

5. Differential diagnosis of epigastric pain

Epigastric pain can be divided into **acute** (sudden) and **chronic**.

After excluding pain caused by trauma, the group of diseases called acute abdomen comes first.

Abdominal ultrasound

The imaging method of choice in epigastric pain is ultrasound of the abdomen, which with high sensitivity and specificity can display **acute cholecystitis or dilatation of the bile ducts** (sometimes visualises the presence of choledocholithiasis).

Utilisation rate of ultrasound is limited in obese patients (limited propagation of ultrasound waves into depth, because of their reflection in the passage through patient) and in significant flatulence (gas completely reflects the mechanical wave, due to the large difference in acoustic impedance – gas cause acoustic shadow). Similarly, utilisation of ultrasound is limited in case of extensive pneumoperitoneum.

Abdominal X-ray

In the next step or simultaneously, X-ray of the abdomen can be performed to confirm the presence of pneumoperitoneum or bowel obstruction.

CT of the abdomen

In case of unclear findings at previous examinations or to clarify the extent of pathology diagnosed at previous examinations (if it is of clinical significance), a CT examination is then performed. Without previous ultrasound and X-ray, CT can be performed directly in hyperacute conditions of unstable patients or very obese patients.

Acute cholecystitis

The most common cause of acute epigastric pain is **acute cholecystitis**. If acute cholecystitis is suspected, the method of choice is an ultrasound examination, where is usually observed dilated gallbladder, thickening of gallbladder wall above 3 mm and wall stratification - layering (edema "separates" individual layers of the wall), swelling or free fluid in the gallbladder bed. The lumen of the gallbladder is usually filled with gallstones and sludge. Acalculous cholecystitis (without the presence of lithiasis) is rare and typically occurs in critically ill patients in intensive care units.

Untreated cholecystitis can result in focal peritonitis (corresponding to fluid in the gallbladder bed) and subsequently perforation of the gallbladder into the duodenum (duodenobiliary fistula with risk of biliary ileus caused by gallstones), liver (abscess formation) or peritoneum (abscess or biliary peritonitis). In rare cases, when perforation of the gallbladder or intestine occurs, we observe signs of pneumoperitoneum on an X-ray of the abdomen (see below). **CT is indicated** to clarify the **complications of cholecystitis**. **For uncomplicated cholecystitis - in most cases – is for the surgeon usually sufficient ultrasound examinations, clinical and laboratory findings** (signs of cholecystitis are the same on CT and on ultrasound; administration of contrast on CT does not bring in evaluation of cholecystitis no additional information; furthermore, on ultrasound may be finding correlated with localisation of patient's pain).

Thickened and stratified gallbladder wall may also be present in ascites or acute hepatitis but lacks the clinical signs typical of acute cholecystitis. Even in very obese patients, the gallbladder as a superficial organ is easily accessible by ultrasound examination, so CT is not necessary in most cases.

Gastritis and gastroenteritis

Another cause of acute epigastric pain is irritation of the stomach or small intestine - **gastritis, gastroenteritis**. For these diagnoses, the **finding on imaging methods** is usually **negative**. Similarly, a peptic ulcer is manifested, which may be located in the stomach or duodenum. The ulcer itself is difficult to visualize by radiological methods (ultrasound, X-ray, CT) and belongs primarily to the care of gastroenterologists, who have at their disposal endoscopic diagnostics and therapy. Mucosal changes characteristic of ulcer lesions can also be observed on fluoroscopic examination of the stomach, but due to the availability of endoscopy, this method is no longer used in practice. **The aim of imaging methods is to visualise the complications of peptic ulcer, i.e. especially perforation** (requires acute surgical treatment), smaller possibilities of imaging methods are in the diagnosis of bleeding or evidence of tumorous etiology of the ulcer. During perforation of the ulcer, **pneumoperitoneum** occurs (gas escapes into the abdominal cavity, which is physiologically found in the digestive tract) and **we often find free fluid in the abdominal cavity**.

If a tumorous etiology of the ulcer is suspected, targeted histology from the lesion is required. On CT tumor is characterized by the presence of irregular thickening of the stomach wall infiltrating individual wall layers. Distinguishing from the reactive thickening of the stomach wall around the ulcer is difficult.

Pneumoperitoneum

We diagnose the **pneumoperitoneum** on an **X-ray in upright position** as a crescent of free gas under the diaphragm, where it does not occur physiologically. In case the patient is not capable of upright examination, the examination can be done in supine position, however, this is associated with a lower sensitivity (*to show typical signs of pneumoperitoneum in supine position - e.g. double wall sign – it requires much larger amount of free gas than in supine position*). In supine X-ray the patient is usually lying on his back, the free gas on CT is most often located ventrally under the abdominal wall, the **sensitivity of CT** even for a very small amount of free gas is **very high**. The presence of pneumoperitoneum is one of the indications for acute surgery, so it is important to confirm or rule out pneumoperitoneum. The aim of CT is to further locate the site of GIT perforation on the basis of direct signs (interruption of wall continuity) and indirect signs (fat swelling, gas distribution).

In case of massive bleeding from a peptic ulcer, contrast-enhanced CT can sometimes show a leakage of a contrast agent outside the lumen of the vessels (sign of active bleeding), but primarily diagnosis and treatment is the domain of endoscopists or surgeons (gastrectomy is necessary in severe conditions).

Ultrasound is not a suitable method for imaging the stomach, because through the gas and the mixed filling of the stomach, clarity is minimal. The stomach can be examined for CT. For valid evaluation of the wall is suitable distension of the stomach with water or mannitol filed YM shortly before CT examination (similar to gallbladder or bladder wall is difficult to evaluate wall of collapsed intestine).

Acute pancreatitis is also one of the causes of acute epigastric pain, see the relevant question.

Bowel obstruction

Less frequent cause of pain is **bowel obstruction (ileus)** which may be caused by mechanical (barrier in the gut), vascular (ischemia, infarction, haemorrhage), nerve (paralysis peristalsis), or a combination of the foregoing. Ileus can be diagnosed using **ultrasound**, where we observe dilatation of the intestinal loops and absent / weak peristalsis. Furthermore, to rule out bowel obstruction, **X-ray of the abdomen** is indicated in supine position, where dilatation of the loops is also observed, fluid-levels are present in upright position (they can also be present physiologically). **CT is indicated when the etiology of the bowel**

obstruction is investigated (if vascular ileus is suspected, it is necessary to administer a contrast agent, which allows the assessment of intestinal ischemia, thrombosis of mesenteric artery or vein).

Other causes of epigastric pain

The etiology of acute epigastric pain may also be **outside the abdominal cavity**. This can lead to a **myocardial infarction of the myocardial wall** and should therefore be considered in the differential diagnosis.

Chronic pain may be in patients with chronic pancreatitis, cholecystolithiasis, chronic cholecystitis or peptic ulcer. These diseases follow the same imaging as the acute pathology of these organs. Other causes of epigastric pain are esophageal reflux disease (diagnosis and treatment is the domain of gastroenterologists), rarely diverticulitis and transverse colitis (see chapter 4 and 17) and muscle pain.