Chronic Abdominal Pain in Children: Diagnosis and Treatment

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Definitions: chronic abdominal pain (CAP) — intermittent or continuous pain for ≥1 mo; recurrent abdominal pain (RAP) — ≥3 episodes of pain over ≥3 mo; functional or organic; functional abdominal pain (FAP) — episodic or continuous pain ≥1/wk for ≥2 mo without demonstrable disease; 10% to 25% of school-aged children have RAP (80%-90% functional)

Classification of functional gastrointestinal (GI) disorders associated with pain in children (Rome III criteria): irritable bowel syndrome (IBS) — associated with constipation or diarrhea; functional dyspepsia — associated with nausea and burning epigastric pain, but no disease present; abdominal migraine — paroxysmal episodes of severe pain and/or vomiting with anorexia, nausea, headache, photophobia, and pallor; FAP syndrome — loss of daily function and/or somatic complaints; FAP — no association

Typical pediatric case of RAP: girl, 12 yr of age, with RAP for 8 mo; pain poorly localized and of short duration (1-3 hr); has no pain when asleep or playing; associated with other complaints; diet poor, with low fiber; gets excellent grades (but with significant stress); family history of FAP

Indications of organic causes: <4 yr of age; localized pain; pain lasting >3 hr; pain that awakens child at night or occurs during play; associated symptoms (eg, bloody stools, poor weight gain); negative psychosocial history; positive family history of inflammatory bowel disease (IBD), celiac disease, or peptic ulcer disease

Diagnostic evaluation: thorough history, including careful psychosocial history; pain log helpful; laboratory tests — indicated if uncertain that pain functional; complete blood count with differential to rule out anemia or eosinophilia; erythrocyte sedimentation rate; C-reactive protein to look for inflammatory process; liver function tests to rule out hepatitis, gallbladder disease, or cholecystitis; urinalysis to rule out urinary tract infection (UTI) or hematuria; stool studies for detection of blood, inflammation (lactoferrin), fat, chronic infections (eg, Helicobacter pylori, Giardia); if patient has diarrhea, check stool for reducing substances and pH (indicative of sugar due to lactose or fructose intolerance); if pancreatitis suspected, obtain spot urine amylase-creatinine ratio; amylase and lipase often normal in CAP, with increased excretion of amylase in urine; if considering constipation or air swallowing, perform kidney, ureter, and bladder (KUB) x-ray

Treatment of FAP: not organic disease (common manifestation of stress); chemicals (eg, serotonin) released due to stress stimulate bowel motility; for management of stress, identify cause and how to reduce it; modify diet if causing symptoms to worsen; speaker tries to avoid use of drugs unless pain severe (involvement of pain management specialist or psychologist sometimes necessary); other therapies include psychotherapy, biofeedback, hypnosis, imagery, yoga, and acupuncture; bowel spasms — possible cause of IBS; pain due to increased intraluminal pressure

Abdominal migraine and cyclic vomiting syndrome: features — recurrent bouts of explosive vomiting and/or abdominal pain; patient completely healthy between episodes; often associated with migraine-type headaches; treatment — cyclic vomiting syndrome possibly due to release of serotonin; speaker prefers cyproheptadine (has few side effects)

Causes of CAP: common — functional (number one); isolated constipation; gastroesophageal reflux (GER); abdominal wall tenderness; aerophagia; UTI (abdominal pain often only symptom); lactose intolerance (often associated with gas and diarrhea); chronic infections; uncommon — peptic ulcer disease; pancreatitis; IBD; gallstones; renal stones; cholecystitis; discitis with referred pain; abdominal migraine

Typical pediatric case of constipation as cause of CAP: boy, 11 yr of age, with 2 yr of abdominal pain; pain periumbilical, of short duration (1-3 hr), postprandial (gastrocolic reflex), and relieved by bowel movement (BM); has history of hard stools twice weekly and frequent smears of stool on underwear; diet low in fiber and fluid inadequate; history of difficulty with potty training common; growth and physical examination (PE) normal, except for stool in rectum; such cases usually respond well to therapy

