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Indications for gastrointestinal endoscopy in childhood

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ABSTRACT

Endoscopic examination of the gastrointestinal tract (GIT) for diagnostics and therapy in children has evolved markedly over the last 20 or so years and is now usually undertaken by paediatric endoscopists. Updated diagnostic and management guidelines for common disorders including coeliac disease, gastro-oesophageal reflux disease, eosinophilic oesophagitis and inflammatory bowel disease highlight the central role of endoscopy. Therapeutic endoscopic approaches are also now widely available and further broaden the referral spectrum to include treatment of GIT bleeding, gastrostomy insertion, dilation of strictures and polypectomy. Lastly, the advent of newer technologies allows the examination of hitherto inaccessible areas of the GIT such as the mid-small bowel by wireless capsule video-endoscopy and enteroscopy. We summarise recent current practice and clinical guidelines, focussing on the key indications for referrals that are likely to require endoscopic assessment.

INTRODUCTION

Paediatric gastrointestinal endoscopy has become much more frequent as paediatric gastroenterology has expanded as a subspecialty aided by the advent of technological advances that have seen the evolution of slimmer endoscopes and size-appropriate accessories. Children of all ages can now be examined, enabling an increase in the diagnosis of well-known diseases (including inflammatory bowel disease (IBD), coeliac disease (CD), reflux-related oesophagitis and peptic ulcer disease) and emerging disorders (eg, eosinophilic oesophagitis (EoE)). Newer modalities, including wireless capsule endoscopy (WCE), have been shown to be safe and effective, allowing mucosal visualisation of the mid-small bowel, the diagnosis of disorders of which had previously relied upon radiological or surgical approaches.[1]

Changing indications for paediatric endoscopy over the last 25 years may have influenced the detection rates of other diseases such as IBD. Prospective studies have shown an increase in paediatric IBD incidence rates, which might indicate a true increase but also may be influenced by acquisition bias secondary to the wider availability of, and improvement in the quality of, endoscopic assessment.[2–4]

However, despite an increase in the number of gastrointestinal (GI) endoscopies in recent years, the diagnostic yield with abnormal histology results in endoscopic procedures overall remains constant at between 62% and 76%.[5 6] This suggests that the increase in the number of paediatric endoscopies is due to increased demand rather than lower thresholds for procedures.

In addition to IBD and EoE, diagnosis of CD is increasing with better awareness of the disease.[7 8] Serological testing of a large cohort random sample from the US population estimated the prevalence of CD in subjects without risk factors to be as high as 1:133 (0.8%),[9] although oesophago-gastro-duodenoscopy (OGD) is now not indicated in every symptomatic child with positive serology and HLA positivity.

It is important to bear in mind that, in appropriately trained and experienced hands, endoscopy is very safe and is rarely associated with morbidity. However, it is not cheap compared to other less invasive diagnostic routes and so a pragmatic approach is required in children.

The aim of this article is to guide the general paediatrician in considering referral to a gastroenterologist for possible endoscopic assessment.

DIAGNOSTIC ENDOSCOPY

Indications for diagnostic OGD and/or ileocolonoscopy are suggested in algorithms shown in figures 1–5. The aim of these algorithms is to provide a guide as to when endoscopy might be necessary based on symptoms (chronic vomiting, dysphagia, chronic iron deficiency anaemia, chronic abdominal pain, chronic diarrhoea and lower GI bleeding).

Endoscopy is not usually indicated in older children for the evaluation of functional GI disorders, including self-limited abdominal pain, constipation and encopresis.[10] Exceptional indications include patients with 'red flag' symptoms and signs such as: pain waking the child from sleep; other associated systemic symptoms such as fever, joint pain or unusual rashes; significant vomiting especially with bile; recurrent mouth ulcers, associated malnutrition or poor growth; dysphagia; and mucous or blood in the faeces.

Gastro-oesophageal reflux disease and endoscopy

OGD is not indicated in uncomplicated gastro-oesophageal reflux disease (GORD). In addition, it is not indicated for infants or children without overt regurgitation presenting with only one of the following: unexplained feeding difficulties (eg, refusing to feed, gagging or choking), distressed behaviour, faltering growth, chronic cough or hoarseness.[11]

However, it should be considered in children in whom reflux-type symptoms persist after 1 year of age and in those presenting with dysphagia (a classic presentation of EoE). Other considerations include

