

MORPHOLOGY OF STOMACH ULCERS

Nurilloeva Shohsanam Shahrilloeva

Faculty of Medicine, International University of Asia, Uzbekistan

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Abstract: Gastric ulcer is a local defect of the gastric mucosa (sometimes involving the submucosal layer)[3], formed by the action of hydrochloric acid, pepsin and bile and causing trophic disorders in this area. The secretion of acid in the stomach usually does not increase.

Peptic ulcer disease is characterized by a recurrent course, that is, alternating periods of exacerbations (more often in spring or autumn) and periods of remission, unlike erosion (a superficial defect in the mucosa), the ulcer heals with scar formation.

Peptic ulcer disease is present in about 4% of the world's population[4]. In 2015, primary new ulcers were detected in 87.4 million people worldwide.

Pathogenesis

Schematic representation of the pathogenesis of gastric ulcers: 1, *H. pylori* penetrates through the mucus layer in the host's stomach and attaches to epithelial cells; 2, Bacteria catalyze the conversion of urea into ammonia, neutralizing the acidic environment of the stomach; 3, Multiply, migrate and form an infectious center; 4, As a result of mucosal destruction, inflammation and death of epithelial cells are formed ulceration of the stomach

The normal functioning of the gastric mucosa occurs under the influence of two groups of factors on the mucosa:

1. protective factors;
2. aggressive, destructive factors.

Group 1 factors include mucus produced by the gastric mucosa. This mucus prevents the reverse diffusion of protons to the mucosa.[source not specified 1449 days]

The factors of the 2nd group include: gastric juice (containing hydrochloric acid and pepsin, an enzyme that digests protein compounds), which is an aggressive agent for cells, and an infectious factor, the *Helicobacter pylori* microbe (in case of infection). The appearance of a peptic ulcer occurs when the destructive effect of aggressive factors on the gastric mucosa begins to prevail over the action of protective factors. A significant number of gastric ulcers are associated with infection with the microorganism *Helicobacter pylori*, a spiral acidophilic bacterium that lives in the acidic contents of the stomach and in its mucous membrane. However, only a small number of infected carriers of *Helicobacter pylori* develop clinically pronounced peptic ulcer of the stomach or duodenum, or gastritis with increased acidity. The reasons why a smaller proportion of those infected with this microorganism become ill are not clear: apparently, the state of general and local immunity, non-specific protective factors of the gastric mucosa (secretion of bicarbonates, protective mucus), the initial (before infection) acidity and enzymatic activity of the gastric contents, etc. are important.[source not specified 1449 days]

According to the latest updated data (what?), 38% of stomach ulcers worldwide are associated with *H. pylori* infection. The second common cause of stomach ulcers is taking nonsteroidal anti-inflammatory drugs. Rarer causes include: adenocarcinoma, carcinoid, penetration of tumors

of neighboring organs, sarcoma, leiomyoma, foreign bodies, diabetes mellitus, Crohn's disease, lymphoma, syphilis, tuberculosis, HIV infection[6].

Smoking, alcohol abuse (especially strong alcoholic beverages), coffee and other caffeinated beverages, neuropsychiatric overstrain, stress, depression, anxiety, when increased secretion of gastric juice (the so-called "stress ulcer") occurs as a result of increased vagus nerve tone, acute pain in severe injuries, burns, accompanied by the development of traumatic shock (the so-called "shock ulcer"), unsystematic nutrition, dry-boiled food, abuse of semi-finished products and concentrates, spices, sour, spicy, peppery, salty, smoked, fried, too hot, too cold or otherwise thermally, chemically or mechanically irritating food, carbonated drinks In some patients exacerbation of symptoms is also caused by the use of large amounts of sweet or muffins, apparently due to increased insulin secretion and concomitant increase in acidity and secretion pepsin

Morphogenesis of chronic ulcers

The morphological substrate of peptic ulcer is a chronic recurrent ulcer. During its formation, it goes through the stages of erosion and acute ulceration, which allows us to consider erosion, acute and chronic ulcers as stages of the morphogenesis of peptic ulcer disease.

Erosion is a superficial defect of the mucous membrane that does not penetrate beyond the muscular plate of its mucosa.

Erosions are formed as a result of necrosis of a portion of the mucous membrane. There is an inhibition of necrotic masses by blood, followed by rejection of necrotic masses and the formation of defects with black edges and bottom due to the accumulation of hydrochloric acid hematin.

An acute ulcer is a deeper defect that affects not only the mucous membrane, but also other membranes of the stomach wall. An acute peptic ulcer has an irregular rounded-oval shape and soft to the touch, uneven edges. The bottom of the acute ulcer is formed by bundles of muscle fibers of the stomach wall, stained brownish-black with hydrochloric acid hematin.

Morphology of chronic gastric ulcer

Macroscopic picture.

In the stomach, a chronic ulcer is localized more often on the small curvature, in the duodenum – in the bulb on the back wall. The ulcer has an oval or rounded shape and varies in size from a few millimeters to 5-6 cm in diameter. It penetrates into the wall of the organ to various depths, sometimes reaching the serous membrane. The bottom of the ulcer is smooth or rough, the edges are raised. The cardiac edge of the ulcer is undercut, and the edge facing the gatekeeper is flat and has the appearance of a terrace. This configuration is due to the constant displacement of the edges during gastric peristalsis. An ulcer with roller-shaped raised, dense, callous edges is called a callous ulcer.

Microscopic picture.

In remission, scar tissue is visible at the bottom of the ulcer, displacing the muscle layer, with single sclerosed and obliterated vessels. Chronic perialcerous gastritis with epithelial hyperplasia usually develops in the edges of the ulcer.

