

Mini-Reviews

Gastrointestinal Disease in Adolescents

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Introduction

Functional gastrointestinal symptoms are identified in up to 30% of patients, two thirds of whom are women. Therefore, any physician who cares for women must be aware of the scope and impact of these conditions. As gynecologists, we are most likely to see those gastrointestinal conditions that have an indolent or chronic course, or those with vague, non-specific symptoms. In adolescents, gastrointestinal disease may be mistaken for gynecologic conditions and the processes of menarche may cloud the identification of primarily gastrointestinal disease. Even sexual abuse may present as vague abdominal or gastrointestinal complaints.¹ A moderate familiarity with these conditions combined with a high degree of suspicion is required if we are to correctly diagnose and treat these complaints in our adolescent patients.

Scope

Our primary focus will not be on topics such as acute disease, hernias, gall bladder disease, massive bleeding, or hematemesis. The diagnosis and management of these entities is either obvious and outside the scope of routine office care, or they are uncommon in adolescent patients. We will, instead, concentrate on those conditions that affect the adolescent girl as she

transitions into womanhood; appendicitis and other conditions affecting the stomach, small and large bowel, colon, and rectum.

Upper Gastrointestinal Complaints

The most common upper gastrointestinal complaints are familiar to everyone; upper abdominal pain, nausea, vomiting, dyspepsia, heartburn, and “gas.” For the gynecologist, esophageal reflux, gastroenteritis and chronic gastritis, peptic ulcer disease, and duodenitis are the most common upper gastrointestinal problems encountered. While we tend to associate these complaints with patients after the age of adolescence, they can and do occur to adolescent girls. Failing to consider them in the differential diagnosis will lead to missed diagnoses and failed therapies.

Gastroesophageal Reflux. The reflux of gastric acid to the sensitive esophagus causes heartburn, the cardinal manifestation of gastroesophageal reflux disease (GERD). The most common etiology is the decrease in tone of the lower esophageal sphincter pressure.² Symptoms are most common after large meals, consuming certain foods, and upon assuming the recumbent position. Prolonged exposure of acid to the esophagus may lead to stricture formation and dysphagia. Nocturnal aspiration may occur and be mistaken for asthma. The sometimes strenuous lifestyle, irregular food consumption, and dietary indiscretions typical of adolescents all may contribute to the development of gastritis or reflux.

Peptic Ulcer Disease. Once the badge of honor for the ‘type-A’ personality, peptic ulcers have been relegated to the status of nothing more than a common infection. Peptic ulcer disease is now recognized as the result of disruption of host factors in the stomach or duodenum in the presence of acid and pepsin. Patients may have multiple abnormalities that lead to ulcer formation: Up to 40% of patients have an increased secretion rate of acid; however, most patients have normal rates of secretion. A breakdown of the mucosal barrier is probably the most important factor

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in peptic ulcer disease, and may occur because of infection with *Helicobacter pylori*, cigarette smoking, or the use of nonsteroidal anti-inflammatory drugs (NSAID). Once proposed factors such as alcohol use, stress, and adrenocorticosteroids are now thought to be less important.³

Helicobacter pylori infection has been isolated in 95% of patients with duodenal ulcers and 70% with gastric ulcers and the influence of *H. pylori* in peptic ulcer disease is now well established.⁴ *H. pylori* is associated with inflammation which disrupts the mucosal barrier, and allows for the disruptive action of acid and pepsin. Cigarette smoking is associated with increased acid formation, alteration in blood flow, and interferes with prostaglandin production. NSAIDs have a direct effect on disruption of the mucosal barrier and range from superficial lesions to deep ulceration. While cyclooxygenase-2 (COX-2) inhibitors are promoted as less prone to cause gastrointestinal side effects,^{5,6} at the doses required for the treatment of adolescent complaints such as dysmenorrhea, a clear superiority has yet to be established.⁷

While it might seem that these causative factors would be unlikely for adolescent girls, adolescent girls are not immune to the development of ulcer disease.⁸ Colonization by *H. pylori* may occur early and cigarette smoking most often becomes established during the early teen years. Adolescent girls often take NSAIDs, both by prescription and otherwise for everything from sports injuries to menstrual discomfort. They are often unaware of the potential for side effects of these readily available medications, resulting in inappropriate dosing or duration of use, putting themselves at risk for gastrointestinal symptoms or damage.