RAP due to GER: typical pediatric case — girl, 12 yr of age, with 2-yr history of recurrent epigastric abdominal pain, frequent regurgitation, and sour taste; has history of GER as infant; symptoms worse upon awakening in morning, with exercise, and postprandially; symptoms worsened by certain foods and improved with antacids; study — found epigastric pain main symptom in children 3 to 9 yr of age; reflux and regurgitation less common; epigastric pain also main symptom in children 10 to 17 yr of age; symptoms suggesting GER — abdominal pain in supine position, postprandially, or worsened by certain foods; regurgitation and vomiting; difficulty swallowing; lung

Educational Objectives

The goals of this program are to improve the management of chronic abdominal pain and constipation in children. After hearing and assimilating this program, the clinician will be better able to:

1. Classify functional gastrointestinal (GI) disorders that are associated with abdominal pain based on the Rome III criteria.
2. Rule out organic causes of abdominal pain based on history, physical examination, and laboratory testing.
4. Recognize physical examination findings that distinguish organic disease from functional constipation.
5. Recommend the most appropriate options for treatment of constipation.

Faculty Disclosure

In adherence to ACCME Standards for Commercial Support, Audio-Digest requires all faculty and members of the planning committee to disclose relevant financial relationships within the past 12 months that might create any personal conflicts of interest. Any identified conflicts were resolved to ensure that this educational activity promotes quality in health care and not a proprietary business or commercial interest. For this program, the faculty and planning committee reported nothing to disclose.
problems (eg, asthma, reactive airway disease, apnea); treatment — acid suppression; prokinetic (ie, erythromycin, metoclopramide [Motovel, Octamide, Reglan]); elevation of head of bed; avoiding eating before bedtime; eating small meals; avoiding foods that worsen symptoms; ≈80% of patients improve within 12 wk of treatment; those who fail to improve or have recurrence of symptoms after therapy discontinued require further work-up; esophageal pH monitoring — detects acid in esophagus during episodes of reflux (and determination of whether acid associated with pain); impedance study — better than esophageal pH monitoring because it detects acidic and nonacidic episodes of reflux; esophagogastroduodenoscopy — detects esophagitis; discriminates between reflux and other causes (eg, eosinophilic esophagitis, H pylori gastritis).

Diagnosis and treatment of H pylori: seen in ≈90% of patients with duodenal ulcer disease; consider in children with duodenal ulcer, gastric ulcer, or gastritis; in children with CAP, consider testing stool for H pylori antigen; antibodies often falsely positive or falsely negative; treat with dual therapy (amoxicillin, clarithromycin, and/or metronidazole) for 7 to 14 days

Chronic or recurrent pancreatitis: screening — anylase-to-creatinine ratio on spot urine (suspect if ratio >7); abdominal ultrasonography (US) to determine whether pancreas swollen or anatomic abnormalities present; US often not sensitive enough, so if pancreatitis suspected, perform magnetic resonance cholangiopancreatography (MRCP; provides better visualization of ductal abnormalities); if pancreatitis strongly suspected and no abnormalities seen on MRCP, obtain endoscopic retrograde cholangiopancreatography (ERCP; diagnostic and therapeutic); consider genetic testing; causes — pancreatic divisum; anomalies of pancreatic and biliary ductal system; obstruction due to stone, cyst, or tumor; abnormal sphincter of Oddi; blunt trauma causing pancreatic duct stricture; treatment via ERCP — sphencterotomy; stenting; balloon dilation; removal of stones

Inflammatory bowel disease: most children have symptoms for >2 yr before diagnosis; differential diagnosis in any child with abdominal pain; presentations — bloody stools; diarrhea; growth failure; delayed onset of puberty; arthritis; skin lesions; oral lesions; ocular lesions; suspect in child with abdominal pain and family history of IBD; growth failure may be first symptom; impaired linear growth — 60% to 85% of children with prepubertal Crohn disease (CD) have growth problems (6%-12% in ulcerative colitis [UC]); consider in presence of oral ulcers, erythema nodosum, or joint pain; diagnosis — histologic diagnosis gold standard (endoscopy or colonoscopy with biopsies); MRI enterography allows visualization of thickening or narrowing of bowel wall; serologic markers for UC and CD (antineutrophil cytoplasmic antibodies [ANCA] and anti-Saccharomyces cerevisiae antibodies [ASCA]); video capsule endoscopy; abnormal hemoglobin and elevated ESR 96% specific for IBD; if one or other abnormal, 83% sensitive for IBD; ensure that no stricture present if performing capsule endoscopy (precede with imaging study)