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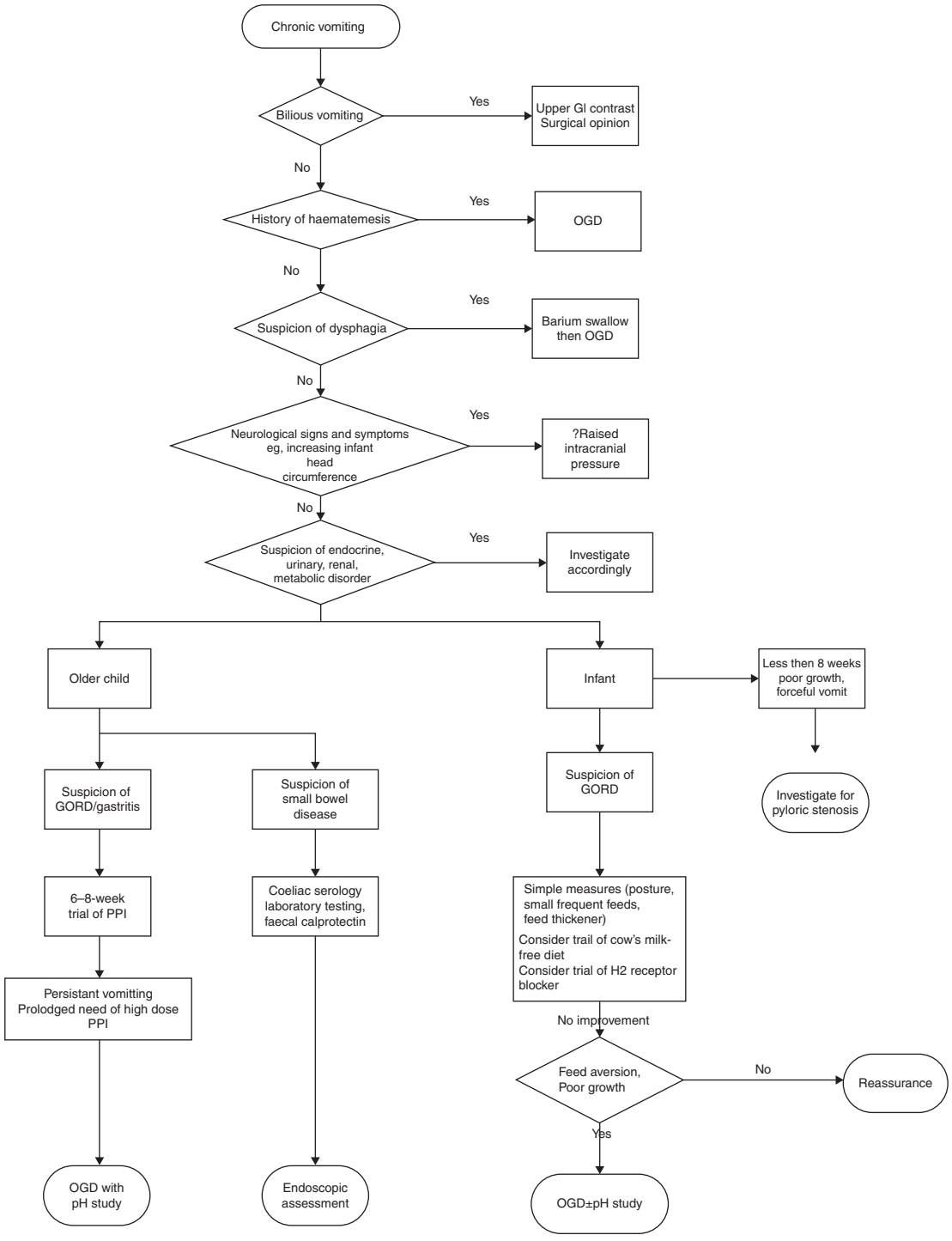

Figure 1 Suggested diagnostic algorithm in chronic vomiting. *Usually combined with raised inflammatory markers (erythrocyte sedimentation rate (ESR), C-reactive protein (CRP)), anaemia, low albumin, thrombocytosis and raised faecal calprotectin. GI, gastrointestinal; GORD, gastro-oesophageal reflux disease; OGD, oesophago-gastro-duodenoscopy; PPI, proton pump inhibitor.

reflux-type symptoms and refractory iron deficiency anaemia, and other complication factors such as faltering growth.

Helicobacter pylori and OGD

It is recommended that the initial diagnosis of *Helicobacter pylori* (HP) infection is based on OGD with positive histopathology/positive rapid urease test and/or a positive culture. The primary goal of testing is to diagnose the cause of clinical symptoms[12] (figure 6). The 'test and treat' strategy (detection of HP infection by a non-invasive test followed by treatment in the case of a positive test) remains controversial in paediatrics. In practice, many practitioners adopt this strategy which is predicated on factors such as the cost and availability of endoscopy and also because potential pathologies associated with HP and which may be causing the symptoms can be treated non-invasively; the issue of antibiotic use and in particular the emerging resistance of HP to standard eradication regimes is also a consideration here. However, it is important to make it clear to the parent that the test may or may not be relevant and upper GI endoscopy might be the only way forward. There is

