Determining the cause of abdominal pain is often tricky and time-consuming. Because pain can be nonspecific and the abdomen has many organs and structures, numerous potential causes have to be ruled out as clinicians try to pin down the source of pain.

Reasons for abdominal pain fall into three broad categories: inflammation, organ distension, and ischemia. In some cases, the underlying cause is life-threatening, so a fast, accurate assessment is essential. In this article, I’ll describe how to assess a patient with abdominal pain and intervene appropriately. Let’s start by looking at a couple of hypothetical situations.

Laurie Greene, 42, comes to your ED complaining of intermittent abdominal pain and bloating that she’s had for a month. She reports no change in bowel habits and no other significant medical history.

When you examine Ms. Greene, you find a protrusion in the umbilical, hypogastric, and left iliac regions. This area is dull to percussion; when you palpate it, you note a firm mass. A complete blood cell (CBC) count reveals severe anemia. A stat computed tomography (CT) scan of the abdomen and pelvis reveals a benign, totally encapsulated left ovarian tumor. The tumor is removed, her anemia is resolved, and she’s doing well.

Patrick Leeson, 45, comes in complaining of dull, achy periumbilical pain that migrated to his right lower quadrant. He says it started about 24 hours ago. He has no nausea or vomiting or changes in bowel habits. He says he was treated for testicular cancer 10 years ago and it began with abdominal pain similar to what he’s experiencing now.

Mr. Leeson has an elevated white blood cell count with a left shift, possibly indicating a bacterial infection or inflammation. A CT scan of the abdomen and pelvis shows an inflamed appendix. Mr. Leeson is admitted to the hospital for an appendectomy and recovers completely.

Narrowing things down
So where do you start when a patient has abdominal pain? Anatomically the abdomen is divided into four quadrants and nine regions. You can use these divisions to narrow down the area of complaint and document your findings (see Where does it hurt?). Remember, however, that abdominal pain can be referred to many locations, including the shoulders, cardiac area (subternal and left chest), low and mid back, and groin.

Besides pain location, the kind of pain provides clues to its cause. Type A delta nerve fibers innervate cutaneous tissues and the parietal peritoneum; stimulation from an irritant such as pus, blood, bile, or urine often leads to localized pain. Type C fibers innervate visceral tissue, so visceral pain is more generalized and deeper.
What a pain!
Visceral pain can be divided into three subtypes:

- **Tension pain** is caused by organ distension, as from bowel obstruction or constipation. Blood accumulation from trauma and pus or fluid accumulation from infection or other causes also can cause this pain. Tension pain that’s described as colicky may be caused by increased peristaltic contractile force as the bowel tries to eliminate irritating substances. Patients with tension pain may have trouble getting comfortable and squirm a lot trying to find a comfortable position.

- **Inflammatory pain** may arise from inflammation of either the visceral or parietal peritoneum, as in acute appendicitis. This pain may be described as deep and boring. Initially, if the visceral peritoneum is involved, the pain may be poorly localized; as the parietal peritoneum becomes

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**Where does it hurt?**

You can use the four abdominal regions shown here and the nine abdominal regions shown below to help you determine what’s causing your patient’s abdominal pain.

- **Right upper quadrant or epigastric pain**
  - from the biliary tree and liver

- **Suprapubic or sacral pain**
  - from the rectum

- **Right lower quadrant**

- **Left lower quadrant**

- **Left upper quadrant**

- **Right hypochondriac**

- **Left hypochondriac**

- **Right lumbar**

- **Left lumbar**

- **Right iliac (or inguinal)**

- **Hypogastric**

- **Umbilical**

- **Epigastric**

- **Hypogastric pain**
  - from the colon, bladder, or uterus. Colonic pain may be more diffuse than illustrated.

- **Periumbilical pain**
  - from the small intestine, appendix, or proximal colon

- **Epigastric pain**
  - from the stomach, duodenum, or pancreas
involved, the pain may become localized. Most patients with inflammatory abdominal pain want to lie still.