Small Bowel Disease

Problems associated with the small bowel specifically are an infrequent source of complaints seen in gynecologic patients of any age. Lactase insufficiency, leading to lactose intolerance, is perhaps the most common, and may present during the teen-age years. Lactase deficiency occurs in 5–15% of Caucasians but in 60–90% of American Indians, black Americans and Asians. Symptoms of lactase insufficiency are generally not seen until adulthood, but the emergence and evolution of symptoms during adolescence may cloud the diagnosis. Patients with this deficiency are intolerant of milk products, experiencing bloating, cramps, and diarrhea. The diagnosis may be suspected by history and confirmed by a hydrogen breath test, in which hydrogen increases abnormally in response to a lactose challenge.

Large Bowel and Colon Disease

Spanning the small and large bowel are diseases such as enteritis and irritable bowel syndrome (IBS). Functional gastrointestinal symptoms are identified in up to

20% of women and 70% of irritable bowel syndrome sufferers are women.⁹ These patients may present with symptoms of abdominal or pelvic pain, abdominal distention, altered bowel habits, and mucous in the stool.

Irritable Bowel Syndrome. Irritable bowel syndrome is the most common gastrointestinal condition seen in clinical practice.¹⁰ Because of its 2:1 female:male ratio, gynecologists are often the first physicians to be consulted. Irritable bowel syndrome accounts for up to 50% of patient visits to gastroenterologists. Evidence suggests that there is altered colonic wall sensitivity and motility in these patients, resulting in exaggerated motor reactivity to various stimuli, including meals, psychological stress, and balloon distention of the rectosigmoid. These abnormal responses cause altered transit time, pain, constipation, and diarrhea. Most affected patients are young to middle age, placing them squarely among those seen in the course of adolescent care. The commonly observed phenomena of ‘entrainment’ with the menstrual cycle, which results in a worsening of symptoms around the time of menses, can easily result in the incorrect diagnosis of dysmenorrhea or endometriosis for these women.¹¹

There are three common clinical variants of IBS: (1) “spastic colitis” characterized by chronic abdominal pain and constipation; (2) intermittent diarrhea which is usually painless; and (3) a combination of both with alternating diarrhea and constipation. Symptoms are generally worse 60 to 90 minutes post-prandial, with 50% of patients experiencing pain that lasts for hours or days and may last for weeks in up to 20% of patients. Symptoms are generally worse with high fat meals, stress, depression, or menstruation. Symptoms often improve after a bowel movement.

Inflammatory Bowel Disease. Inflammatory bowel disease includes both Crohn’s disease and ulcerative colitis. In both of these conditions, the intensity and type of symptoms encountered depend on the extent and severity of the bowel involvement. In many cases, the symptoms reported may be difficult to separate for other conditions such as irritable bowel syndrome. Symptoms may be either chronic or intermittent.

Ulcerative colitis involves an inflammatory process limited to the mucosa of the large bowel and is found primarily in the descending colon and rectum, though the entire colon may be involved. Most sufferers are between the ages of 20 and 50, though symptoms may begin during adolescence. Acute pain and diarrhea are the most common symptoms. The pain encountered is generally mild to moderate and frequently relieved by bowel movement, though many report the sensation of incomplete evacuation. Most patients experience voluminous, watery diarrhea with occasional blood. Ulcerative colitis may be differentiated from IBS by

the frequent presence of fever or bloody stools in ulcerative colitis. Symptoms, combined with sigmoidoscopy, barium enema, or rectal biopsy will establish the diagnosis.

The inflammatory process in Crohn's disease is transmural, involving both the large and small bowel in 50% of cases. Bowel thickening, stenosis, and internal fistula formation are common with most cases presenting between the ages of 15 and 30. Approximately 80–85% of patients with Crohn's disease experience abdominal pain associated with diarrhea and fever, often lasting for days or weeks. The pain described is frequently mid-abdominal or right lower quadrant in location, though generalized pain is often present. Abdominal pain is more common in Crohn's disease than in ulcerative colitis, although it may occur in either. Patients may present to their gynecologist with complaints of dyspareunia, vulvar or perineal fissures or fistulae, or occasionally with vulvar granulomas. As with ulcerative colitis, suspicion, symptoms and imaging (upper gastrointestinal X-ray with small bowel follow through), and colonoscopy will establish the diagnosis.

