential. Confirming a positive diagnosis, and acknowledging and validating the symptoms and their consequences, must be prioritised.[8] Therefore, patient education and reassurance are the mainstay of management. This includes discussions about how pain is experienced, 'false alarm' signals from the gut, and how pain can feel stronger when our attention is directed towards it.[8] Understanding why the patient has presented at this time is helpful to tackle concerns that arise from what they might have read online or seen in family and/or friends with significant underlying diseases such as cancer or bowel obstruction.[8] Furthermore, instead of pain eradication, it is necessary to set realistic therapeutic goals, such as returning to school or sports.

Furthermore, as trigger food avoidance can lead to nutritional deficiency and poor growth, diet should be regularly reviewed and routinely assessed for the need for referral to a dietitian. Addressing dysfunctional eating, sleeping and exercise habits are important aspects of improving overall health outcomes.[8]

Regarding therapeutic interventions, the role and efficacy of probiotics has been long debated given the implications of the microbiota–gut–brain axis. A recent Cochrane review reported low-quality evidence that probiotics relieved abdominal pain in paediatric FAPDs.[15] However, unexplained heterogeneity of the study designs and absence of long-term safety data prevents this from being recommended as standard clinical practice.[15] Similarly, although there are many alternative medicines and pharmacological options, including neuromodulatory medications (eg tricyclic antidepressants), their efficacy in children needs to be further investigated.[16] Thus, non-pharmacological alternatives emerge as practical solutions.

Most FAPD studies investigate the efficacy of cognitive behavioural therapy (CBT), including internet-delivered programs that are emerging as a cost-effective approach.[17] It is important to identify, and treat, co-existing anxiety and depression in children diagnosed with FAPDs as they are associated with greater functional impairment and poor recovery.[13] CBT was found to alleviate both abdominal pain *and* improve psychological outcomes.[18] It equips children with skills to cope with the psychosocial stressors that act as perpetuating factors for their somatic symptoms.

Similarly, gut-focused hypnotherapy induces a state of increased focus on pleasant thoughts and mental images, and receptivity to suggestions.[19] Although the exact mechanism is unknown, hypnotherapy is thought to improve intestinal motility and visceral hypersensitivity in patients with FAPDs.[20] Consequently, studies have demonstrated long-lasting improvements in pain, as well as anxiety, depression and quality of life.[20] However, there are limited predictors of therapeutic response.

Given the role of a dysregulated gut–brain axis in FAPDs, sleep disturbances correlate with abdominal pain severity, both directly and indirectly through increased susceptibility to psychological stressors.[21] Therefore, improvements in sleep habits offer therapeutic benefits.

Ultimately, referral to a paediatric gastroenterologist can be helpful if the diagnosis is uncertain and can facilitate addressing behaviours that might act as perpetuating factors.

Conclusion

Paediatric FAPDs are commonly encountered in primary care and despite being benign, they have a significant effect on the wellbeing and functioning of children and their families. The pathophysiology of FAPDs is complex and multifactorial, involving interplay between the microbiota–brain–gut axis, visceral hypersensitivity and changes to gut motility. Novel pharmacological therapies continue to emerge, but reassurance, patient education, building a strong therapeutic relationship and psychological approaches including CBT and gut-directed hypnotherapy, remain the cornerstones of FAPD management.

Key points

- Paediatric FAPDs are commonly encountered in general practice, affecting 13.5% of children.
- The pathophysiology of FAPDs is complex, involving interactions between the microbiota–gut–brain axis, changes in gut motility and visceral hypersensitivity.
- A thorough clinical assessment is often sufficient for a diagnosis of FAPD; however, if investigations are indicated, they must be targeted at likely diagnoses.
- Concurrent psychological symptoms must be identified and treated as they are associated with greater functional impairment and persistence of FAPDs into adulthood.
- Developing a strong therapeutic relationship, providing reassurance and patient education are the mainstay of FAPD management.

