

source of bleeding, occurs in two per cent of the population.

Finally, **bleeding from GIT can be due to disturbed haemostasis and haemocoagulation**. Therefore, bleeding occurs in cases of impaired coagulation (haemophilia, disseminated intravascular coagulation), in vascular malformations (Osler-Weber-Rendu) and in vasculitis (Henoch-Schönlein purpura).

7.17 Abdominal pain

Pain is a general symptom which arises in consequence of tissue impairment. **In coincidence with gastrointestinal diseases, pain is the cause which drives the patient to the physician**. Specific signs of pain can facilitate the assessment of the correct diagnosis. Particular types of pain are specific for some diseases. Hence, e.g. the diagnosis of appendicitis can be assessed on the basis of the character of pain even when the result of computer tomography is negative. Sensitive neurons lead information from visceral organs and peritoneum via the sympathetic fibers into the spinal sensoric neurons. Their afferent endings terminate in smooth muscles of hollow organs, in organ capsules, peritoneum and intraabdominal vessels. Abdominal organs per se are not sensitive to stimuli of cutting, traction and burns. Only three stimuli are able to induce the pain in the digestive tract:

- **Distension** or increased tension in the wall of hollow organs or tension in capsules of solid organs. It arises due to strong muscular contraction in these organs, their spasms, distension, or traction.
- **Inflammation**, owing to which, substances such as bradykinin, prostaglandins, histamine and serotonin are released. These substances stimulate the sensitive endings of nerves.
- **Ischaemia** brings about a release of tissue metabolites. These products, in the same way, stimulate the sensitive endings of the nerves.

Spinal sensoric neurons receive information also from non-sensoric neurons. Consequently, abdominal pain can as well be perceived in extraabdominal parts of the body.

Localisation, time of occurrence and progression of abdominal pain are significant facts which are of important diagnostic value. Abdominal pain has one of the following three properties, or their mutual combinations:

1. **Visceral pain** is usually dull, inaccurately localised due to multisegmental and bilateral innervation of abdominal organs. Therefore it is frequently perceived in the central line. It has its origin in visceral organs. It may, however, be of crampy and carving character.
2. **Parietal pain** is of somatic character. It is very intensive, well localised and lateralised. The pain is usually evoked by inflammation in the parietal peritoneum.
3. **Transferred pain** is localised superficially. It manifests irritation of visceral organs perceived as pain in more remote areas. The involved areas are innervated by the same spinal segments. The pain is usually associated with hyperaesthesia.

Visceral pain, as mentioned above, is not precisely localised. Despite this fact it is possible to make out a list of pain characteristics classifying the relation of particular pain to individual visceral organs. Pain originating in oesophagus is localised substernally. If it is abrupt, it can be projected to the back, or to the left arm. The pain coming from the stomach, duodenum and pancreas is localised in the epigastrium, or right upper quadrant of the abdominal cavity. Pain from the gallbladder and bile ducts can be transferred below the lower angle of the right shoulder blade. Pain due to subphrenic or hepatic abscesses can be transferred to the upper margin of the right shoulder blade. Jejunal and ileal pains are often localised periumbilically. Pain from the terminal ileum can be perceived in the right lower quadrant. Pain from the large intestine is not precisely demarkated. It is perceived in the hypogastrium, or lower abdominal area, as if coming from organs within the pelvic cavity. Pain in the left upper quadrant resembling that which arises due to ischaemic heart disease is present due to affliction of the transverse colon. Pain

in the area of the left hip joint appears due to diseases of the transverse and descendent colons. Rupture due to appendicitis can be manifestant by pain in the lumbal and gluteal areas. Pain from the rectum is perceived in the sacral region.

In addition to its localisation, pain is determined also by its progression and quality. Pain due to oesophageal reflux is of burning character. The pain appearing in coincidence with peptic ulcers may be of burning or cutting character. It is related to the intake of food or antacids. Pain arising due to intestinal obstruction is sharp, crampy with alternating periods with and without severe pain. Patients are anxious. Pain arising in coincidence with biliary or cystic obstruction is permanent without interruption. The pain evoked by inflammation, especially by that of the parietal peritoneum is of permanent equal quality, and is perceived in a demarkated site, providing the peritoneum is irritated focally. It occurs in coincidence with appendicitis and gallbladder inflammation. Pain is diffuse when the inflammation itself is diffuse and the peritoneal cavity contains pus, blood, gastric or intestinal contents. Irritation of the peritoneum is associated with muscular rigidity above this area. Patients usually choose to remain in horizontal position in order to minimize the discomfort. The pain caused by intestinal ischaemia is abrupt, weakly localised and permanent. Pain arising due to the rupture of dissecting aortic aneurysm arises suddenly and the afflicted person describes it as being unbearable.

Some types of abdominal pain are characterized by its course. Thus, e.g. an abrupt onset of pain which becomes generalised, with subsequent development of symptoms of peritoneal irritation often signalises that the perforation of a hollow organ has brought about peritonitis. Inversely, acute appendicitis or cholecystitis begin as a weakly localised pain in the central line. The pain is projected above the afflicted organ with subsequent symptoms of peritoneal irritation.

Abdominal pain is often associated with nausea and vomiting. Vomiting appears most frequently in coincidence with obstruction and distention of the stomach and intestine. It occurs especially due to obstruction of the pylorus or that of the small intestine. Sometimes the cause resides in motility impairment, e.g. in diabetic gastroparesis. Nausea and vomiting are incurred also by peritoneal irritation

and peritonitis. These states stimulate the triggering zones in medulla oblongata via the vagus nerve by afferentation. The triggering zones induce vomiting. In this way, drugs and irritation of the gastric mucosa can induce vomiting. Other impairments associated with vomiting include the increase in intraabdominal pressure, psychogenous vomiting, hypersecretion of gastric acid, morning vomiting in alcoholics, pregnant women and patients with uraemia.