Appendicitis. Appendicitis is common among young people. The incidence of appendicitis among those aged 10 to 17 is 25 per 10,000 with a slightly higher rate for males than for females.¹² Appendicitis is rare in patients over the age of 30. Once it starts, there is no effective medical therapy, so appendicitis is considered a medical emergency. It is the most common acute surgical emergency of the abdomen and must be differentiated from acute adnexal events in young women. The most common symptom of appendicitis is abdominal pain, though less than 5% of patients with acute abdominal pain have appendicitis.

Hemorrhoids. Hemorrhoids are an anatomic fact of life. Few escape an occasional flare-up of hemorrhoidal symptoms, including adolescents. Either internal or external hemorrhoids may provide symptoms. External hemorrhoids tend to present with irritation, itching, bleeding, and fecal soiling while internal hemorrhoids most often cause blood with bowel movements or on wiping. Either type may undergo thrombosis. A history of rectal bleeding should not be ascribed to hemorrhoids without direct visualization of the bleeding or ruling out other potentially more ominous causes. Over-the-counter medications generally provide adequate relief when combined with strategies designed to avoid extremes of diarrhea or constipation. Inactivity, including sitting in class for prolonged periods, can increase the risk and exacerbate the symptoms of hemorrhoids for either sex.

Establishing the Diagnosis

Upper Gastrointestinal Complaints

Gastrointestinal Reflux. Formal evaluation, when indicated, is best accomplished by upper gastrointestinal

endoscopy (esophagoscopy and/or gastroscopy). The information gained will eliminate other potential causes of the patient's symptoms, including esophageal motility disorders, erosive esophagitis and peptic ulcer disease. A satisfactory working diagnosis may be established on purely clinical grounds, combined with the results of a therapeutic trial with antacids, histamine blockers, or proton pump inhibitors.

Peptic Ulcer Disease. Common symptoms of peptic ulcer include nausea, vomiting, anorexia, fullness and bloating, and pain in the upper abdomen. Pain is described anywhere in the upper abdomen and may be cramping, gnawing or burning. Pain may last only a few minutes, and response to meals is variable. A correlation between symptoms and demonstrated ulcers is poor and a high degree of suspicion is necessary to make the diagnosis. Physical examination is rarely helpful, unless a more serious complication such as perforation or obstruction is present. Diagnosis is established either by radiographic studies (which may miss as many as 20% of cases) or more reliably by endoscopy.

Large Bowel and Colon Disease

Irritable Bowel Syndrome. The diagnosis of IBS is made by careful history and exclusion of other pathology (Tables 1 and 2). If the history is suspicious of ulcerative colitis or inflammatory bowel disease (by the intensity of symptoms, or the presence of bloody stools), the patient should be referred for a barium enema and sigmoidoscopy or colonoscopy. Consensus in the speciality literature supports the position that taking a detailed history can prevent unnecessary investigation and referrals in patients with IBS.

Irritable bowel syndrome is characterized by abdominal pain and discomfort, changes in stool frequency and consistency, urgency to defecate, bloating, and mucus in the stool. If a patient presents with chronic (≥ 12 weeks) bowel function symptoms including abdominal pain as the dominant symptom with altered bowel function, a diagnosis of IBS is quite likely. Alternative or coexisting diagnoses are suggested by symptoms such as weight loss, rectal bleeding, or anemia (Table 3) and should suggest the need for a more thorough evaluation, including sigmoidoscopy. Laboratory studies and a physical exam are performed to confirm the absence of organic disease.