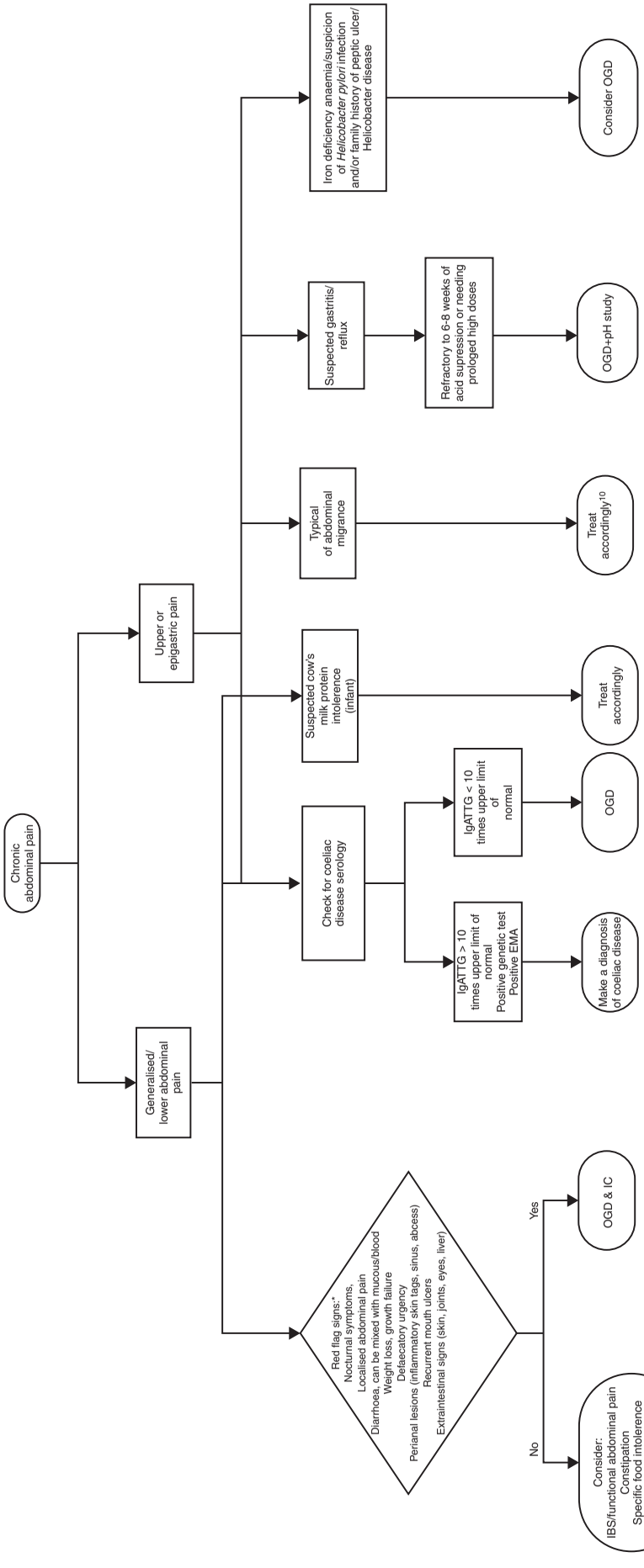

Figure 2 Suggested diagnostic algorithm in chronic abdominal pain. *Usually combined with raised inflammatory markers (erythrocyte sedimentation rate (ESR), C-reactive protein (CRP)), anaemia, low albumin, thrombocytosis and raised faecal calprotectin. GI, gastrointestinal; IC, ileo-colonoscopy; IBS, irritable bowel syndrome; OGD, oesophago-gastro-duodenoscopy.

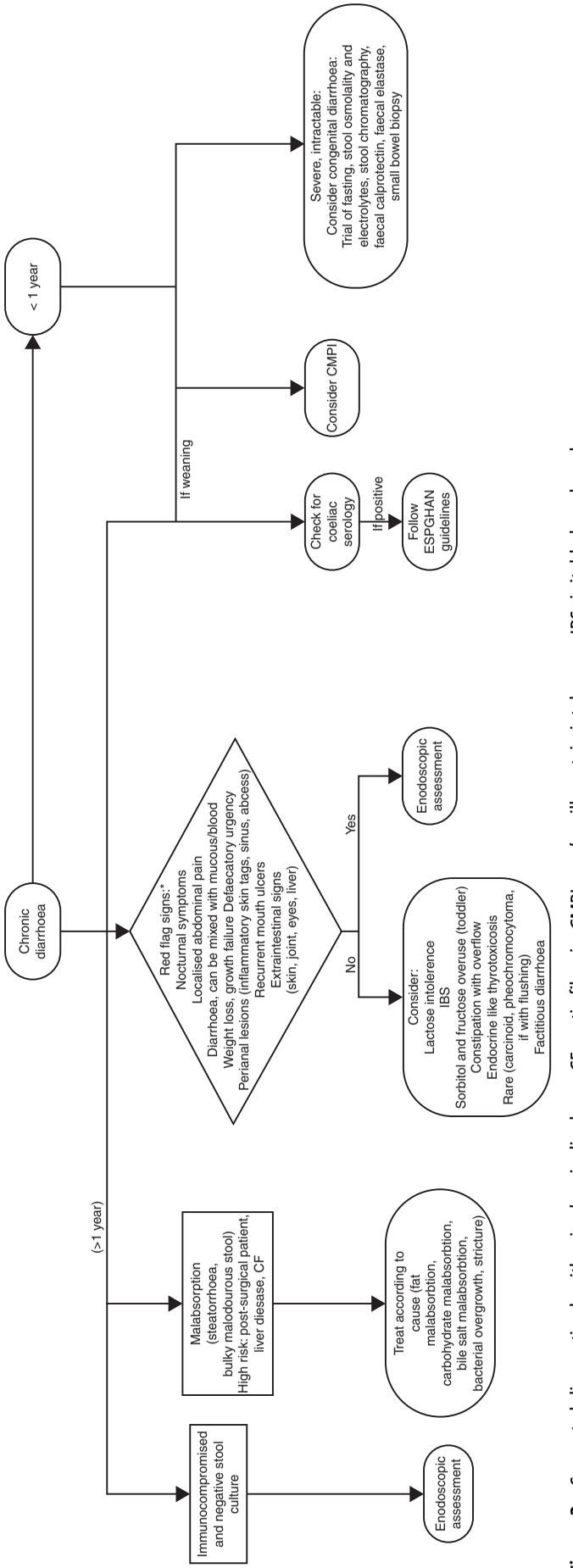

Figure 3 Suggested diagnostic algorithm in chronic diarrhoea. CF, cystic fibrosis; CMPI, cow's milk protein intolerance; IBS, irritable bowel syndrome.

