

## Abdominal Pain, Acute

Abdominal pain is common and often inconsequential. Acute and severe abdominal pain, however, is almost always a symptom of intra-abdominal disease. It may be the sole indicator of the need for surgery and must be attended to swiftly: Gangrene and perforation of the gut can occur < 6 h from onset of symptoms in certain conditions (eg, interruption of the intestinal blood supply from a strangulating obstruction or an arterial embolus). Abdominal pain is of particular concern in patients who are very young or very old and in those who have HIV infection or are taking immunosuppressants.

Textbook descriptions of abdominal pain have limitations because people react to pain differently. Some, particularly elderly people, are stoic, whereas others exaggerate their symptoms. Infants, young children, and some elderly people may have difficulty localizing the pain.

### Pathophysiology

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**Visceral pain** comes from the abdominal viscera, which are innervated by autonomic nerve fibers and respond mainly to the sensations of distention and muscular contraction—not to cutting, tearing, or local irritation. Visceral pain is typically vague, dull, and nauseating. It is poorly localized and tends to be referred to areas corresponding to the embryonic origin of the affected structure. Foregut structures (stomach, duodenum, liver, and pancreas) cause upper abdominal pain. Midgut structures (small bowel, proximal colon, and appendix) cause periumbilical pain. Hindgut structures (distal colon and GU tract) cause lower abdominal pain.

**Somatic pain** comes from the parietal peritoneum, which is innervated by somatic nerves, which respond to irritation from infectious, chemical, or other inflammatory processes. Somatic pain is sharp and well localized.

**Referred pain** is pain perceived distant from its source and results from convergence of nerve fibers at the spinal cord. Common examples of referred pain are scapular pain due to biliary colic, groin pain due to renal colic, and shoulder pain due to blood or infection irritating the diaphragm.

**Peritonitis:** Peritonitis is inflammation of the peritoneal cavity. The most serious cause is perforation of the GI tract, which produces

immediate chemical inflammation followed shortly by infection from intestinal organisms. Peritonitis can also result from any abdominal condition that produces marked inflammation (eg, appendicitis, diverticulitis, strangulating intestinal obstruction, pancreatitis, pelvic inflammatory disease, mesenteric ischemia). Intraperitoneal blood from any source (eg, ruptured aneurysm, trauma, surgery, ectopic pregnancy) is irritating and results in peritonitis. Barium causes severe peritonitis and should never be given to a patient with suspected GI tract perforation. Peritoneosystemic shunts, drains, and dialysis catheters in the peritoneal cavity predispose a patient to infectious peritonitis, as does ascitic fluid. Rarely, spontaneous bacterial peritonitis occurs, in which the peritoneal cavity is infected by blood-borne bacteria.

Peritonitis causes fluid shift into the peritoneal cavity and bowel, leading to severe dehydration and electrolyte disturbances. Adult respiratory distress syndrome can develop rapidly. Kidney failure, liver failure, and disseminated intravascular coagulation follow. The patient's face becomes drawn into the masklike appearance typical of hippocratic facies. Death occurs within days.

## Etiology

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Many intra-abdominal disorders cause abdominal pain (see Fig. 1); some are trivial but some are immediately life threatening, requiring rapid diagnosis and surgery.

**Immediate life threats** include

- Ruptured abdominal aortic aneurysm
- Perforated viscus
- Mesenteric ischemia
- Ruptured ectopic pregnancy

Other **serious and urgent causes** include

- Intestinal obstruction
- Appendicitis
- Severe acute pancreatitis

Several extra-abdominal disorders also cause abdominal pain (see Table 1).

Abdominal pain in neonates, infants, and young children has numerous causes not encountered in adults, including meconium peritonitis, pyloric stenosis, esophageal webs, volvulus of a gut with a common mesentery, imperforate anus, intussusception, and intestinal obstruction from atresia.