Table 1. Rome II Diagnostic criteria for irritable bowel syndrome^{18,19}

At least 12 weeks, which need not be consecutive, in the preceding
12 months, of abdominal discomfort or pain that has 2 of 3 features:
Relieved with defecation
Onset associated with a change in frequency of stool
Onset associated with a change in form (appearance) of stool

Table 2. Diagnoses to consider for patients with abdominal pain and bowel dysfunction

Malabsorption: postgastrectomy syndrome, sprue, pancreatic insufficiency.
Dietary factors: lactose-intolerance, caffeine, alcohol, and fat-containing or gas-producing (e.g., cruciferous vegetables) foods.
Infection: bacteria (e.g., <i>Campylobacter jejuni</i> , <i>Salmonella</i> spp), common parasites like <i>Giardia lamblia</i> .
Inflammatory bowel disease: Crohn's disease or ulcerative colitis, microscopic colitides (e.g., collagenous colitis or mast-cell disease - diagnosed by colonic biopsy).
Psychological disorders: panic disorder, depression, and somatization.
Miscellaneous conditions: endometriosis, dysmenorrhea, endocrine tumors (e.g., carcinoid, Zollinger-Ellison syndrome, VIPoma), HIV disease and other associated infections.

Inflammatory Bowel Disease. The inflammatory process in Crohn's disease is transmural and involves both the large and small bowel in 50% of cases. This transmural character results in thickening and the possibility of internal fistula formation. These changes may be detected on contrast enhanced radiographic studies and confirmed by sigmoidoscopy or colonoscopy with biopsy. Granulomas may be found in 15% of patients.

Ulcerative colitis is characterized by an inflammation limited to the mucosa of the large bowel and found primarily in the descending colon and rectum (though the entire colon may be involved). Sigmoidoscopy or colonoscopy may demonstrate superficial inflammation, with ulceration common. Hyperemia and hemorrhage are also common. The rectum is involved in 95% of cases but the inflammation extends proximal in a continuous manner, at times even involving the terminal ileum.

Appendicitis. The diagnosis of appendicitis is made on clinical grounds through the characteristic progression of symptoms, clinical findings, and an elevated white blood cell count with its characteristic shift in the differential cell count. A urinalysis may be helpful to rule out a urinary tract infection. A pregnancy test

Table 3. Symptoms that suggest diagnoses beyond functional bowel disease

Anemia
Fever
Persistent diarrhea
Rectal bleeding
Severe constipation
Weight loss
Nocturnal symptoms of pain and abnormal bowel function
Family history of GI cancer, inflammatory bowel disease, or celiac disease
New onset of symptoms in patients 50+ years of age
Abnormal physical examination

to rule out a complication of pregnancy should be considered imperative in all but the most florid cases. Ultrasonography may be useful to image adnexal structures, document intraperitoneal fluid collections or to see thickening of the appendix, but it should not replace a careful clinical and pelvic examination.

Clinical Intervention

Upper Gastrointestinal Complaints

Gastroesophageal Reflux. Empirical therapy is appropriate in patients with uncomplicated GERD (Table 4). Medications that contribute to reduced esophageal pressure, such as diazepam and calcium channel blockers, should be eliminated. The use of non-steroidal anti-inflammatory drugs (NSAID), common in adolescents through both prescription and self-medication routes, may contribute to direct damage to the esophageal mucosa. Cigarette smoking contributes to lowering esophageal pressure, delays esophageal acid clearance and therefore increases the risk of prolonged acid exposure. Patients should not lie down for 2 to 3 hours after consuming large meals. Placing the bed on 6 to 8 inch blocks, or using a bed wedge, has been shown to decrease acid exposure and are as effective as medication in healing reflux esophagitis. The patient's diet should be modified by eliminating liquids with high acid content (such as orange juice), fatty foods and chocolate (which decrease esophageal pressure and delay gastric emptying) and onions, garlic, and peppermint (which increase gas, belching and lower esophageal pressure) should be eliminated from the diet.

Before the widespread availability of H₂-antagonists and proton pump inhibitors, antacids were the preferred therapy. Due to the frequent dosage intervals required, and the high incidence of diarrhea, bloating and constipation, compliance was often a problem. Cimetidine, ranitidine and famotidine have become available without prescription and are reasonable first

Table 4. Therapeutic options for heartburn

• Lifestyle change	Stop smoking
	Do not eat within 2 - 3 hours of bed
	Extra pillows / bed wedge
• Dietary Change	Reduce acidic liquids (e.g., orange juice)
	Reduce fatty foods and chocolate
	Avoid onions, garlic, peppermint, and liquors
• Antacids	
• Histamine (H ₂) antagonists	Cimetidine, famotidine, nizatidine, ranitidine
• Proton pump inhibitors	Esomeprazole magnesium, lansoprazole, omeprazole, pantoprazole sodium, rabeprazole sodium

line therapies.¹³ For those with resistant symptoms or when esophageal damage is suspected or documented, the use of proton pump inhibitors is more appropriate. The mechanism of action is the inhibition of the hydrogen potassium pump in gastric acid producing cells. Referral of patients with this degree of disease severity is prudent.

