

1878 criteria are the Rome criteria. When tested against findings of structural investigations, the Rome criteria exhibit diagnostic specificities exceeding 90% for many of the functional bowel disorders.

PHYSICAL EXAMINATION

The physical exam complements information from the history. Abnormal vital signs provide diagnostic clues and determine the need for acute intervention. Fever suggests inflammation or neoplasm. Orthostasis is found with significant blood loss, dehydration, sepsis, or autonomic neuropathy. Skin, eye, or joint findings may point to specific diagnoses. Neck exam with swallowing assessment evaluates dysphagia. Cardiopulmonary disease may present with abdominal pain or nausea; thus lung and cardiac exams are important. Pelvic examination tests for a gynecologic source of abdominal pain. Rectal exam may detect blood, indicating gut mucosal injury or neoplasm or a palpable inflammatory mass in appendicitis. Metabolic conditions and gut motor disorders have associated peripheral neuropathy.

Inspection of the abdomen may reveal distention from obstruction, tumor, or ascites or vascular abnormalities with liver disease. Ecchymoses develop with severe pancreatitis. Auscultation can detect bruits or friction rubs from vascular disease or hepatic tumors. Loss of bowel sounds signifies ileus, whereas high-pitched, hyperactive sounds characterize intestinal obstruction. Percussion assesses liver size and can detect shifting dullness from ascites. Palpation assesses for hepatosplenomegaly as well as neoplastic or inflammatory masses. Abdominal exam is helpful in evaluating unexplained pain. Intestinal ischemia elicits severe pain but little tenderness. Patients with visceral pain may exhibit generalized discomfort, whereas those with parietal pain or peritonitis have directed pain, often with involuntary guarding, rigidity, or rebound. Patients with musculoskeletal abdominal wall pain may note tenderness exacerbated by Valsalva or straight-leg lift maneuvers.

TOOLS FOR PATIENT EVALUATION

Laboratory, radiographic, and functional tests can assist in diagnosis of suspected GI disease. The GI tract also is amenable to internal evaluation with upper and lower endoscopy and to examination of luminal contents. Histopathologic exams of GI tissues complement these tests.

Laboratory Selected laboratory tests facilitate the diagnosis of GI disease. Iron-deficiency anemia suggests mucosal blood loss, whereas vitamin B₁₂ deficiency results from small-intestinal, gastric, or pancreatic disease. Either also can result from inadequate oral intake. Leukocytosis and increased sedimentation rates and C-reactive protein levels are found in inflammatory conditions, whereas leukopenia is seen in viremic illness. Severe vomiting or diarrhea elicits electrolyte disturbances, acid-base abnormalities, and elevated blood urea nitrogen. Pancreaticobiliary or liver disease is suggested by elevated pancreatic or liver chemistries. Thyroid chemistries, cortisol, and calcium levels are obtained to exclude endocrinologic causes of GI symptoms. Pregnancy testing is considered for women with unexplained nausea. Serologic tests can screen for celiac disease, inflammatory bowel disease, rheumatologic diseases like lupus or scleroderma, and paraneoplastic dysmotility syndromes. Hormone levels are obtained for suspected endocrine neoplasia. Intraabdominal malignancies produce other tumor markers including the carcinoembryonic antigen CA 19-9 and α -fetoprotein. Blood testing also monitors medication therapy in some diseases, as with thiopurine metabolite levels in inflammatory bowel disease. Other body fluids are sampled under certain circumstances. Ascitic fluid is analyzed for infection, malignancy, or findings of portal hypertension. Cerebrospinal fluid is obtained for suspected central nervous system causes of vomiting. Urine samples screen for carcinoid, porphyria, and heavy metal intoxication.

Luminal Contents Luminal contents can be examined for diagnostic clues. Stool samples are cultured for bacterial pathogens, examined for leukocytes and parasites, or tested for *Giardia* antigen. Duodenal aspirates can be examined for parasites or cultured for bacterial overgrowth. Fecal fat is quantified in possible malabsorption. Stool electrolytes can be measured in diarrheal conditions. Laxative screens

are done when laxative abuse is suspected. Gastric acid is quantified to rule out Zollinger-Ellison syndrome. Esophageal pH testing is done for refractory symptoms of acid reflux, whereas impedance techniques assess for nonacidic reflux. Pancreatic juice is analyzed for enzyme or bicarbonate content to exclude pancreatic exocrine insufficiency.