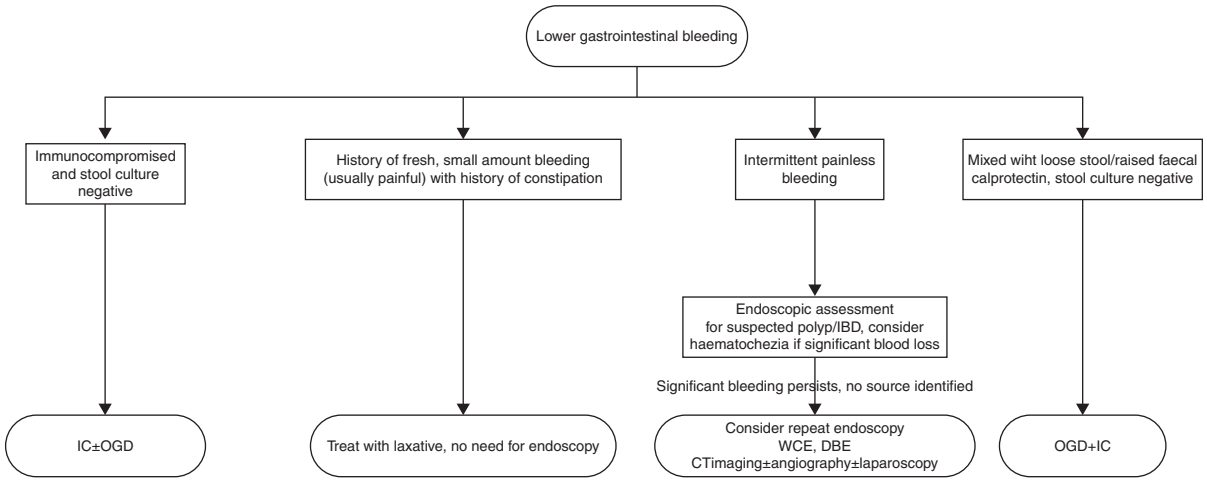

Figure 4 Suggested diagnostic algorithm in lower gastrointestinal bleeding. DBE, double balloon enteroscopy; IBD, inflammatory bowel disease; IC, ileo-colonoscopy; OGD, oesophago-gastro-duodenoscopy; WCE, wireless capsule endoscopy.

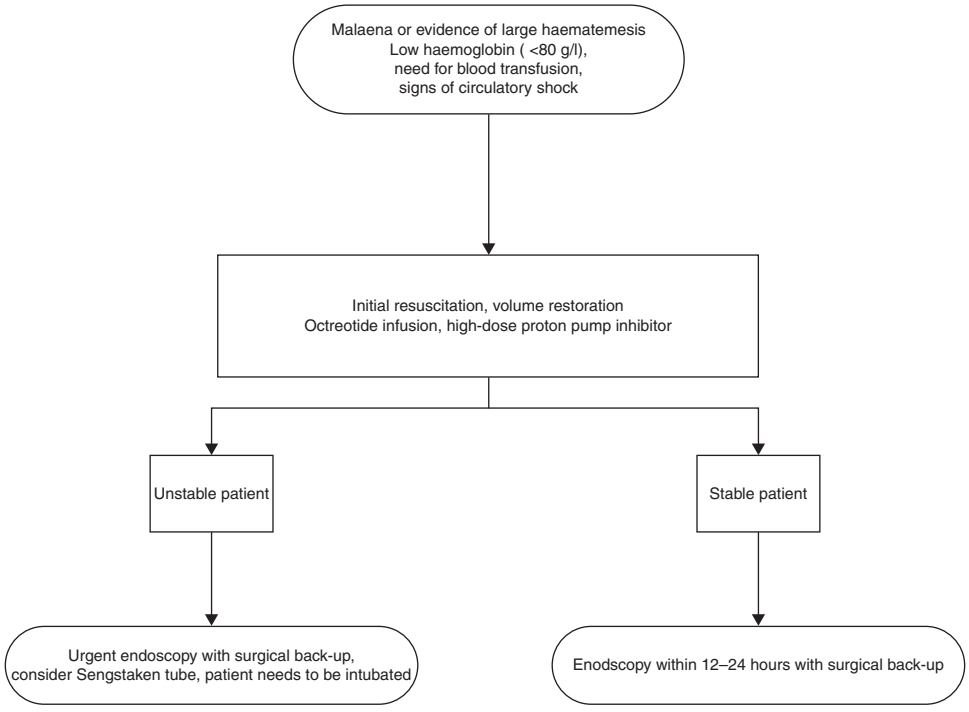

Figure 5 Suggested initial algorithm in managing acute upper gastrointestinal bleeding.

inadequate evidence supporting a causal relationship between HP gastritis and abdominal symptoms in the absence of ulcer disease.[13 14] Therefore, eradication of the organism in the absence of ulcers may not result in improvement of symptoms. Eradication of HP after 6–8 weeks subsequent to the eradication regime should be confirmed by non-invasive methods.[12]