- **Ischemic pain** is the most serious type of visceral pain—and, fortunately, the least common because the affected area will become necrotic if blood flow isn’t promptly restored. Sudden in onset, this pain is extremely intense, progressive in severity, and not relieved by analgesics. Like patients with inflammatory pain, patients with ischemic pain won’t want to move or change positions. The most common cause of ischemic abdominal pain is strangulated bowel.¹

**Assessment pointers**

Now let’s look at how to begin your assessment of a patient with abdominal pain. Take a health history, gynecologic history for women, and family history of abdominal conditions such as gastroesophageal reflux disease (GERD), gallbladder disease, renal calculi, colon cancer, or inflammatory bowel disease. Ask the patient when the pain began, where it’s located, and how he’d describe its quality and intensity. Ask if the pain is constant or intermittent, if it wakes him at night, and if anything aggravates or relieves it. If he says that food worsens or relieves abdominal pain, ask him what kind of food. Assess and document whether he has associated signs and symptoms such as fever, nausea or vomiting, change in bowel habits, weight loss, heartburn, or rectal bleeding.

If he reports nausea and vomiting and a change in bowel habits, ask if he’s recently traveled, eaten food that was recalled, drank water that might have been contaminated, or gone swimming in lakes or public pools. Ask about frequency of bowel movements. If he reports diarrhea, ask if the diarrhea is liquid, loose, or a combination and whether he’s noticed blood in the stool.

If he’s had a change in bowel habits without diarrhea, ask about the color and consistency of the stool, whether it floats or sinks, and if it’s associated with mucus or change in odor. Vomiting that precedes abdominal pain, or is associated with the onset of abdominal pain, may suggest infection as a possible cause of pain. Abdominal pain that began before vomiting may indicate appendicitis or, more rarely, cholecystitis. Suspect cholecystitis in patients with right upper quadrant abdominal pain and a family history of early gallbladder disease.² Other risk factors for cholecystitis include being female, age 40 or older, and overweight. Associated signs and symptoms may include vomiting and fever.³

As you continue your assessment, ask if the patient is taking new medications that might cause abdominal pain (such as nonsteroidal anti-inflammatory drugs) or has recently been diagnosed with a condition that might be associated with abdominal symptoms, such as GERD.

In children, abdominal migraine can cause abdominal pain. Look for a pattern of symptoms, especially if the abdominal pain is associated with vomiting and is cyclical. Ask about frequency, duration, and associated symptoms such as vomiting. Also ask about a personal or family history of migraines.¹

Your physical assessment should include inspection, auscultation, percussion, and palpation.

- **Inspect** the abdomen for movement, such as fluid waves or increased peristalsis. Look for scars from past surgeries; the patient may have adhesions that could lead to bowel obstruction. Note the contour of the abdomen; generalized distension may indicate increased gas, but local bulges may indicate a distended bladder or a hernia.
- **Auscultate** for bowel sounds or additional sounds such as bruits. Normal bowel sounds consist of peristaltic clicks and gurgles occurring at a rate of 5 to 34 per minute. Hypoactive bowel sounds may indicate an ileus. Hyperactive bowel sounds may indicate early intestinal obstruction. Arterial bruits with both systolic and diastolic components are abnormal sounds made by blood traveling through narrowed arteries such as the aorta or renal, iliac, or femoral arteries.
- **Percussion** can help you identify the borders of organs such as the liver, as well as determine the presence of air or solid masses such as tumors. Normally you’ll hear tympany (a drumlike sound)

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¹ Your physical assessment should include inspection, auscultation, percussion, and palpation.

² If you suspect an aortic aneurysm, palpation may be contraindicated or best left to the physician.

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### Some causes of acute abdominal pain