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References

1. Rome Foundation. Appendix A: Rome IV Diagnostic criteria for FGIDs. A. Esophageal disorders. Rome Foundation, 2021. Available at https://theromefoundation.org/rome-iv/rome-iv-criteria [Accessed 5 July 2024].
2. Drossman DA. Functional gastrointestinal disorders: History, pathophysiology, clinical features and Rome IV. Gastroenterology 2016:S0016-5085(16)00223-7. doi: 10.1053/j.gastro.2016.02.032.
3. Korterink JJ, Diederen K, Benninga MA, Tabbers MM. Epidemiology of pediatric functional abdominal pain disorders: A meta-analysis. PLoS One 2015;10(5):e0126982. doi: 10.1371/journal.pone.0126982.
4. Varni JW, Bendo CB, Nurko S, et al; Pediatric Quality of Life Inventory (PedsQL) Gastrointestinal Symptoms Module Testing Study Consortium. Health-related quality of life in pediatric patients with functional and organic gastrointestinal diseases. J Pediatr 2015;166(1):85–90. doi: 10.1016/j.jpeds.2014.08.022.
5. Thapar N, Benninga MA, Crowell MD, et al. Paediatric functional abdominal pain disorders. Nat Rev Dis Primers 2020;6(1):89. doi: 10.1038/s41572-020-00222-5.
6. McClellan N, Ahlawat R. Functional abdominal pain in children. StatPearls Publishing, 2023. Available at www.ncbi.nlm.nih.gov/books/NBK537298 [Accessed 13 July 2024].
7. Korterink J, Devanarayana NM, Rajindrajith S, Vlieger A, Benninga MA. Childhood functional abdominal pain: Mechanisms and management. Nat Rev Gastroenterol Hepatol 2015;12(3):159–71. doi: 10.1038/nrgastro.2015.21.
8. Nightingale S, Sharma A. Functional gastrointestinal disorders in children: What is new? J Paediatr Child Health 2020;56(11):1724–30. doi: 10.1111/jpc.14857.
9. Sieberg CB, Smith A, White M, Manganella J, Sethna N, Logan DE; Guest Editors: Gerhardt CA, Berg CA, Wiebe DJ, Holmbeck GN. Changes in maternal and paternal pain-related attitudes, behaviors, and perceptions across pediatric pain rehabilitation treatment: A multilevel modeling approach. J Pediatr Psychol 2017;42(1):52–64.
10. Yacob D, Di Lorenzo C, Bridge JA, et al. Prevalence of pain-predominant functional gastrointestinal disorders and somatic symptoms in patients with anxiety or depressive disorders. J Pediatr 2013;163(3):767–70. doi: 10.1016/j.jpeds.2013.02.033.
11. Dengler-Crish CM, Horst SN, Walker LS. Somatic complaints in childhood functional abdominal pain are associated with functional gastrointestinal disorders in adolescence and adulthood. J Pediatr Gastroenterol Nutr 2011;52(2):162–65. doi: 10.1097/MPG.0b013e3181ec1d2e.
12. Horst S, Shelby G, Anderson J, et al. Predicting persistence of functional abdominal pain from childhood into young adulthood. Clin Gastroenterol Hepatol 2014;12(12):2026–32. doi: 10.1016/j.cgh.2014.03.034.
13. Cunningham NR, Lynch-Jordan A, Mezoff AG, Farrell MK, Cohen MB, Kashikar-Zuck S. Importance of addressing anxiety in youth with functional abdominal pain: Suggested guidelines for physicians. J Pediatr Gastroenterol Nutr 2013;56(5):469–74. doi: 10.1097/MPG.0b013e31828b3681.
14. The Royal Children's Hospital Melbourne. Abdominal pain – chronic. Clinical practice guidelines. The Royal Children's Hospital Melbourne, 2024. Available at www.rch.org.au/clinicalguide/guideline_index/Abdominal_pain_-_chronic [Accessed 15 July 2024].
15. Wallace C, Gordon M, Sinopoulou V, Akobeng AK. Probiotics for management of functional abdominal pain disorders in children. Cochrane Database Syst Rev 2023;2(2):CD012849. doi: 10.1002/14651858.CD012849.pub2.
16. Rexwinkel R, de Bruijn CMA, Gordon M, Benninga MA, Tabbers MM. Pharmacologic treatment in functional abdominal pain disorders in children: A systematic review. Pediatrics 2021;147(6):e2020042101. doi: 10.1542/peds.2020-042101.
17. Lalouni M, Ljótsson B, Bonnert M, et al. Clinical and cost effectiveness of online cognitive behavioral therapy in children with functional abdominal pain disorders. Clin Gastroenterol Hepatol 2019;17(11):2236–2244.e11. doi: 10.1016/j.cgh.2018.11.043.
18. Rutten JM, Korterink JJ, Venmans LM, Benninga MA, Tabbers MM. Nonpharmacologic treatment of functional abdominal pain disorders: A systematic review. Pediatrics 2015;135(3):522–35. doi: 10.1542/peds.2014-2123.
19. Elkins GR, Barabasz AF, Council JR, Spiegel D. Advancing research and practice: The Revised APA Division 30 Definition of Hypnosis. Am J Clin Hypn 2015;57(4):378–85. doi: 10.1080/00029157.2015.1011465.
20. Vlieger AM, Assa A, Borrelli O, et al; Gastroenterology Committee of ESPGHAN. Hypnotherapy in pediatric gastroenterology. J Pediatr Gastroenterol Nutr 2023;76(1):9–13. doi: 10.1097/MPG.0000000000003617.
21. Kim HJ. Importance of sleep quality in functional abdominal pain disorder in pediatric patients. Sleep Biol Rhythms 2021;20(1):81–85. doi: 10.1007/s41105-021-00342-9.

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