Endoscopy The gut is accessible with endoscopy, which can provide the diagnosis of the causes of bleeding, pain, nausea and vomiting, weight loss, altered bowel function, and fever. **Table 344-2** lists the most common indications for the major endoscopic procedures. Upper endoscopy evaluates the esophagus, stomach, and duodenum, whereas colonoscopy assesses the colon and distal ileum. Upper endoscopy is advocated as the initial structural test performed in patients with suspected ulcer disease, esophagitis, neoplasm, malabsorption, and Barrett's metaplasia because of its ability to directly visualize as well as biopsy the abnormality. Colonoscopy is the procedure of choice for colon cancer screening and surveillance as well as diagnosis of colitis secondary to infection, ischemia, radiation, and inflammatory bowel disease. Sigmoidoscopy examines the colon up to the splenic flexure and is currently used to exclude distal colonic inflammation or obstruction in young patients not at significant risk for colon cancer. For elusive GI bleeding secondary to arteriovenous malformations or superficial ulcers, small-intestinal examination is performed with push enteroscopy, capsule endoscopy, or double-balloon enteroscopy. Capsule endoscopy also can visualize small-intestinal Crohn's disease in individuals with negative barium radiography. Endoscopic retrograde cholangiopancreatography (ERCP) provides diagnoses of pancreatic and biliary disease. Endoscopic ultrasound is useful for evaluating extent of disease in GI malignancy as well as exclusion of choledocholithiasis, evaluation of pancreatitis, drainage of pancreatic pseudocysts, and assessment of anal continuity.

Radiography/Nuclear Medicine Radiographic tests evaluate diseases of the gut and extraluminal structures. Oral or rectal contrast agents like barium provide mucosal definition from the esophagus to the rectum. Contrast radiography also assesses gut transit and pelvic floor dysfunction. Barium swallow is the initial procedure for evaluation of dysphagia to exclude subtle rings or strictures and assess for achalasia, whereas small-bowel contrast radiology reliably diagnoses intestinal tumors and Crohn's ileitis. Contrast enemas are performed when colonoscopy is unsuccessful or contraindicated. Ultrasound and computed tomography (CT) evaluate regions not accessible by endoscopy or contrast studies, including the liver, pancreas, gallbladder, kidneys, and retroperitoneum. These tests are useful for diagnosis of mass lesions, fluid collections, organ enlargement, and, in the case of ultrasound, gallstones. CT and magnetic resonance (MR) colonography are being evaluated as alternatives to colonoscopy for colon cancer screening. MR imaging assesses the pancreaticobiliary ducts to exclude neoplasm, stones, and sclerosing cholangitis, and the liver to characterize benign and malignant tumors. Specialized CT or MR enterography can assess intensity of inflammatory bowel disease. Angiography excludes mesenteric ischemia and determines spread of malignancy. Angiographic techniques also access the biliary tree in obstructive jaundice. CT and MR techniques can be used to screen for mesenteric occlusion, thereby limiting exposure to angiographic dyes. Positron emission tomography can facilitate distinguishing malignant from benign disease in several organ systems.

Scintigraphy both evaluates structural abnormalities and quantifies luminal transit. Radionuclide bleeding scans localize bleeding sites in patients with brisk hemorrhage so that therapy with endoscopy, angiography, or surgery may be directed. Radiolabeled leukocyte scans can search for intraabdominal abscesses not visualized on CT. Biliary scintigraphy is complementary to ultrasound in the assessment of cholecystitis. Scintigraphy to quantify esophageal and gastric emptying is well established, whereas techniques to measure small-intestinal or colonic transit are less widely used.

Histopathology Gut mucosal biopsies obtained at endoscopy evaluate for inflammatory, infectious, and neoplastic disease. Deep rectal biopsies assist with diagnosis of Hirschsprung's disease or amyloid. Liver