

muscles in other parts of the body usually serves to differentiate myositis of the abdominal wall from other processes that might cause pain in the same region.

REFERRED PAIN IN ABDOMINAL DISEASE

Pain referred to the abdomen from the thorax, spine, or genitalia may present a vexing diagnostic challenge because diseases of the upper part of the abdominal cavity such as acute cholecystitis or perforated ulcer may be associated with intrathoracic complications. A most important, yet often forgotten, dictum is that the possibility of intrathoracic disease must be considered in every patient with abdominal pain, especially if the pain is in the upper abdomen.

Systematic questioning and examination directed toward detecting myocardial or pulmonary infarction, pneumonia, pericarditis, or esophageal disease (the intrathoracic diseases that most often masquerade as abdominal emergencies) will often provide sufficient clues to establish the proper diagnosis. Diaphragmatic pleuritis resulting from pneumonia or pulmonary infarction may cause pain in the right upper quadrant and pain in the supraclavicular area, the latter radiation to be distinguished from the referred subscapular pain caused by acute distention of the extrahepatic biliary tree. The ultimate decision as to the origin of abdominal pain may require deliberate and planned observation over a period of several hours, during which repeated questioning and examination will provide the diagnosis or suggest the appropriate studies.

Referred pain of thoracic origin is often accompanied by splinting of the involved hemithorax with respiratory lag and decrease in excursion more marked than that seen in the presence of intraabdominal disease. In addition, apparent abdominal muscle spasm caused by referred pain will diminish during the inspiratory phase of respiration, whereas it persists throughout both respiratory phases if it is of abdominal origin. Palpation over the area of referred pain in the abdomen also does not usually accentuate the pain and, in many instances, actually seems to relieve it.

Thoracic disease and abdominal disease frequently coexist and may be difficult or impossible to differentiate. For example, the patient with known biliary tract disease often has epigastric pain during myocardial infarction, or biliary colic may be referred to the precordium or left shoulder in a patient who has suffered previously from angina pectoris.

For an explanation of the radiation of pain to a previously diseased area, see Chap. 18.

Referred pain from the spine, which usually involves compression or irritation of nerve roots, is characteristically intensified by certain motions such as cough, sneeze, or strain and is associated with hyperesthesia over the involved dermatomes. Pain referred to the abdomen from the testes or seminal vesicles is generally accentuated by the slightest pressure on either of these organs. The abdominal discomfort experienced is of dull, aching character and is poorly localized.

METABOLIC ABDOMINAL CRISES

Pain of metabolic origin may simulate almost any other type of intraabdominal disease. Several mechanisms may be at work. In certain instances, such as hyperlipidemia, the metabolic disease itself may be accompanied by an intraabdominal process such as pancreatitis, which can lead to unnecessary laparotomy unless recognized. C1 esterase deficiency associated with angioneurotic edema is often associated with episodes of severe abdominal pain. Whenever the cause of abdominal pain is obscure, a metabolic origin always must be considered. Abdominal pain is also the hallmark of familial Mediterranean fever (**Chap. 392**).

The problem of differential diagnosis is often not readily resolved. The pain of porphyria and of lead colic is usually difficult to distinguish from that of intestinal obstruction, because severe hyperperistalsis is a prominent feature of both. The pain of uremia or diabetes is nonspecific, and the pain and tenderness frequently shift in location and intensity. Diabetic acidosis may be precipitated by acute appendicitis or intestinal obstruction, so if prompt resolution of the abdominal pain does not result from correction of the metabolic abnormalities, an underlying organic problem should be suspected. Black widow spider

bites produce intense pain and rigidity of the abdominal muscles and back, an area infrequently involved in intraabdominal disease.

IMMUNOCOMPROMISE

Evaluating and diagnosing causes of abdominal pain in immunosuppressed or otherwise immunocompromised patients is very difficult. This includes those who have undergone organ transplantation; who are receiving immunosuppressive treatments for autoimmune diseases, chemotherapy, or glucocorticoids; who have AIDS; and who are very old. In these circumstances, normal physiologic responses may be absent or masked. In addition, unusual infections may cause abdominal pain where the etiologic agents include cytomegalovirus, mycobacteria, protozoa, and fungi. These pathogens may affect all gastrointestinal organs, including the gallbladder, liver, and pancreas, as well as the gastrointestinal tract, causing occult or overtly symptomatic perforations of the latter. Splenic abscesses due to *Candida* or *Salmonella* infection should also be considered, especially when evaluating patients with left upper quadrant or left flank pain. Acalculous cholecystitis is a relative common complication in patients with AIDS, where it is often associated with cryptosporidiosis or cytomegalovirus infection.

Neutropenic enterocolitis is often identified as a cause of abdominal pain and fever in some patients with bone marrow suppression due to chemotherapy. Acute graft-versus-host disease should be considered. Optimal management of these patients may require meticulous follow-up including serial examinations to be certain that surgical intervention is not required to treat an underlying disease process.

NEUROGENIC CAUSES

Diseases that injure sensory nerves may cause causalgic pain. It has a burning character and is usually limited to the distribution of a given peripheral nerve. Normal nonpainful stimuli such as touch or a change in temperature may be causalgic and may frequently be present even at rest. The demonstration of irregularly spaced cutaneous pain spots may be the only indication that an old nerve injury exists. Even though the pain may be precipitated by gentle palpation, rigidity of the abdominal muscles is absent, and the respirations are not disturbed. Distention of the abdomen is uncommon, and the pain has no relationship to the intake of food.

Pain arising from spinal nerves or roots comes and goes suddenly and is of a lancinating type (**Chap. 22**). It may be caused by herpes zoster, impingement by arthritis, tumors, a herniated nucleus pulposus, diabetes, or syphilis. It is not associated with food intake, abdominal distention, or changes in respiration. Severe muscle spasm, as in the gastric crises of tabes dorsalis, is common but is either relieved or not accentuated by abdominal palpation. The pain is made worse by movement of the spine and is usually confined to a few dermatomes. Hyperesthesia is very common.

Pain due to functional causes conforms to none of the aforementioned patterns. Mechanisms of disease are not clearly established. Irritable bowel syndrome (IBS) is a functional gastrointestinal disorder characterized by abdominal pain and altered bowel habits. The diagnosis is made on the basis of clinical criteria (**Chap. 352**) and after exclusion of demonstrable structural abnormalities. The episodes of abdominal pain are often brought on by stress, and the pain varies considerably in type and location. Nausea and vomiting are rare. Localized tenderness and muscle spasm are inconsistent or absent. The causes of IBS or related functional disorders are not known.

APPROACH TO THE PATIENT: Abdominal Pain

Few abdominal conditions require such urgent operative intervention that an orderly approach need be abandoned, no matter how ill the patient. Only patients with exsanguinating intraabdominal hemorrhage (e.g., ruptured aneurysm) must be rushed to the operating room immediately, but in such instances, only a few minutes are required to assess the critical nature of the problem. Under these