

# Abdominal Pain: Pathophysiology, Classification, and Causes

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**Abdominal pain can be classified into acute or chronic types ranging from benign, self-limiting events to life-threatening conditions. The underlying etiology of abdominal pain may include distention, contraction, compression, and torsion of abdominal contents in addition to other pathological factors. Pain localization is key to a definitive diagnosis and prompt treatment. Aside from the patient's history, physical examination, laboratory results, ultrasound imaging, and CT scan are often utilized to establish the diagnosis and the treatment procedure.**



## Background and Pathophysiology of Abdominal Pain

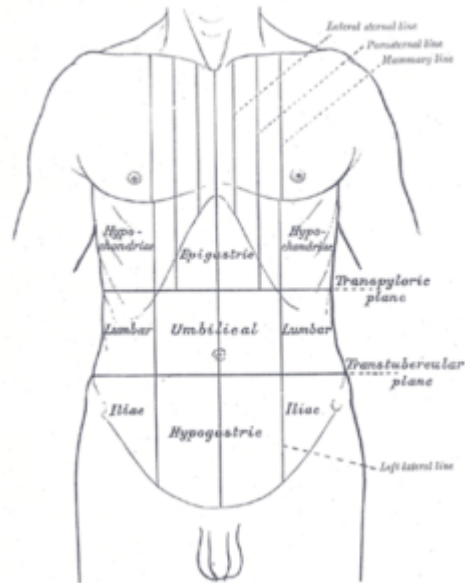


Image: Abdomen anatomy. By Henry Vandyke Carter - Henry Gray. License: [Public Domain](#).

The abdominal cavity (also known as the peritoneal cavity) is bounded anterolaterally by the xiphoid process and costal margins, posteriorly by the vertebral column, superiorly by the diaphragm, and inferiorly by the upper parts of the pelvic bones. It contains multiple visceral organs and is covered by parietal and visceral layers of the peritoneum.

Abdominal pain occurs when mechanical or chemical stimuli trigger the pain receptors in the abdomen. Stretch is the primary mechanical stimulus. Other mechanical stimuli, such as expansion, contraction, compression, pulling, and twisting of the viscera, also induce pain.

## Types of Abdominal Pain

### Visceral pain

Visceral pain is considered a **vague and dull** pain because the majority of organs and the visceral peritoneum do not carry an abundance of nerve fibers for the pain.

The patient may experience **mild pain** that is **poorly localized**, with the exact location difficult to pinpoint.

### Parietal pain

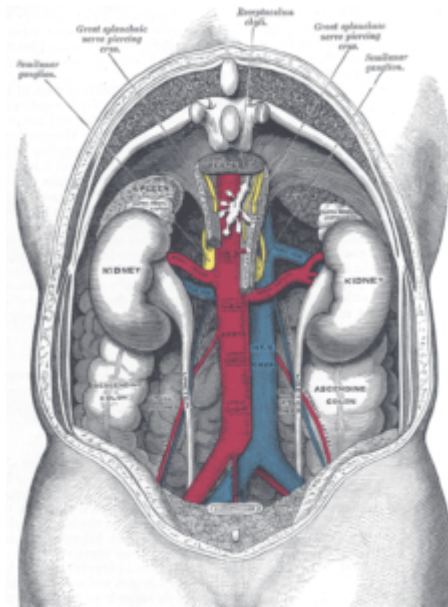
Parietal pain, or somatic pain, occurs when there is an irritation of the parietal peritoneum that lines the abdominal cavity. Somatic pain is **sharp, constant, severe**, and is **easily localized**.

### Referred pain

Referred pain is **perceived distant from its source**. It is poorly localized but normally constant in nature. It occurs when organs share a common nerve pathway.

For example, the pain due to phrenic nerve irritation is referred to the ipsilateral shoulder. The phrenic nerve has the same nerve value (C3–C5) as the cutaneous nerves supplying the shoulder. Therefore, when afferent nerves transmit the information to the

brain, the brain misinterprets and localizes the pain to the shoulder when, in fact, the problem lies within the phrenic nerve and not the shoulder.



**Image:** The relationships of the viscera and large vessels of the abdomen, seen from behind. By Henry Vandyke Carter - Henry Gray. License: [Public Domain](#).

**Other common examples of referred pain in the human body are as follows:**

- Referred pain of a ureteric stone into the groin
- Acute myocardial infarction pain referred to the left arm and jaw

## Methodical Assessment of Abdominal Pain

The differential diagnosis of abdominal pain varies widely, ranging from benign to life-threatening conditions, so a step-wise approach is required to identify the exact cause and its severity.