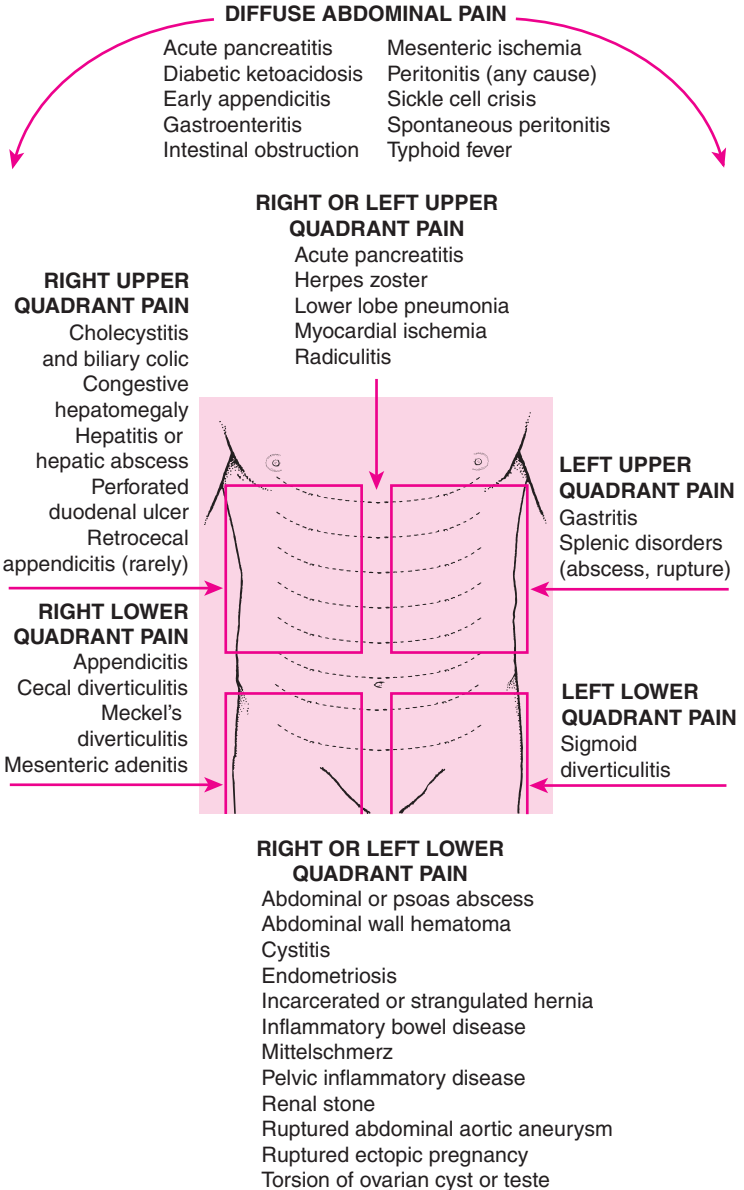


Fig. 1. Location of abdominal pain and possible causes.

**Table 1. EXTRA-ABDOMINAL CAUSES OF ABDOMINAL PAIN**

<b>ABDOMINAL WALL</b>
Rectus muscle hematoma
<b>GU</b>
Testicular torsion
<b>INFECTIOUS</b>
Herpes zoster
<b>METABOLIC</b>
Alcoholic ketoacidosis
Diabetic ketoacidosis
Porphyria
Sickle cell disease
<b>THORACIC</b>
Myocardial infarction
Pneumonia
Pulmonary embolism
Radiculitis
<b>TOXIC</b>
Black widow spider bite
Heavy metal poisoning
Methanol poisoning
Scorpion sting
Opioid withdrawal

## Evaluation

Evaluation of mild and severe pain follows the same process, although with severe abdominal pain, therapy sometimes proceeds simultaneously and involves early consultation with a surgeon. History and physical examination usually exclude all but a few possible causes, with final diagnosis confirmed by judicious use of laboratory and imaging tests. Life-threatening causes should always be ruled out before focusing on less serious diagnoses. In seriously ill patients with severe abdominal pain, the most important diagnostic measure may be expeditious surgical exploration. In mildly ill patients, watchful waiting may be best.

**HISTORY**

**History of present illness** usually suggests the diagnosis (see Table 2). Of particular importance are pain location (see Fig. 1) and characteristics, history of similar symptoms, and associated symptoms. Concomitant symptoms such as gastroesophageal reflux, nausea, vomiting, diarrhea, constipation, jaundice, melena, hematuria, hematemesis, weight loss, and mucus or blood in the stool help direct subsequent evaluation.

**Past medical history** should ascertain known medical conditions and previous abdominal surgeries. Women should be asked whether they are pregnant. A drug history should include details concerning prescription and illicit drug use as well as alcohol. Many drugs cause GI upset. Prednisone or immunosuppressants may inhibit the inflammatory response to perforation or peritonitis and result in less pain and leukocytosis than might otherwise be expected. Anticoagulants can increase the chances of bleeding and hematoma formation. Alcohol predisposes to pancreatitis.

**Table 2. HISTORY IN PATIENTS WITH ACUTE ABDOMINAL PAIN**

Question	Potential Responses and Indications
Where is the pain?	See Fig. 1
What is the pain like?	Acute waves of sharp constricting pain that “take the breath away” (renal or biliary colic) Waves of dull pain with vomiting (intestinal obstruction) Colicky pain that becomes steady (appendicitis, strangulating intestinal obstruction, mesenteric ischemia) Sharp, constant pain, worsened by movement (peritonitis) Tearing pain (dissecting aneurysm) Dull ache (appendicitis, diverticulitis, pyelonephritis)
Have you had it before?	“Yes” suggests recurrent problems such as ulcer disease, gallstone colic, diverticulitis, or mittelschmerz
Was the onset sudden?	Sudden: “like a light switching on” (perforated ulcer, renal stone, ruptured ectopic pregnancy, torsion of ovary or testis, some ruptured aneurysms) Less sudden: most other causes
How severe is the pain?	Severe pain (perforated viscus, kidney stone, peritonitis, pancreatitis) Pain out of proportion to physical findings (mesenteric ischemia)