<table>
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<th>Cause</th>
<th>Signs and symptoms</th>
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| Abdominal aortic aneurysm          | • Usually asymptomatic, but may cause back and abdominal pain  
• Pulsatile mass may be palpable. |
| Appendicitis                       | • Abdominal pain over umbilicus, moving to right lower quadrant  
• Often associated with fever. Clinical exam may show rebound tenderness and positive obturator, psoas, and Rovsing’s signs.  
• Complete blood cell count will show an increase in white blood cells with a shift to the left and increased neutrophils. |
| Cholecystitis                      | • Pain in the right upper quadrant (toward the epigastric area) can radiate to the shoulder or back.  
• Nausea and vomiting may occur.  
• Biliary colic (pain that increases over 2 to 3 minutes and is sustained for 20 minutes or more)  
• Positive Murphy’s sign |
| Constipation                       | • Possible colicky to sharp pain that can mimic appendicitis  
• Patient may have diffuse tenderness on palpation as well as palpable stool. |
| Diverticulitis                     | • Left lower quadrant pain, often worse after eating and improved after defecation  
• Possible fever  
• Possible diarrhea or constipation  
• Abdomen may be distended and tympanic and tender to palpation over the left lower quadrant. |
| Ectopic pregnancy, ruptured        | • Sudden onset of lower left or right quadrant pain  
• Possible vaginal bleeding |
| Gastroenteritis                    | • Diffuse abdominal cramping, possibly with nausea, vomiting, diarrhea, and fever  
• Possible hyperactive bowel sounds, abdominal distension, and diffuse tenderness on palpation |
| Ileus or bowel obstruction         | • Diffuse pain that comes in cramping waves lasting 5 to 15 minutes  
• Nausea, followed by vomiting when the bowel obstructs  
• Stool may be passed distal to the obstruction and may also involve diarrhea  
• Abdomen may be distended with high-pitched bowel sounds.  
• Diffuse tenderness and guarding |
| Pancreatitis                       | • Pain in the right upper quadrant to epigastric area, possibly radiating to the back; can be associated with nausea and vomiting as well as fever  
• Possible ileus  
• In severe cases, shock, jaundice, and pleural effusion  
• Rare signs include Grey Turner and Cullen’s signs. |
| Peptic ulcer disease               | • Usually epigastric pain 1 to 3 hours after meals and often associated with nighttime awakenings  
• Sudden and severe pain with radiation to the right shoulder, along with peritoneal signs, may indicate perforation.  
• Hematemesis or melena suggests hemorrhage. |
| Peritonitis                         | • Acute diffuse abdominal pain that can be associated with fever, nausea, and vomiting. Pain increases with any motion.  
• Abdominal distension and rigidity. Rebound tenderness present but, unlike in appendicitis, is diffuse rather than localized. Guarding may be present.  
• Possible signs and symptoms of shock |
over the stomach and intestines, areas that normally are air filled. You’ll hear dullness over solid areas such as the liver, spleen, tumors, or other masses.

If you think the patient’s abdominal pain may be related to pyelonephritis or renal calculi, assess for costovertebral angle tenderness. Place the palm of one hand in the right costovertebral angle and strike it with the ulnar surface of your fist. Repeat in the left costovertebral angle. Pain with percussion suggests pyelonephritis.

• Palpation lets you assess local versus generalized areas of tenderness, as well as check for masses and enlarged organs. Palpation can go from light to deep, but keep in mind that a patient with abdominal pain may not tolerate abdominal palpation at all. He may guard (tighten his abdominal muscles), preventing you from assessing the abdomen adequately via palpation. If this happens, flexing his knees may relax the abdomen so you can palpate it. If he’s very ticklish, you can circumvent the tickle response by placing his hand below yours and palpating the area first with his hand, then switching hands so you can palpate.4 If the presence of a bruit leads you to suspect that the patient has an aortic aneurysm, palpation may be contraindicated or best left to the physician.

To assess for specific areas of tenderness, use specific palpation techniques. Murphy’s sign evaluates gallbladder tenderness and inflammation. Hook your fingers under the patient’s right lower ribs or press them under the ribs, then ask the patient to take a deep breath. A sharp increase in tenderness with a sudden stop in inspiratory effort constitutes a positive Murphy’s sign, indicating acute cholecystitis.

Leave checking for rebound tenderness for last because it may elicit enough pain that the patient won’t let you touch his abdomen again. Push your fingers into the area of tenderness slowly and firmly, then quickly lift them away. Rebound tenderness is present if the pain worsens when you withdraw your fingers. Rebound tenderness suggests peritoneal inflammation; for example, from appendicitis. If you suspect that your patient has appendicitis, check for Rovsing’s sign and for referred rebound tenderness. Press deeply and evenly in the patient’s left lower quadrant, then quickly withdraw your fingers. Pain in the right lower quadrant during left-sided pressure (a positive Rovsing’s sign) suggests appendicitis, as does right lower quadrant pain on quick withdrawal (referred rebound tenderness).

