A patient arrives in the emergency department with severe abdominal pain, vomiting and fever. The condition is serious and has to be treated quickly as life-threatening illnesses could be the cause of these symptoms. The working diagnosis is ‘acute abdomen’. Here we are going to examine what is covered by this commonly used term, which clinical diagnostics are expedient and which differential diagnosis could be considered.
Definition of Acute Abdomen

**Acute abdomen as a symptom complex**

An acute abdomen is not a single disease entity, but a blanket term for a symptom complex that constitutes a life-threatening abdominal condition that needs urgent medical attention. The symptoms can have both abdominal and extra-abdominal etiology.

The term acute abdomen is used to describe a patient’s condition until a final etiological explanation can be given and a diagnosis can be made, and it always describes an emergency situation. The phrase acute abdomen should, therefore, be carefully selected in a clinical context.

**Key symptoms of acute abdomen**

*Abdominal pain* is the most important and the most frequent complaint in patients presenting with acute abdomen in emergency settings. The pain is of acute onset, often very severe, and non-traumatic. Although in some patients, pain may be mild or even absent.

The following complaints are also the part of an acute abdomen symptom complex and are considered to be key symptoms:

- Nausea, vomiting
- Constipation
- Symptoms of shock (dyspnea, oliguria, anuria, dizziness, palpitations)
- Poor general health
- Bleeding (Hematemesis, melena, etc)

In very young and elderly patients as well as in pregnant women, acute abdomen may present in a more diffuse manner and with atypical symptoms that are less specific for the underlying pathology such as abdominal bloating, heart burn, abdominal discomfort, drowsiness and general ill-health, that may lead to delay in the proper diagnosis and treatment. This results in increased complications and higher morbidity and mortality.

**Etiology**

**Causes of acute abdomen**

The causes of the acute abdomen are broadly categorized into:

1. Localized abdominal pain
2. Diffuse clinical conditions, such as inflammation, infection, mechanical obstruction, and circulatory disturbances
3. Extra-abdominal diseases

*Note: The most important causes of the acute abdomen are inflammations or perforations of the intraperitoneal organs (e.g. appendix, bile ducts, and stomach); intestinal obstruction (ileus) and visceral circulatory problems.*
These most common causes of the acute abdomen should always be ruled out first. Some of the extra-abdominal entities may mimic acute abdomen such as myocardial infarction, lower lobe pneumonia, and testicular/ovarian torsion, it makes sense to conduct a targeted observation and examination by organ system to reach the accurate diagnosis.

Diagnosis of Acute Abdomen

Clinical diagnosis of acute abdomen

Acute abdomen represents an emergency situation and needs urgent evaluation. Several of the possible disease complexes which could lie at the heart of the diagnosis requires a prompt causal therapy for the patient. Weighing up how thorough an initial diagnosis is required before proceeding with the first steps of treatment is different from case to case and depends on the following factors:

- **Hemodynamic stability of the patient:** Hemodynamic instability, such as unexplained decreases in blood pressure, can be indicative of bleeding. Indications of internal bleeding would suggest immediate surgical treatment.
- **Extent of peritonism:** Local or diffuse as a measure of the progression of the symptoms.
- **Clinical stability of the patient** or is their condition rapidly deteriorating?

History

A proper history is indispensable and can give clues to the underlying etiology of acute abdomen. It is important to ask:

- **Where the pain began and the current location of it** in order to gain clues to the primarily affected organ. For example, the pain of acute appendicitis starts in the periumbilical region and then shifts to the McBurney’s point.
- **Type of pain:** Description of the intensity and nature of the symptoms.
  - **Visceral pain:** Relatively hard to pinpoint, dull, pressing pain that often radiates to other regions of the body, as well as non-specific symptoms such as vomiting, sweating, and hypotension e.g. stomach ulcer perforation or inflammation
  - **Colic pain:** Belongs to the visceral pain category, increasing and decreasing intensity, extremely unsettled patients e.g. gallstones,
kidney stones or ileus.

- **Somatic pain**: Relatively easy to locate, although becomes increasingly diffuse in advanced peritoneal irritation, pricking to stabbing pain, often only mild or no vegetative attendant symptoms at all e.g. appendicitis.