*(continued)*

**Table 2. HISTORY IN PATIENTS WITH ACUTE ABDOMINAL PAIN**  
(continued)

Question	Potential Responses and Indications
Does the pain travel to any other part of the body?	Right scapula (gallbladder pain) Left shoulder region (ruptured spleen, pancreatitis) Pubis or vagina (renal pain) Back (ruptured aortic aneurysm)
What relieves the pain?	Antacids (peptic ulcer disease) Lying as quietly as possible (peritonitis)
What other symptoms occur with the pain?	Vomiting precedes pain and is followed by diarrhea (gastroenteritis) Delayed vomiting, absent bowel movement and flatus (acute intestinal obstruction; the delay increases with a lower site of obstruction) Severe vomiting precedes intense epigastric, left chest, or shoulder pain (emetic perforation of the intra-abdominal esophagus)

### PHYSICAL EXAMINATION

The general appearance is important. A happy, comfortable-appearing patient rarely has a serious problem, unlike one who is anxious, pale, diaphoretic, or in obvious pain. BP, pulse, state of consciousness, and other signs of peripheral perfusion must be evaluated. However, the focus of the examination is the abdomen, beginning with inspection and auscultation, followed by palpation and percussion. Rectal examination and pelvic examination (for women) to locate tenderness, masses, and blood are essential.

Palpation begins gently, away from the area of greatest pain, detecting areas of particular tenderness, as well as the presence of guarding, rigidity, and rebound (all suggesting peritoneal irritation) and any masses. Guarding is an involuntary contraction of the abdominal muscles that is slightly slower and more sustained than the rapid, voluntary flinch exhibited by sensitive or anxious patients. Rebound is a distinct flinch upon brisk withdrawal of the examiner's hand. The inguinal area and all surgical scars should be palpated for hernias.

### INTERPRETATION OF FINDINGS

Some findings strongly suggest certain disorders.

**Distention**, especially when surgical scars, tympany to percussion, and high-pitched peristalsis or borborygmi in rushes are present, strongly suggests bowel obstruction.



## RED FLAGS

- Severe pain
- Signs of shock (eg, tachycardia, hypotension, diaphoresis, confusion)
- Signs of peritonitis
- Abdominal distention

**Severe pain** in a patient with a silent abdomen who is lying as still as possible suggests peritonitis; location of tenderness suggests etiology (eg, right upper quadrant suggests cholecystitis, right lower quadrant suggests appendicitis) but may not be diagnostic.

**Back pain with shock** suggests ruptured abdominal aortic aneurysm (AAA), particularly if there is a tender, pulsatile mass.

**Shock and vaginal bleeding** in a pregnant woman suggest ruptured ectopic pregnancy.

**Ecchymoses of the costovertebral angles** (Grey Turner's sign) or around the umbilicus (Cullen's sign) suggest hemorrhagic pancreatitis but are not very sensitive for this disorder.

History is often suggestive (see Table 2). Mild to moderate pain in the presence of active peristalsis of normal pitch suggests a nonsurgical disease (eg, gastroenteritis) but may also be the early manifestation of a more serious disorder. A patient who is writhing around trying to get comfortable is more likely to have an obstructive mechanism (eg, renal or biliary colic).

Previous abdominal surgery makes obstruction from adhesions more likely. Generalized atherosclerosis increases the possibility of MI, AAA, and mesenteric ischemia. HIV infection makes infectious causes and drug adverse effects likely.

## TESTING

Tests are selected based on clinical suspicion.

- Urine pregnancy test for all women of childbearing age
- Selected imaging tests based on suspected diagnosis

**Standard laboratory tests** (eg, CBC, chemistries, urinalysis) are often done but are of little value due to poor specificity; patients with significant disease may have normal results. Abnormal results do not provide a specific diagnosis (the urinalysis in particular may show pyuria or hematuria in a wide variety of conditions), and they can also occur in the absence of significant disease. An exception is serum lipase, which strongly suggests a diagnosis of acute pancreatitis when elevated. A bedside urine pregnancy test should be done for all women

of childbearing age because a negative result effectively excludes ruptured ectopic pregnancy.

An **abdominal series**, consisting of flat and upright abdominal x-rays and upright chest x-rays (left lateral recumbent abdomen and anteroposterior chest x-ray for patients unable to stand), should be done when perforation or obstruction is suspected. However, these plain x-rays are seldom diagnostic for other conditions and need not be automatically done.

**Ultrasound** should be done for suspected biliary tract disease or ectopic pregnancy (transvaginal probe). Ultrasound can also detect AAA but cannot reliably identify rupture.

**Noncontrast helical CT** is the modality of choice for suspected renal stones.

**CT with oral contrast** is diagnostic in about 95% of patients with significant abdominal pain and has markedly lowered the negative laparotomy rate. However, advanced imaging must not be allowed to delay surgery in patients with definitive symptoms and signs.

## Treatment

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Some clinicians feel that providing pain relief before a diagnosis is made interferes with their ability to evaluate. However, moderate doses of IV analgesics (eg, fentanyl 50 to 100 mg, morphine 4 to 6 mg) do not mask peritoneal signs and, by diminishing anxiety and discomfort, often make examination easier.



### KEY POINTS

- Look for life threats first.
- Rule out pregnancy in women of childbearing age.
- Look for signs of peritonitis, shock, and obstruction.
- Blood tests are of minimal value.