Similar treatment strategies may be applied to those with chronic dyspepsia and gastritis as well (Table 5). **Peptic Ulcer Disease.** Several therapies are effective in treating ulcers, but ulcers usually require 12 weeks of therapy to completely heal. Treatment regimens include anti-secretory agents include H₂-receptor antagonists (cimetidine, ranitidine, and famotidine), proton pump inhibitors (esomeprazole magnesium, lansoprazole, omeprazole, pantoprazole sodium, rabeprazole sodium), anti-muscarinic drugs (rarely used due to side effects of blurred vision and dry mouth), and prostaglandins (misoprostol). As in esophageal reflux, antacids are rarely used due to frequent dosage schedules and side effects of diarrhea or constipation. Sucralfate is an aluminum hydroxide salt of sucrose octasulfate which is effective in duodenal ulcers. In patients with *H. pylori* infection, a combination of bismuth (Pepto-Bismol) and an antibiotic (metronidazole 250 mg q6 hours, tetracycline 500 q6 hours, or amoxicillin 500 mg q8 hours) has been recommended for 2 weeks. A 4-week treatment with clarithromycin (Biaxin) and either omeprazole (Prilosec) or ranitidine bismuth citrate (Tritec) is also an option.

Large Bowel and Colon Disease

Irritable Bowel Syndrome. Treatment of IBS is difficult due to the chronicity of the condition. Because many of these patients have hysterical, depressive, and bipolar personality disorders, psychological support is important.¹⁴⁻¹⁶ Bulk agents and increased dietary fiber in association with patient education may be helpful. Mild sedation with phenobarbital and tranquilizers

may afford some relief, though long-term success is generally poor. In some studies, placebo response rates are as high as 80%.

Many of the pharmacological agents that are used for the treatment of IBS target only one symptom. Consequently, patients may need to take more than one medication in order to control their symptoms. Medications should be targeted toward the predominant symptom (e.g., pain, diarrhea, or constipation). Tricyclic antidepressants and SSRIs are often prescribed for patients with severe or refractory pain.

Because of the role of 5HT₃ in the development of IBS, 5HT₃ receptor blocking agents would seem promising,¹⁷ but side effects or untoward outcomes of one agent introduced for the diarrheal form resulted in its withdrawal from the market. Another agent (tegaserod maleate) has been introduced for the treatment of women with constipation due to IBS and offers good response rates. This may be a good alternative for those in whom fiber or osmotic laxatives have been unsuccessful. Stimulant laxatives (e.g., bisacodyl, phenolphthalein) enhance intestinal motility and stimulate accumulation of water and electrolytes in the colonic lumen. These agents are effective in relieving constipation associated with IBS, but in some patients, laxatives can exacerbate abdominal pain and bloating. Therefore, these agents should be used with caution when abdominal pain and bloating symptoms are already present.

Inflammatory Bowel Disease. The management of both ulcerative colitis and Crohn's disease is complicated, long, and disappointing. Referral to a gastroenterologist is strongly suggested.

Appendicitis. Acute appendicitis is a surgical disease, almost without exception. Because the symptoms of appendicitis can be similar to those of ectopic pregnancies, adnexal torsion or other adnexal accidents, careful evaluation is required leading some to advocate early laparoscopic evaluation to establish the diagnosis.

Table 5. Therapeutic options for dyspepsia and chronic gastritis

- Lifestyle change
 - Stress reduction
 - Stop smoking
- Dietary Change
 - Slow, stress-free meals
 - Balanced diet, moderate amounts
 - Increased fiber
 - Avoid irritants
- Medications
 - Bethanechol, anti-emetics, Phenobarbital
- Antacids
- Histamine (H₂) antagonists
 - Cimetidine, famotidine, nizatidine, ranitidine
- Proton pump inhibitors
 - Esomeprazole magnesium, lansoprazole, omeprazole, pantoprazole sodium, rabeprazole sodium

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