- **Age of patient**: Probable diagnoses of certain disease complexes can be evaluated based on the age of the patient. While invagination and testicular torsion are relatively common amongst younger patients, perforations of the GI tract or tumors are more common diseases amongst adults. This knowledge also allows for more targeted clinical diagnosis.

- **Patient medication history**: The medication history of the patient is very important. If surgical symptoms present, then we have to determine the use of anticoagulants such as warfarin.

**Physical examination**

In order to clinically examine a patient with acute abdomen, it is necessary to:

- **Inspection** for injuries or hematomas, hernias, other abdominal wall defects or skin discoloration (pancreatitis).

- **Auscultation** should always be performed prior to manual examination in order to avoid provoking intestinal noises. Intestinal sounds should be auscultated in 4 sections. Are there intestinal noises present? What grade are they? If no noises are heard, this could indicate a paralytic ileus.

- **Palpation** to detect muscle rigidity, muscle guarding, peritonism (rebound tenderness), tenderness, and ascites.

- **Percussion** helps in the detection of ascites, and abdominal fluid.

- **Digital rectal examination** for conditions such as palpable tumors, an empty bowel (caused by an obstacle such as ileus or tumor) and blood.

**Note**: A digital rectal examination is always employed by acute abdomen – a fact which
Laboratory testing

The laboratory testing depends upon the suspected diagnosis according to the patient’s medical history, physical examination, and clinical status. The following laboratory parameters are commonly tested in the emergency settings:

- **Complete blood counts** (leukocytes, hemoglobin, hematocrit, platelets)
- **Inflammatory parameters** [e.g. C-reactive protein (CRP), creatine kinase]
- **Blood group typing and cross matching**
- **Amylase** and/or **lipase** in the serum (rises in pancreatitis)
- **Liver function tests** (rise in gallbladder inflammation)
- **Lactate** (rises in mesenteric ischemia, shock)
- **Electrolytes**
- **Blood sugar**
- **Urine sediment** (leukocytes/blood on suspicion of kidney stones or ureteral calculi)
- **Urine pregnancy test** in all women of child-bearing age

Imaging

Based on the observations from the history and the physical examination, a targeted diagnostic investigation should take place.

**Ultrasonography of the abdomen**

A sonography of the abdomen is the most cost effective and fastest procedure to carry out. It can be used as a first line, orientating investigation, used principally to identify gallbladder pathology, abdominal aortic aneurysm, free fluids such as blood, ascites and the contents of ruptured hollow organs in the abdomen.

Injuries to the parenchymatous organs, widening or perforations of vessels (abdominal aorta, ureter or bile ducts) can also be noticed. In paralytic ileus, a sonogram often has a poor resolution due to the superimposition of air.

**X-rays of the chest and abdomen**
An upright **chest x-ray** serves to identify free air in the abdomen which can occur as a result of perforation of the hollow organs and is visible as a **sub-diaphragmatic crescent of air (pneumoperitoneum)**. It also detects abnormal chest findings such as pneumonia, which sometimes present as acute abdomen.

**Plain abdominal radiography** in a **left lateral position** can depict an air inclusion between the **liver** and flank in cases of pneumoperitoneum.

Further, an intestinal obstruction (ileus) can be visualized by **increased fluid levels** in the small and large intestines, or dilated intestinal loops in cases of volvulus, on upright and flat views.
A CT scan is the gold standard in the diagnostics for acute abdomen if there is a justifiable suspicion of acute inflammation of intra-abdominal structures (e.g. **pancreatitis**, **diverticulitis**). It is also of use in cases where sonography results are less meaningful e.g. in obese patients, if there is air superimposition or if there are large injuries. Advantages of a CT scan include a **shorter investigation time** and **good picture resolution**.

**Diagnostic Laparoscopy**

In selected patients, the diagnostic laparoscopy is sometimes considered when a diagnosis is not established by history, examination, and relevant diagnostic testings.

**Differential Diagnosis**

Differential diagnosis of acute abdomen is often made in relation to the location of pain in abdominal quadrants and on further characteristics of the pain. The abdominal organs produce symptoms in relation to their location e.g. liver and gall bladder diseases often cause pain in right upper quadrant, while kidney diseases cause pain in the lumbar regions, and spleen diseases in the left upper quadrant.