Abdominal pain often occurs in the irritable bowel syndrome. The clinical picture is dominated by abdominal pain, constipation or alternation of constipation and diarrhea. The organic foundation of these symptoms is not present. Possible changes in the large intestine are nonspecific. Currently, two factors are considered as being decisive:

1. **Abnormal motility of the large intestine.** The latter is manifestant by high amplitudes of segmental contractions. They are very pronounced especially after the intake of food, in coincidence with emotions, mechanical distension and some drugs.
2. **Increased sensitivity to physiological stimuli,** such as normal amount of intestinal gas or normal intraluminal pressure in the sigmoid colon. Intensity of the pain varies and it is usually localised in the lower quadrants. The pain may be related to the intake of food. After defecation and release of gases it becomes more moderate.

The stool is of marble-like appearance, or pellet-like. It can contain a greater amount of mucus. Bleeding is not observed, providing haemorrhoids are not the causal condition. The clinical picture displays particular individual patterns. The disease afflicts people with emotional instability, lethargy, headache, a certain degree of psychic rigidity and anxiety. Laboratory examinations and examinations of the entire digestive tract are negative. The medicamentous therapy has no chances to be successful. Spasmolytic drugs relieve the pain. The symptoms appear in original intensity even after a lapse of time following a special diet. In such cases the condition is to be treated by patient's re-education under the physician's supervision and aimed at the psychoneurotic essence of this state. According to some statistical studies, as many as 5% of all gastroenterologic outdoor patients suffer from this condition.

Acute abdominal pain always represents an urgent situation. It is an intricate and serious problem. It may represent a significant symptom of a condition which if not treated immediately ends up by death of the afflicted patient. Acute abdominal pain requires rapid and precise diagnosis and in many cases it is inevitable to operate. Therefore, despite the fact that it would be possible to object that the discourse on acute abdominal pain belongs to the domain of clinical medicine, we are going to present several important matters on this symptom.

Acute abdominal pain most frequently occurs in the diseases of the digestive tract as follow: acute appendicitis, cholecystitis, pancreatitis, intestinal obstruction, perforation of hollow organs, intestinal infarction, intestinal strangulation, acute diverticulitis.

Acute abdominal pain can arise also due to disturbances of other than digestive organs. It may be due to: rupture of aortic aneurysms, rupture in extrauterine pregnancy, pneumonia, renal stones, haemolytic crisis, acute hepatitis and acute porphyria.

The judgement of abdominal pain requires to take into consideration the **onset of pain, its course and accompanying symptoms**, such as fever, nausea, vomiting, constipation and diarrhea. The latter represents a supremely valuable symptom which aids to assess the correct and qualified diagnosis.

4. excretion of larger and more hydrophobic metabolites, foreign substances and a number of drugs

Optimal procurement of these mutually distinct functions is in accord with **hepatic structure**, including the blood and bile pathways. The overall blood perfusion via the liver represents one fourth of the cardiac output at rest. The **blood inflow** is procured by the hepatic artery (25%) which brings in blood rich in oxygen, and the portal vein (75%) which supplies the liver with blood rich in nutrients from the splanchnic area. Both vessels enter the liver and terminally reach the sinusoids. The sinusoids already contain mixed blood which directly bathes the hepatocytes. The blood delivers important metabolic products. After taking up some nutrients and eliminated waste products (some waste products are taken up, whereas others are excreted by hepatocytes) the blood is drained through the central veins (venae centrales) which represent the beginning of the efferent blood pathways subsequently merging into the inferior vena cava. The hepatic parenchyma microscopically appears as a system of hexagonal lobuli, the centres of which contain a central vein.

However, regarding the functional aspect, the hepatic parenchyma is divided into **acini**. The acinus is localised among several central veins and its centre is constituted by so-called **portobiliary space** (terminal triad), which contains the terminal branch of the portal vein, terminal branch of the hepatic artery and the bile duct. The functional efficiency, resistance, as well as the enzymatic equipment of hepatocytes is determined by its localisation – its distance from the portobiliary space. The periportal zone (zone 1) resides in the close vicinity of terminal triad and it is perfused by blood being still rich in oxygen and nutrients. The function of the intermediary zone (zone 2) changes according to the overall supply of the liver by blood. The central zone (zone 3) is localised in the vicinity of central vein, i.e. at the periphery of acini. The blood flowing to the cells of the latter zone is poor in oxygen and nutrients which have been taken up in the previous two zones. Therefore the cells of this zone are predominantly liable to impairment in coincidence with e.g. shock and other disorders of circulation. According to the enzymatic equipment, the cells of the periportal zone primarily synthesize proteins, the cells of the central zone carry out glycolysis, lipogenesis and processes of biotransformation.

7.18 The Liver

The liver is the largest parenchymatous organ in the human body. Its task in organism is irreplaceable. Liver failure, or **experimental hepatectomy incurs death in several hours**. Hepatic functions can be divided into four groups:

1. synthesis of a large amount of special proteins, carbohydrates and lipids
2. regulation of the balance between GIT and systemic circulation which maintains a stable level of amino acids and glucose
3. production of bile salts and bicarbonate necessary for the correct digestion in GIT