Coeliac disease and OGD

According to the recent BSPGHAN and ESPGHAN guidelines, most symptomatic patients with positive tissue transglutaminase (tTG) findings should have endoscopic assessment. However, a diagnosis of CD can be made in symptomatic patients with tTG levels more than 10 times the upper limit of normal without endoscopic assessment, providing that genetic testing (HLA DQ2/DQ8) and anti-endomysial antibodies are positive.[15]

Endoscopic assessment in asymptomatic patients with a risk of developing CD is indicated if their tTG is >3 times the upper limit of normal with positive HLA DQ2/DQ8 genetic testing, or if tTG is positive but <3 times the upper limit of normal with positive anti-endomysial antibodies and positive HLA DQ2/DQ8 genetic testing. The expertise of the local genetics laboratory in interpreting coeliac genetics should be considered. A genotyping result that has resolved all common and well-documented HLA alleles ((HLA-DQ2.5, -DQ2.5/8, -DQ8, -DQ2.2 and -DQA1*05) is preferred.[15–17] However, it should be remembered that HLA DQ2/DQ8 risk-associated haplotypes are common and carried by 20–30% of the general population. CD is very unlikely (1%) if these risk alleles are absent.[17] Recently HLA-DQ2.2 has been used to further improve the true negative value of this test. Discussion with a gastroenterologist

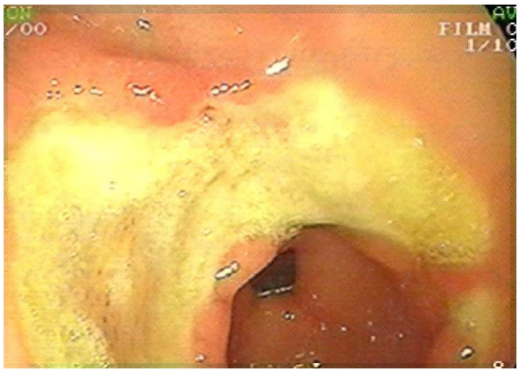

Figure 6 Large pre-pyloric ulcer associated with *Helicobacter pylori* in a 5-year-old child.

or paediatrician with a special interest in gastroenterology is recommended before making the diagnosis.

Eosinophilic oesophagitis

EoE is an emerging chronic disease with an estimated prevalence similar to that of other GI diseases such as Crohn's disease.[18] Usually, EoE is suspected if symptoms caused by oesophageal dysfunction and/or fibrosis are present. Infants and toddlers often present with feeding difficulties, while school-aged children and adolescents are more likely to have dysphagia/odynophagia/reflux-type pain. EoE in children is most often present in association with other manifestations of atopic diathesis.[19] The diagnosis of EoE is confirmed if oesophageal biopsy shows at least 15 eosinophils per high-power field (×40) as a peak value in one or more of at least four specimens obtained randomly from the oesophagus.[20] The disease is isolated to the oesophagus, and other causes of oesophageal eosinophilia should be excluded, specifically proton-pump inhibitor (PPI)-responsive oesophageal eosinophilia. The disease is responsive to the elimination of specific dietary antigens, topical corticosteroids, or both.[21]

UPPER GASTROINTESTINAL BLEEDING

Upper gastrointestinal bleeding, including variceal and non-variceal bleeding, occurs in 1 or 2 per 10 000 children per year; hopefully this will be further clarified by an nationwide survey in the UK.[22] Urgent endoscopy (within 12 hours of presentation) is recommended for patients presenting with significant haematemesis and/or melaena with a significant drop in haemoglobin (Hb). If signs of hypovolaemia including hypotension, tachycardia and shock occur, then emergent (as soon as possible) OGD is necessary. Figure 5 shows the initial management algorithm for upper gastrointestinal bleeding.

FOREIGN BODY INGESTION

Ingested foreign bodies which have passed through the oesophagus, will pass through the GIT in most cases. However, sharp or toxic foreign bodies lodged in the oesophagus have to be removed as an emergency within 2 hours of ingestion even if the patient has not been appropriately fasted.[23–25] Regardless of the properties of the ingested object, OGD is indicated if passing is delayed and the foreign body remains in the stomach, although the timing of removal varies. Button batteries can lead to severe oesophageal damage and fistula formation within a very short time, and delayed complications can occur even days after removal, indicating the urgency of foreign body retrieval.[26] Hence, oesophageal button batteries have emerged as the most critical indication for emergent endoscopy in children. Immediate retrieval is also indicated after ingestion of multiple magnets as they may cause intestinal obstruction and perforation. A sharp object in the oesophagus is a medical emergency because of the high risk of perforation and migration, and should be removed. If the patient exhibits signs of respiratory compromise, neck swelling, crepitus or peritonitis, surgical consultation is mandatory and the patient should be transferred to a facility with appropriate expertise.[23]

CAUSTIC INGESTION

Oesophageal stricture is a major complication of caustic ingestion. Endoscopy is a mandatory technique in children with suspected gastro-oesophageal caustic injuries and should be performed to prevent unnecessary hospitalisation and to plan future treatment. Clinical signs and symptoms are not predictors of oesophageal and gastric injury, and the absence of clinical findings such as oral cavity/lip injury does not rule out a severe oesophageal or gastric injury. Stricture formation should be diagnosed and treated early 10–14 days after caustic ingestion with an endoscopic dilation programme following radio-contrast-aided radiology.[27 28]

Indications for therapeutic applications of OGD are listed in box 1.

