Abdominal Pain — Pathophysiology, Classification and Causes

Abdominal pain can be classified into acute or chronic ranging from benign, self-limiting condition to life-threatening conditions. The underlying etiology of abdominal pain can be distention, contraction, compression, and torsion of abdominal contents with other pathological reasons. Localization of pain should be definite to diagnose and ensure proper treatment. Apart from the patient’s history, physical examination, laboratory results, imaging through ultrasound and CT scan are often indicated to establish a definite diagnosis and treatment.

Background and Pathophysiology of Abdominal Pain
An abdominal cavity also called a 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 two layers of peritoneum i.e. parietal and visceral layers.

Abdominal pain occurs when mechanical or chemical stimuli stimulates abdominal pain receptors. Stretch is the primary mechanical stimulus. Other mechanical stimuli, such as expansion, contraction, compression, pulling on, and twisting of the viscera, are also perceived.

Classification 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 have an abundance of nerve fibers for the pain.

The patient will experience **mild pain** that is **poorly localized** and it is difficult to pinpoint the exact location.

**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**, can be **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. Phrenic nerve has the same nerve value (C3 – C5) as the cutaneous nerves supplying the shoulder, therefore, when afferent nerves carry the information to the brain, it misinterprets and localizes the pain to the shoulder when, in fact, the problem lies within the phrenic nerve and not the shoulder.

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

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

**Methodological Assessment of Abdominal Pain**

Since abdominal pain has wide differential diagnoses and varies from benign to life-threatening, a step-wise approach is required to identify the exact cause and its severity.
Patient History

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

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

Physical Examination

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

Inspection

An attentive abdominal inspection of the shape, visible masses, scars, and the abdominal movement with respiration provide key clues to the diagnosis.

For example, generalized distensions suspect intestinal obstruction, while specific distention in the upper quadrant may suspect 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 further guide to the accurate diagnosis.

Rectal examination should be done for the presence of the 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 assist in 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 the mechanical intestinal obstruction. Abdominal aortic and renal bruit may also be heard.

Investigations

Laboratory investigations

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

All patients with abdominal pain should always have:

1. Complete peripheral blood count.
2. Serum electrolytes, creatinine, blood glucose, and urinalysis.
3. A urine pregnancy test must be done for all women in the child-bearing age.
4. Liver function tests and serum amylase levels should be done in all patients with right upper quadrant abdominal pain.

**Imaging investigations**

**Plain abdominal X-ray**

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

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

2. **Abdominal Ultrasound**

Abdominal ultrasound is one of the most commonly used diagnostic tests for the diagnosis of the diseases of the hepatobiliary system, the urinary tract, as well as acute appendicitis. Pelvic ultrasound in women helps in the diagnosis of suspected ectopic pregnancy and ovarian cysts/masses.

3. **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](https://example.com/abdominal_regions.png)

**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 divided into the pain in the right upper quadrant, epigastrium, and the left upper quadrant.
<table>
<thead>
<tr>
<th>Right upper quadrant</th>
<th>Epigastrium</th>
<th>Left upper quadrant pain</th>
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<tr>
<td><strong>Biliary etiologies:</strong></td>
<td><strong>Myocardial etiologies:</strong></td>
<td><strong>Splenic etiologies:</strong></td>
</tr>
<tr>
<td>• Gallstones</td>
<td>• Acute myocardial infarction</td>
<td>• Splenomegaly</td>
</tr>
<tr>
<td>• Acute cholecystitis</td>
<td></td>
<td>• Splenic infarction</td>
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<tr>
<td>• Acute cholangitis</td>
<td>• Pancreatitis</td>
<td>• Splenic abscess</td>
</tr>
<tr>
<td><strong>Hepatic etiologies:</strong></td>
<td>• Peptic ulcer disease</td>
<td>• Splenic rupture</td>
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<tr>
<td>• Hepatitis</td>
<td>• Gastroesophageal reflux disease</td>
<td></td>
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<tr>
<td>• Liver abscess</td>
<td>• Gastritis</td>
<td></td>
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<tr>
<td>• Budd-Chiari syndrome</td>
<td>• Functional dyspepsia</td>
<td></td>
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<tr>
<td>• Portal vein thrombosis</td>
<td>• Gastroparesis</td>
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Causes of lower abdominal pain

Lower abdominal pain can be divided into the pain in the right lower quadrant, hypogastrium, and the left lower quadrant.

<table>
<thead>
<tr>
<th>Right lower quadrant</th>
<th>Hypogastrium</th>
<th>Left lower quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Acute appendicitis</td>
<td>• Cystitis</td>
<td>• Diverticulitis</td>
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<tr>
<td>• Crohn’s disease</td>
<td>• Acute urinary retention</td>
<td>• Kidney stones</td>
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<tr>
<td>• Kidney stones</td>
<td></td>
<td>• Pyelonephritis</td>
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<tr>
<td>• Pyelonephritis</td>
<td>• Testicular Torsion (in males)</td>
<td>• In women:</td>
</tr>
<tr>
<td>• In women:</td>
<td></td>
<td>• Ectopic pregnancy</td>
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<tr>
<td>• Ectopic pregnancy</td>
<td></td>
<td>• Ovarian cyst</td>
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<tr>
<td>• Ovarian cyst</td>
<td></td>
<td>• Ovarian torsion</td>
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<tr>
<td>• Ovarian torsion</td>
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</tbody>
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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 seen in women

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

- Pregnancy
- Complications of pregnancy
- Ectopic pregnancy
- Pelvic inflammatory disease
- Ovarian torsion
- Ruptured ovarian cyst
- Endometriosis
- Endometritis
- Leiomyomas (fibroids)
- Ovarian hyperstimulation
- Ovarian cancer
References


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