Constipation: A Pediatric Update

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Physiology: conscious regulation of bowel begins at ≈28 mo of age; normal colonic transit time ~40 hr (as long as 4 days); segmental colonic transit time — ~14 hr for food to reach ascending colon; frequency of BMs — 0 to 3 mo of age, if breast-fed, average of 3 per day (≤40 per week); adult pattern (once daily, or 3-14 BMs per week) develops by 3 yr of age; BM every other day normal; BM should be soft, with minimal straining and no blood

Definition of constipation: delay or difficulty in defection present for ≥2 wk; accounts for 3% of visits to outpatient pediatric clinic; associated factors — female sex; high body mass index; low socioeconomic status (less fiber and more processed or convenience foods in diet); encopresis — involuntary passage of stool at >4 yr of age; associated with constipation 95% of time; some patients have history of painful defecation

Rome III criteria for functional constipation (FC): neonates and toddlers — ≥2 of following symptoms for >1 mo, ie, <2 defecations per week; >1 episode of encopresis per week (after toilet training); excessive stool retention; painful or hard BMs; large-diameter fecal mass in rectum; older children — ≥2 of following symptoms occurring ≥1/wk for 2 mo, ie, ≤2 defecations per week; 1 episode of fecal incontinence per week; persistent soiling; painful or hard BMs; large fecal mass in rectum; >90% of time FC (functional fecal retention or fecal withholding); has multiple secondary causes

Differential diagnosis: nonorganic causes — developmental (eg, autism); conduct disorder; oppositional defiant disorder; coercive toilet training; low-fiber diet; malnutrition; sexual abuse; depression; organic causes — anatomic malformations; metabolic causes (eg, hypothyroidism, hypokalemia, cystic fibrosis, hypercalcemia, celiac disease); scleroderma (indicates screening for constipation); Hirschsprung disease; drug-induced (by, eg, opiates, antiepileptic agents)

Evaluation: important information from history — passage of meconium at birth; type of BMs; presence and frequency of encopresis; dietary history; family history of related conditions; PE findings that distinguish organic disease from FC — failure to thrive; abnormal developmental milestones; persistent abdominal distention, especially if child not encopretic; sacral dimple; absent anal wink; hypotonia; extreme fear during anal inspection (possible sign of sexual abuse); laboratory testing — stool occult blood testing; celiac testing (if child >12 mo of age when symptoms start; includes total IgA, transglutaminase antibody [Ab], endomysial Ab, and deaminated gliadin Ab (regular gliadin Ab has high false-positive rate); thyroid studies; sweat test; electrolyte levels (especially calcium); lead level

Radiologic tests: KUB x-ray — most common test; assesses for presence of retained stool; subject to interpretation; consider in setting of family and patient’s history and PE; barium enema — useful in younger children, especially if Hirschsprung disease suspected (shows transition between ganglionic and aganglionic bowel); evaluates for any evidence of redundant sigmoid colon; recommended for patients with chronic constipation; abdominal US — measures transverse diameter of rectum; serial studies performed in patients with IP to check for decreasing diameter as frequency of BMs increases; colonic transit (eg, Sitzmark) study — allows measurement of total and segmental colonic transit time; in pseudo-obstruction, radiopaque markers scattered throughout colon; in Hirschsprung disease, markers trapped in transition zone in rectum (rectal biopsy indicated); ano-rectal manometry — beneficial in neonates and older teenagers; indications include early-onset constipation without fecal soiling; often, such patients have significant abdominal distention and small-diameter stools; insertion of balloon in rectum allows detection of rectoanal inhibitory reflex (reflex decreases pressure, which indicates normal function); biofeedback used in older children to train brain and rectum to recognize need to use bathroom; presence of abnormalities indication for rectal biopsy to rule out Hirschsprung disease; may require sedation; colonic motility study — measures amplitude of contractions in colon (contractions coordinated in normal colon)