### Patient history

A comprehensive patient history is indispensable for an accurate diagnosis. The location of abdominal pain narrows down the differential diagnosis. Other general information should be obtained regarding the following:

- Time/mode of onset
- Duration of pain
- Severity and quality of pain
- Aggravating and remitting factors
- Past medical and surgical history
- Menstrual history

### Physical examination

After history, physical examination is an important component of the evaluation of a patient with abdominal pain.

## Inspection

A careful abdominal inspection of the shape, visible masses, scars, and abdominal movement with respiration provides key clues to the diagnosis.

For example, generalized distensions suggest possible intestinal obstruction, while specific distention in the upper quadrant may indicate a possible acute gastric dilatation or pancreatic cyst.

## Palpation

During abdominal palpation, one should look for abdominal guarding, tenderness, and epigastric pulsations. The palpation of masses and internal organs facilitates an accurate diagnosis.

Rectal examination should be done for the presence of occult or frank blood, pain, or mass (fecal impaction, tumor, prostate, or pelvic abscess).

Pelvic examination is indicated for most women if the pain is in the lower abdomen. It may enable the diagnosis or exclusion of ovarian torsion, an ectopic pregnancy, or pelvic inflammatory disease.

## Percussion

Percussion helps in the detection of ascites, large cysts, and abdominal masses.

## Auscultation

Hyperactive bowel sounds are present initially in mechanical intestinal obstruction. An abdominal aortic and renal bruit may also be heard.

# Investigations

## Laboratory investigations

Laboratory tests are often non-specific and are used to support clinical findings.

### **Mandatory tests for patients with abdominal pain include the following:**

1. Complete peripheral blood count
2. Analysis of serum electrolytes, creatinine, blood glucose, and urinalysis
3. A urine pregnancy test for all women of child-bearing age
4. Liver function tests and serum amylase levels in cases involving right upper quadrant abdominal pain

## Imaging investigations

### Plain abdominal X-ray

An initial, easy, and inexpensive test to look for the following:

- Air under the diaphragm for perforated viscus
- Air-fluid level on upright abdominal X-ray for intestinal obstruction
- Radio-opaque opacities for renal and gallbladder stones

### Abdominal ultrasound

Abdominal ultrasound is one of the most commonly used diagnostic tests for the

diagnosis of diseases of the hepatobiliary system, the urinary tract, and acute appendicitis. Pelvic ultrasound in women aids the diagnosis of suspected ectopic pregnancy and ovarian cysts/masses.

### Abdominal computed tomography (CT)

Abdominal CT provides better visualization of the abdominal viscera. It is also an investigation of choice in hemodynamically stable patients presenting with an acute abdomen in an emergency setting.

## Causes of Abdominal Pain According to Regions

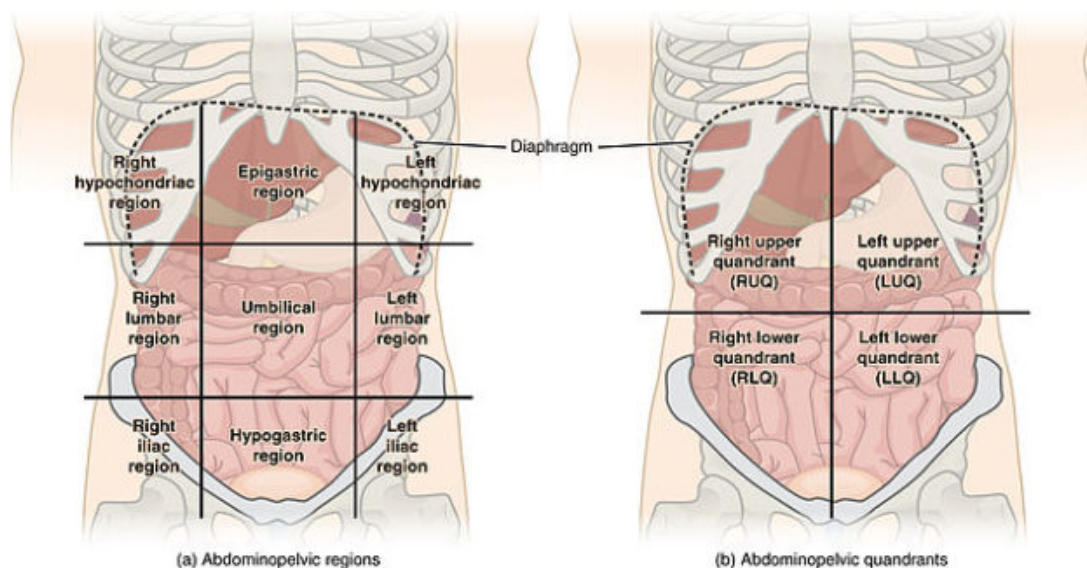


Image: There are (a) nine abdominal regions and (b) four abdominal quadrants in the peritoneal cavity. By OpenStax. License: [CC BY 3.0](https://creativecommons.org/licenses/by/3.0/).