Ileo-colonoscopy

The most common indications for ileo-colonoscopy (IC) include: suspected IBD; known IBD for disease re-assessment; per rectum bleeding which, when painless, may suggest a polyp

Box 1 Therapeutic indications for oesophago-gastro-duodenoscopy

Percutaneous endoscopic gastrostomy (PEG) insertion
Changing PEG tube to button/balloon gastrostomy
Naso-jejunal (NJ) tube placement or gastro-jejunal (GJ) tube placement
Foreign body removal
Food bolus impaction removal
Dilatation of oesophageal strictures±topical application of anti-fibrotic mitomycin C
Oesophageal stent placement—usually reserved for the palliative situation
Dilatation of achalasia
Closure of oesophageal fistulae with tissue glue and endo-clips
Upper gastrointestinal (GI) polypectomy
Upper GI non-variceal bleeding therapy
Oesophageal varices banding (emergency or as prophylactic)
Injection of gastric fundal varices with Histoacryl glue
Division of duodenal web/diaphragm/stenosis
Delivery of wireless video capsule
Laparoscopy assisted percutaneous endoscopic jejunostomy (LAPEJ)
Endoscopic fundoplication
Endo-mucosal resection of sessile lesion (EMR)
Trans-gastric drainage of pancreatic pseudocyst
Endo-ultrasound guided coeliac plexus neurolysis
Endoscopic retrograde cholangiopancreatography (ERCP)—stent placement both biliary and pancreatic
ERCP—sphincterotomy and removal of biliary stones

or polyps (which are usually benign juvenile polyps; figure 4); assessment of known polyposis syndromes; suspected allergic colitis; significant unexplained diarrhoea; and abdominal pain especially in the presence of raised inflammatory markers and/or raised faecal calprotectin.[29] Figures 2–4 show the recommended diagnostic algorithms for common symptoms that might need IC (lower gastrointestinal bleeding, chronic abdominal pain and chronic diarrhoea).

Absolute contraindications to colonoscopy in paediatric patients are suspected bowel perforation and acute peritonitis. Even in severe colitis, with care, IC may be performed without complication.

IBD and endoscopy

IBD symptoms may be extremely diverse. Bloody diarrhoea is the most common presenting symptom in ulcerative colitis (UC), whereas Crohn's disease may present with vague abdominal pain, diarrhoea, unexplained anaemia, fever, weight loss or growth retardation frequently reported as symptoms. The classic triad of abdominal pain, diarrhoea and weight loss occurs in only 25% of patients with Crohn's disease.[30] Extra-intestinal manifestations may present at diagnosis in 6–23% of children and include erythema nodosum, arthropathy, uveitis and mouth ulceration/oro-facial granulomatosis. Endoscopic assessment in children with these signs and symptoms is recommended, especially if they have raised faecal calprotectin.[31] The classification of IBD is complex and requires recognition of the typical features of Crohn's disease and UC, identification of atypical phenotypes that are still consistent with a diagnosis of IBD, and knowledge of those factors helps in differentiating Crohn's disease from UC.[32] Performing biopsies in all segments of the lower digestive tract (ileum, right colon, transverse colon, descending colon, sigmoid and rectum) helps differentiate Crohn's disease from UC (figures 7 and 8) and will help to determine the extent of the inflammatory process.[33] In addition, the diagnostic yield of an OGD with multiple biopsies for diagnosing Crohn's disease and differentiating it from UC in patients with an otherwise normal workup (IC and small bowel imaging) is 7%.[4]

POLYPOSIS SYNDROMES

Children with familial adenomatous polyposis (FAP) or known mutations in the adenomatous polyposis coli (APC) gene should be screened regularly, starting at 10 or 12 years of age.[34]

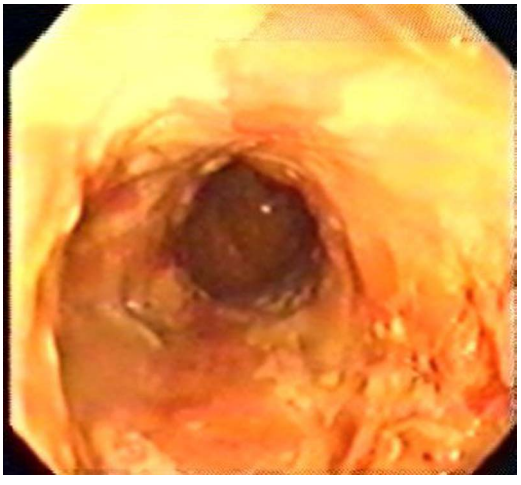

Figure 7 Terminal ileal Crohn's disease.

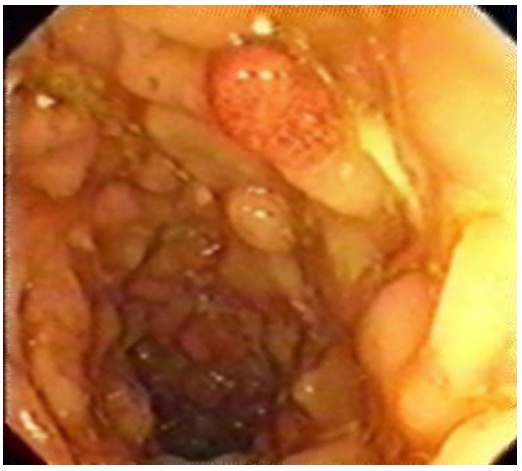

Figure 8 Severe ulcerative colitis with pseudopolyps in an 8-year-old child.