• Special techniques to assess for appendicitis include looking for a psoas or obturator sign. Place your hand just above the patient’s right knee and ask him to raise his thigh against your resistance. Alternatively, ask him to turn onto his left side; then extend his right leg at the hip. Flexing the leg at the hip makes the psoas muscle contract; extension stretches it. Increased abdominal pain on either maneuver (a positive psoas sign) suggests that the psoas muscle is irritated by an inflamed appendix.

To elicit the obturator sign, ask the patient to bend his right knee, then flex his right thigh at the hip and rotate the leg internally at the hip to stretch the internal obturator muscle. Right hypogastric pain (a positive obturator sign) suggests irritation of the obturator muscle by an inflamed appendix.

Diagnostic testing and treatment
The following lab studies may help narrow down causes of abdominal pain:

• CBC count, for signs of infection, cancer, and inflammation
• complete metabolic profile, for blood glucose level, renal or hepatic dysfunction, electrolyte imbalances, or problems related to low albumin level
• stool sample to look for infection or parasites
• urinalysis to look for infection or evidence of renal calculi
• amylase and lipase levels, which will be elevated in a patient with pancreatic problems.
• Helicobacter pylori level to check for peptic ulcer disease
• pregnancy test and microscopic examination of vaginal secretions in women, to rule out ectopic pregnancy and infections such as bacterial vaginosis or vulvovaginal candidiasis.

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sexually transmitted disease testing in sexually active men and women.

The following imaging studies may be done:
- A CT scan may be the first imaging test performed because it’s more sensitive, specific, and accurate than a plain radiographic abdominal series.
- An abdominal/pelvic ultrasound is more diagnostic than a plain X-ray and can help clinicians identify renal stones, gallstones, appendicitis, and gynecologic problems.
- Abdominal plain film radiography may reveal stones, bowel dilation, fluid levels indicating bowel obstruction, and stool and gas patterns.

For details on signs and symptoms specific to common abdominal problems, see Some causes of acute abdominal pain.

Because the causes of abdominal pain are so varied, so are the treatments. Generally, surgery is indicated for bowel obstruction, acute appendicitis, a ruptured ovarian cyst, and aortic aneurysm. Antibiotics will be prescribed if the cause of pain is an infection such as pyelonephritis or a lower urinary tract infection. However, if the infection is due to an abscess, surgical drainage may also be performed. Abdominal pain due to viral gastroenteritis will be treated with fluids, bowel rest, and antiemetics if the patient is over age 12.

Your role
Because some causes of abdominal pain are life-threatening, triaging patients quickly and accurately is crucial.

Providing emotional support, restoring fluid and electrolyte balance, and specific interventions to treat the pain’s underlying cause. If pain is associated with infection, for example, you’ll also take steps to regulate your patient’s body temperature and administer antibiotics as prescribed.

Manage your patient’s pain with medications as ordered and nonpharmacologic interventions, including positioning, back rubs, and heating pads (if not contraindicated).

To protect your patient against complications such as cardiac dysrhythmias and seizures, maintain fluid and electrolyte balance. Patients with diarrhea, vomiting, or fever are the most prone to fluid and electrolyte imbalances. Make sure electrolyte levels are evaluated before electrolyte replacement begins and periodically reassessed during replacement.

Maintain accurate intake and output records.

If your patient’s abdominal pain was caused by GERD, hiatal hernia, peptic ulcer disease, or diverticulitis, teach him about foods to avoid as well as how to time meals in relation to activities and bedtime. He should avoid overeating in general and stay away from fats, fried foods, spices, coffee, tea, tomato products, and alcohol. (Some patients should avoid certain other foods as well.) Tell him not to eat within 2 to 3 hours before bedtime and not to lie down or exercise immediately after eating.

Advise him to try to maintain a normal weight and to lose weight if he’s overweight or obese; the risk of GERD and gallbladder disease increases with weight. He should reduce stress, quit smoking, decrease or eliminate alcohol consumption, and reduce his use of medications that can damage the esophagus, such as corticosteroids and nonsteroidal anti-inflammatory drugs, including aspirin.

Divide and conquer
Although abdominal pain can be tricky to diagnose and treat, remembering which structures lie in which section and understanding the different types of pain can help you net clues to the source of the patient’s pain so he gets the help he needs—and fast.

REFERENCES