## Causes of upper abdominal pain

Upper abdominal pain can be classified into pain involving the right upper quadrant, epigastrium, and the left upper quadrant.

Right upper quadrant	Epigastrium	Left upper quadrant pain
<p>Biliary etiologies:</p> <ul style="list-style-type: none"> <li>• <a href="#">Gallstones</a></li> </ul> <p>Acute cholecystitis</p> <p>Acute cholangitis</p> <p>Hepatic etiologies:</p> <ul style="list-style-type: none"> <li>• <a href="#">Hepatitis</a></li> <li>• Liver abscess</li> </ul> <p>Budd-Chiari syndrome</p> <p>Portal vein thrombosis</p>	<p>Myocardial etiologies:</p> <ul style="list-style-type: none"> <li>• <a href="#">Acute myocardial infarction</a></li> </ul> <p>Pancreatic etiologies:</p> <ul style="list-style-type: none"> <li>• <a href="#">Pancreatitis</a></li> </ul> <p>Gastric etiologies:</p> <ul style="list-style-type: none"> <li>• <a href="#">Peptic ulcer disease</a></li> <li>• <a href="#">Gastroesophageal reflux disease</a></li> <li>• Gastritis</li> </ul> <p>Functional dyspepsia</p> <ul style="list-style-type: none"> <li>• <a href="#">Gastroparesis</a></li> </ul>	<p>Splenic etiologies:</p> <ul style="list-style-type: none"> <li>• <a href="#">Splenomegaly</a></li> <li>• Splenic infarction</li> <li>• Splenic abscess</li> <li>• Splenic rupture</li> </ul>

## Causes of lower abdominal pain

Lower abdominal pain can be classified into pain involving the right lower quadrant, hypogastrium, and the left lower quadrant.

Right lower quadrant	Hypogastrium	Left lower quadrant
<ul style="list-style-type: none"> <li>• <a href="#">Acute appendicitis</a></li> <li>• Crohn's disease</li> <li>• <a href="#">Kidney stones</a></li> <li>• <a href="#">Pyelonephritis</a> <ul style="list-style-type: none"> <li>• In women:</li> </ul> </li> <li>• Ectopic pregnancy                             <ul style="list-style-type: none"> <li>◦ Ovarian cyst</li> <li>◦ Ovarian torsion</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Cystitis</a> <ul style="list-style-type: none"> <li>• Acute urinary retention</li> </ul> </li> <li>• Testicular torsion (in males)</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Diverticulitis</a></li> <li>• <a href="#">Kidney stones</a></li> <li>• <a href="#">Pyelonephritis</a> <ul style="list-style-type: none"> <li>• In women:</li> </ul> </li> <li>• Ectopic pregnancy                             <ul style="list-style-type: none"> <li>◦ Ovarian cyst</li> <li>◦ Ovarian torsion</li> </ul> </li> </ul>

## Causes of diffuse abdominal pain

Diffuse abdominal pain occurs in:

- [Acute peritonitis](#)
- [Intestinal obstruction](#)
- Perforation of the gastrointestinal tract
- [Mesenteric ischemia](#)
- [Inflammatory bowel disease](#)
- Viral gastroenteritis
- Malignancy (colorectal, gastric, and pancreatic)
- [Celiac disease](#)

## Causes of lower abdominal pain or pelvic pain, specifically in women

In women, the causes of lower abdominal pain may include the following:

<ul style="list-style-type: none"> <li>• Pregnancy</li> <li>• Complications of pregnancy                             <ul style="list-style-type: none"> <li>• <a href="#">Ectopic pregnancy</a></li> </ul> </li> <li>• <a href="#">Pelvic inflammatory disease</a> <ul style="list-style-type: none"> <li>• Ovarian torsion</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Ruptured ovarian cyst                             <ul style="list-style-type: none"> <li>• <a href="#">Endometriosis</a></li> <li>• Endometritis</li> </ul> </li> <li>• Leiomyomas (fibroids)</li> <li>• Ovarian hyperstimulation                             <ul style="list-style-type: none"> <li>• <a href="#">Ovarian cancer</a></li> </ul> </li> </ul>
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## References

Kumar, P. J., & Clark, M. L. (2012). *Kumar & Clark's clinical medicine* (8th ed.). Edinburgh.

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