Patients with Peutz-Jegher's polyposis (PJP) may develop significant GI bleeding, intussusception and rectal prolapse. Regular surveillance starting at 10 or 12 years of age with potential polypectomies is indicated. WCE and double balloon enteroscopy (DBE) are significant advances allowing less frequent laparotomy/laparoscopy with small bowel resection in PJP.

Juvenile polyposis coli is suggested if more than five polyps are found and surveillance is needed subsequently due to increased malignant potential.

Genetic counselling and risk analysis via genetic referral of the family members of polyposis patients is required.[35]

Before the introduction of advanced endoscopic techniques like WCE and DBE, surgical resection of the intestinal tract was considered the only possible therapeutic option. Polypectomies via DBE allow therapeutic goals to be achieved in most paediatric patients without the need for more invasive surgical intervention.[36]

Therapeutic application of IC

The most common ileo-colonoscopic therapeutic application is snare polypectomy with cautery, most often of a single juvenile (figure 9) or inflammatory polyp in the sigmoid colon or rectum. Box 2 lists the most common therapeutic applications of IC.

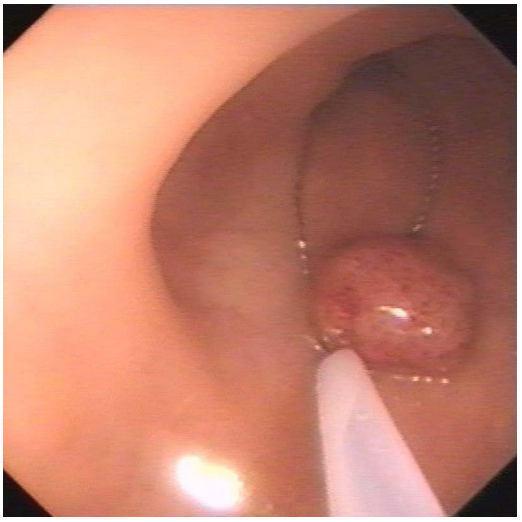

Figure 9 Snare polypectomy for a pedunculated polyp in the sigmoid colon of a child presenting with painless per rectum bleeding.

Box 2 Indications for therapeutic colonoscopy in children

Polypectomy
Dilatation of ileo-colonic stenosis
Treatment of haemorrhagic lesions
Foreign body removal
Caecostomy
Stenting of strictures
Sigmoidostomy

THE ROLE OF THE PAEDIATRIC SURGEON

Collaboration between the paediatric gastroenterologist and the paediatric surgeon is well established in many hospital settings and represents the ideal model of care. Depending on the skill mix within a tertiary centre, the paediatric gastroenterologist or the paediatric surgeon may perform procedures in children, for example, foreign body removal, percutaneous endoscopic gastrostomy placement, treatment of caustic ingestion or upper gastrointestinal bleeding, etc.

CONCLUSION

We have attempted to cover updated indications for paediatric gastrointestinal endoscopy, following the most recent national and international guidelines. The aim has been to provide a general guide for the paediatrician regarding the referral of patients to a paediatric gastroenterologist for consideration of endoscopic assessment or treatment.