The next step is to consider which diseases of those organs identified could be responsible for the particular pattern of complaints. The most important differential diagnoses are illustrated below.

<table>
<thead>
<tr>
<th>Organ System</th>
<th>Organ with clinical picture</th>
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</table>
| Upper abdomen (both sides possible) | Lungs/Pleura: Pleurisy, Pneumonia, Pneumothorax, Pulmonary embolism  
Heart: Acute Myocardial infarction, Pericarditis  
Kidneys: Renal pelvis calculi, nephritic abscess, pyelonephritis |
| Right upper abdomen           | Bile ducts: cholecystitis, cholangitis  
Pancreas: pancreatitis  
Duodenum: duodenal ulcer  
Liver: hepatitis, liver abscess, ruptured liver, congested liver |
Epigastrium

**Stomach:** Peptic ulcers, Gastritis
Small intestine: Ileus

Left upper abdomen

Spleen: splenic infarction, ruptured spleen
Pancreas: pancreatitis, pancreatic cancer

Lower abdomen (both sides possible)

Intestines: Diverticulitis
Urinary: acute urinary retention, kidney or ureter stones, testicular torsion
Gynecological: ovarian cysts, extra uterine pregnancy, duct rupture, inflammation of the ovaries (adnexitis)

Right lower abdomen

Intestines: Appendicitis

Central abdomen, Navel

Intestines: Ileus (mechanical), Mesenteric ischemia, volvulus, invagination, toxic megacolon, intestinal infection, Crohn’s disease, ulcerating colitis

Left lower abdomen

Intestines: sigmoid diverticulitis

### Treatment of Acute Abdomen

- Since acute abdomen is a medical emergency, the patient’s vital signs and airway (A), breathing (B), and circulation (C) should be initially assessed and managed accordingly.
- An intravenous line should be established and transfusions should be administered immediately unless contraindicated.
- Patients are initially given nothing by mouth (NPO).
- Early analgesic use is recommended, even before a definitive diagnosis is established. Intravenous acetaminophen is the first choice. Other non-steroidal anti-inflammatory drugs (NSAIDs) and narcotic analgesics may be given according to the pain severity.

### Conservative or operative measures

The definite treatment of acute abdomen is based upon its underlying etiology and is either conservative or operative depending on the diagnosis (e.g. appendectomy and cholecystectomy for appendicitis and cholecystitis, respectively). If abdominal pathology indicates a secondary peritonitis, then this has to be treated with antibiotics. It is important not to primarily prescribe cephalosporin in this case. This class of antibiotic has a loophole for enterococci and would therefore not be effective against a number of common bacteria that cause acute abdomen – a point which is commonly asked about in written medical exams.

**Note:** Cephalosporins are not to be used as an initial treatment for peritonitis due to their reduced effectiveness against enterococci.

### Disease Progress and Prognosis of Acute Abdomen

The course and prognosis for acute abdomen are highly dependent on the causal factors as acute abdomen is only a working diagnosis until a final diagnosis is established.

### Review Questions

Solutions can be found below the references.

1. Which procedure is obligatory during the examination of patients with symptoms of the acute abdomen?
A. Digital rectal examination
B. MRT scan
C. Abdominal CT
D. Cranial nerve status
E. Neurological examinations using major reflexes

2. Which antibiotics should not be prescribed as the first choice when there is a suspicion of secondary peritonitis?
   A. Ampicillin
   B. Linezolid
   C. Vancomycin
   D. Mezlocillin
   E. Cephalosporin
   F. Piperacillin

3. Which of these is amongst the most common causes of the acute abdomen?
   A. Appendicitis, cholecystitis, ileus, visceral circulatory disorders
   B. Appendicitis, adnexitis, cholecystitis, ileus
   C. Appendicitis, myocardial infarction, ileus, visceral circulatory disorders
   D. Appendicitis, testicular torsion, cholecystitis, adnexitis
   E. Appendicitis, aortic aneurysm, ileus, cholecystitis

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Correct answers: 1A, 2E, 3A

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