Therapeutic options: education — inform parent that constipation chronic problem; explain cycling nature of constipation and that soiling usually voluntary; explain that treatment lengthy process; immediate goal — fecal disimpaction; oral agents — polyethylene glycol (PEG) 3350 (eg, Golytely, MiraLAX, SoftLax); magnesium citrate; magnesium hydroxide (milk of magnesia); rectal agents — glycerin suppositories
(more effective in children <2 yr of age); enemas; different regimens available; lactulose — used most often in younger children; well tolerated; dose 1 to 3 mL/kg per day; magnesium hydroxide — long-term use not recommended due to possible magnesium toxicity; dose 1 to 3 mL/kg per day qd or bid; magnesium citrate — long-term use not recommended due to possible magnesium toxicity; 1 mL/yr of age ≤10 mL, then 10 mL on day 1 and 10 mL on day 2 if no significant BM seen; PEG 3350 — quantity affects outcome; for school-aged child (7-12 yr), speaker uses 1-day clean-out with 8 capsules and 32 mL of fluid (must be consumed in ≤3 hr); safe; for older child (15-16 yr of age), 15 capsules given; highly effective; may cause cramping; produces no deleterious medical effects or electrolyte abnormalities; enemas — not recommended for “anally defensive” children because it reinforces psychology of constipation; sodium phosphate enema not recommended for more than few consecutive days due to risk for electrolyte abnormalities; stimulants (for straining despite softer BMs) — bisacodyl (eg, Bisac-Evac, Correctol, Dulcolax); sennosides (eg, Ex-Lax, Senexon, Senokot); if patient admitted — PEG electrolyte solution (eg, Colyte, GoLYTELY, NuLYTELY) administered by nasogastric tube, plus enemas; if still impacted after 3 to 5 days, manual disimpaction in operating room recommended

Newer medications: tegaserod (Zelnorm) — effective but withdrawn from market due to cardiac side effects; lubiprostone (Amitiza) — most data from adult patients; most effective in teenage girls with constipation-predominant IBS; safe; may cause some dizziness; probiotics — marketed as promoting overall gut health; eg, BioGaia infant drops or straws, VSL 3 (for patients with IBD)

Other strategies: increasing dietary fiber (in children >2 yr of age who equals age in years plus 5 g/day; natural fiber sources recommended [some fiber supplementation acceptable]); psychological counseling for intractable cases

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Suggested Reading

1. Which of the following factors raise(s) suspicion that a child’s chronic abdominal pain has an organic cause?
   (A) Age >4 yr
   (B) Poorly localized pain
   (C) Family history of peptic ulcer disease
   (D) All the above

2. Abdominal migraine is not associated with migraine-type headaches.
   (A) True  (B) False

For questions 3 to 6, match the condition in Column I with its appropriate characteristic in Column II.

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
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<tbody>
<tr>
<td>3. Gastroesophageal reflux disease</td>
<td>(A) Growth failure often first symptom</td>
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<tr>
<td>4. <em>Helicobacter pylori</em> infection</td>
<td>(B) Associated with lung problems</td>
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<tr>
<td>5. Chronic or recurrent pancreatitis</td>
<td>(C) Associated with duodenal ulcer disease</td>
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<tr>
<td>6. Inflammatory bowel disease</td>
<td>(D) Amylase-to-creatinine ratio used for screening</td>
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7. Which of the following factors is(are) associated with risk for constipation?
   (A) Female sex
   (B) High body mass index
   (C) Low socioeconomic status
   (D) All the above

8. Which of the following can help to distinguish organic disease from functional constipation?
   1. Failure to thrive
   2. Abdominal distention
   3. Abnormal developmental milestones
   4. Absence of conscious bowel regulation by 2 yr of age
   (A) 1,3  (B) 2,4  (C) 1,2,3  (D) 1,2,3,4

9. Anorectal manometry is used to:
   (A) Measure total and segmental colonic transit time
   (B) Detect rectoanal inhibitory reflex
   (C) Rule out redundant sigmoid colon
   (D) Measure amplitude of contractions in colon

10. Choose the correct statement about lubiprostone.
    (A) Use in children well documented in literature
    (B) Effective in teenage girls with constipation-predominant irritable bowel syndrome
    (C) Rash frequently reported as side effect
    (D) No longer available in United States

**NOTE:** On Audio-Digest Pediatrics Volume 59, Issue 03, the answer to question 2 is “C.”

Answers to Audio-Digest Pediatrics Volume 59, Issue 09: 1-B, 2-B, 3-A, 4-D, 5-C, 6-B, 7-D, 8-B, 9-D, 10-B