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REFERENCES

1 Friedt M, Welsch S. An update on pediatric endoscopy. *Eur J Med Res* 2013;18:24.
2 Kugathasan S, Judd RH, Hoffmann RG, *et al*. Epidemiologic and clinical characteristics of children with newly diagnosed inflammatory bowel disease in Wisconsin: a statewide population-based study. *J Pediatr* 2003;143:525–31.
3 Abdullah BA, Gupta SK, Croffie JM, *et al*. The role of esophagogastroduodenoscopy in the initial evaluation of childhood inflammatory bowel disease: a 7-year study. *J Pediatr Gastroenterol Nutr* 2002;35:636–40.
4 Castellaneta SP, Afzal NA, Greenberg M, *et al*. Diagnostic role of upper gastrointestinal endoscopy in pediatric inflammatory bowel disease. *J Pediatr Gastroenterol Nutr* 2004;39:257–61.
5 Stojanovic J, Kader A, Dryden P, *et al*. Are we doing too many or too few paediatric endoscopies? *Paediatric Child Health* 2007;17:416–17.
6 Lee WS, Zainuddin H, Boey CC, *et al*. Appropriateness, endoscopic findings and contributive yield of pediatric gastrointestinal endoscopy. *World J Gastroenterol* 2013;19:9077–83.
7 Whyte LA, Jenkins HR. The epidemiology of coeliac disease in South Wales: a 28-year perspective. *Arch Dis Child* 2013;98:405–7.
8 White LE, Merrick VM, Bannerman E, *et al*. The rising incidence of celiac disease in Scotland. *Pediatrics* 2013;132:e924–31.
9 Fasano A, Berti I, Gerarduzzi T, *et al*. Prevalence of celiac disease in at-risk and not-at-risk groups in the United States: a large multicenter study. *Arch Intern Med* 2003;163:286–92.
10 Lightdale JR, Acosta R, Shergill AK, *et al*., American Society for Gastrointestinal Endoscopy. Modifications in endoscopic practice for pediatric patients. *Gastrointest Endosc* 2014;79:699–710.
11 Davies I, Burman-Roy S, Murphy MS, Guideline Development Group. Gastro-oesophageal reflux disease in children: NICE guidance. *BMJ* 2015;350:g7703.
12 Koletzko S, Jones NL, Goodman KJ, *et al*. Evidence-based guidelines from ESPGHAN and NASPGHAN for Helicobacter pylori infection in children. *J Pediatr Gastroenterol Nutr* 2011;53:230–43.
13 Bode G, Brenner H, Adler G, *et al*. Recurrent abdominal pain in children: evidence from a population-based study that social and familial factors play a major role but not Helicobacter pylori infection. *J Psychosom Res* 2003;54:417–21.
14 Tindberg Y, Nyrén O, Blennow M, *et al*. Helicobacter pylori infection and abdominal symptoms among Swedish school children. *J Pediatr Gastroenterol Nutr* 2005;41:33–8.
15 Murch S, Jenkins H, Auth M, *et al*., BSPGHAN. Joint BSPGHAN and Coeliac UK guidelines for the diagnosis and management of coeliac disease in children. *Arch Dis Child* 2013;98:806–11.
16 Lionetti E, Castellaneta S, Francavilla R, *et al*. Introduction of gluten, HLA status, and the risk of celiac disease in children. *N Engl J Med* 2014;371:1295–303.
17 Tye-Din JA, Cameron DJ, Daveson AJ, *et al*. Appropriate clinical use of human leukocyte antigen typing for coeliac disease: an Australasian perspective. *Intern Med J* 2015;45:441–50.
18 Cianferoni A, Spergel J. Eosinophilic esophagitis: a comprehensive review. *Clin Rev Allergy Immunol* 2016;50:159–74.
19 Aceves SS, Newbury RO, Dohil MA, *et al*. A symptom scoring tool for identifying pediatric patients with eosinophilic esophagitis and correlating symptoms with inflammation. *Ann Allergy Asthma Immunol* 2009;103:401–6.
20 Mukkada VA, Haas A, Maune NC, *et al*. Feeding dysfunction in children with eosinophilic gastrointestinal diseases. *Pediatrics* 2010;126:e672–7.
21 Liacouras CA, Furuta GT, Hirano I, *et al*. Eosinophilic esophagitis: updated consensus recommendations for children and adults. *J Allergy Clin Immunol* 2011;128:3–20.e6; quiz 21–2.
22 Grimaldi-Bensouda L, Abenhaim L, Michaud L, *et al*. Clinical features and risk factors for upper gastrointestinal bleeding in children: a case-crossover study. *Eur J Clin Pharmacol* 2010;66:831–7.
23 Kramer RE, Lerner DG, Lin T, *et al*., North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition Endoscopy Committee. Management of ingested foreign bodies in children: a clinical report of the NASPGHAN Endoscopy Committee. *J Pediatr Gastroenterol Nutr* 2015;60:562–74.
24 Soccorso G, Grossman O, Martinelli M, *et al*. 20 mm lithium button battery causing an oesophageal perforation in a toddler: lessons in diagnosis and treatment. *Arch Dis Child* 2012;97:746–7.
25 Thomson M, Sharma S. The hazards of button battery ingestion. *Arch Dis Child* 2015;100:1010–11.
26 Behrens R. Ingestion of foreign bodies in the gastrointestinal tract of children and adolescents. *HNO* 2012;60:781–7.
27 Boskovic A, Stankovic I. Predictability of gastroesophageal caustic injury from clinical findings: is endoscopy mandatory in children? *Eur J Gastroenterol Hepatol* 2014;26:499–503.
28 Uygun I. Caustic oesophagitis in children: prevalence, the corrosive agents involved, and management from primary care through to surgery. *Curr Opin Otolaryngol Head Neck Surg* 2015;23:423–32.
29 Park JH. Role of colonoscopy in the diagnosis and treatment of pediatric lower gastrointestinal disorders. *Korean J Pediatr* 2010;53:824–9.
30 Gupta N, Bostrom AG, Kirschner BS, *et al*. Presentation and disease course in early-compared to later-onset pediatric Crohn's disease. *Am J Gastroenterol* 2008;103:2092–8.
31 Jose FA, Garnett EA, Vittinghoff E, *et al*. Development of extraintestinal manifestations in pediatric patients with inflammatory bowel disease. *Inflamm Bowel Dis* 2009;15:63–8.
32 Levine A, Koletzko S, Turner D, *et al*. ESPGHAN revised Porto criteria for the diagnosis of inflammatory bowel disease in children and adolescents. *J Pediatr Gastroenterol Nutr* 2014;58:795–806.
33 Turner D, Levine A, Escher JC, *et al*, European Crohn's and Colitis Organization; European Society for Paediatric Gastroenterology, Hepatology, and Nutrition. Management of pediatric ulcerative colitis: joint ECCO and ESPGHAN evidence-based consensus guidelines. *J Pediatr Gastroenterol Nutr* 2012;55:340–61.
34 Hyer W, Fell JME. Screening for familial adenomatous polyposis. *Arch Dis Child* 2001;84:377–80.
35 Syngal S, Brand RE, Church JM, *et al*., American College of Gastroenterology. ACG clinical guideline: Genetic testing and management of hereditary gastrointestinal cancer syndromes. *Am J Gastroenterol* 2015;110:223–62.
36 Urs AN, Martinelli M, Rao P, *et al*. Diagnostic and therapeutic utility of double-balloon enteroscopy in children. *J Pediatr Gastroenterol Nutr* 2014;58:204–12.

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