Vascular changes in chronic ulcers during remission:

- sclerosis;
- obliteration of the lumen

In the acute stage, 4 layers are clearly distinguishable in the bottom of the ulcer.:

1. Fibrinous-purulent exudate zone;
2. Fibrinoid necrosis zone;
3. Granulation tissue layer;
4. The area of coarse fibrous connective tissue

The exacerbation of an ulcer is indicated not only by exudative necrotic changes in its fundus, but also by fibrinoid changes in the walls of blood vessels, often with blood clots in their lumens, as well as mucoid and fibrinoid swelling of scar tissue in the ulcer floor.

Ulcer healing begins with the gradual cleansing of the ulcer floor from necrotic masses and resorption of exudate. The necrosis zone is sprouted by granulation tissue, which gradually matures into coarse-fibrous scar tissue. The process of regeneration of epithelium and connective tissue takes place synchronously. The epithelium, which initially covers the bottom of the ulcer in one row, continues to regenerate, and over time, a full-fledged mucous membrane forms in the bottom of the ulcer. Under this newly formed mucous membrane, granulation tissue with its blood vessels is visible (the stage of the "red scar"). As the granulations mature, the process moves to the next stage, the "white scar" stage.

The submucosal base and the muscular membrane in the area of the ulcer floor are not restored, but are replaced by a scar, the mucous membrane regenerates without scar formation. Since there is no complete regeneration at the bottom of the stomach ulcer, the disease proceeds for a long time and undulates, with exacerbations and remissions.

A chronic stomach ulcer heals in 8 weeks, and a duodenal ulcer heals in 6 weeks.

Clinical manifestations of peptic ulcer disease

The symptoms of peptic ulcer disease depend on the location of the ulcer, the duration of the disease, and the individual sensitivity of the patient to pain.

The main symptom of an ulcer is pain in the epigastric region. If the ulcer is localized in the stomach, pain usually occurs after eating, and if it is localized in the duodenum, "hunger pains" occur on an empty stomach; eating usually brings relief[7].

Other symptoms of peptic ulcer disease may be:

- acidic belching or heartburn;
- weight loss;
- vomiting and nausea after eating.

Types of gastric and duodenal ulcers

Ulcers are classified according to many parameters: the cause of occurrence, the nature of the course, size, localization.

According to the International Classification of Diseases (ICD-11), the following types of ulcers are distinguished:

- acute ulcer with bleeding,
- acute ulceration with perforation,
- acute ulcer with bleeding and perforation,
- acute ulcer without bleeding or perforation,
- chronic or unspecified ulcer with bleeding,
- chronic or unspecified ulcer with bleeding and perforation,
- chronic ulcer without bleeding and perforation,
- unspecified ulcer without bleeding and perforation.

Due to the occurrence, ulcers are isolated:

- Ulcers associated with *Helicobacter pylori* infection;
- "medicinal" — a consequence of taking high doses of drugs that destroy the mucous layer of the stomach;
- "stressful" — caused by physical or psychological stress.

According to the size of the defect of the mucous membrane, ulcers are divided into:

- small (up to 5 mm);
- medium (5-10 mm);
- large: for the stomach 11-29 mm, for the duodenum — 11-19 mm;
- gigantic: for the stomach 30 mm or more, for the duodenum — 20 mm or more.

According to the nature of the course, ulcers are divided into acute and chronic, and the latter can be with frequent (2-3 times a year) or rare (1 time every 2-3 years) exacerbations.

By localization, ulcers of the stomach, duodenum or a combined form of the disease are isolated, when lesions of the mucous membrane are detected in both organs.

Different types of peptic ulcer disease differ in symptoms and severity of their manifestations. In addition, depending on the type of peptic ulcer, the treatment will vary. So, with an acute ulcer, the patient may need emergency surgery and further monitoring and treatment in a hospital, and with a chronic course of the disease with rare relapses, a diet and medications will be sufficient.

Symptoms of gastric and duodenal ulcers

The symptoms of an ulcer can be varied. The first sign of a stomach ulcer is usually a burning pain in the upper abdomen, which is especially strongly felt on an empty stomach and decreases slightly after eating or taking medications for heartburn.

In many ways, the symptoms depend on the location of the injury, but there are several common manifestations of peptic ulcer disease.

Symptoms of peptic ulcer of the stomach and duodenum:

- feeling of fullness in the stomach;
- bloating;
- burping;
- nausea;
- a frequent feeling of hunger.

Diagnostics

- Clinical blood test.

A clinical blood test with an uncomplicated course of peptic ulcer disease most often remains unchanged. Sometimes there is a slight increase in hemoglobin and red blood cells, but anemia may also be detected, indicating obvious or hidden bleeding. Leukocytosis and accelerated ESR occur in complicated forms of peptic ulcer disease.

- Stool analysis for hidden blood.
- The study of the acid-forming function of the stomach, which is carried out using pH-metric (in recent years, using daily monitoring of intragastric pH).

Ulcers of the stomach and subcardial ulcers usually show normal or decreased levels of acid production.

- X-ray examination method.

X—ray examination with double tight barium contrast reveals a direct sign of peptic ulcer disease - a "niche" on the contour or relief of the mucous membrane and indirect signs of the disease.

- Endoscopic examination method.

The most informative in the diagnosis of peptic ulcer of the stomach and duodenum is an endoscopic examination, which visually confirms the presence of an ulcerative defect, allows you to clarify its localization, depth, shape, size, allows you to assess the condition of the bottom and edges of the ulcer, to identify concomitant changes in the mucous membrane. When conducting an endoscopic examination, it is possible to perform a targeted biopsy — "pinching" a piece of tissue from the edges or bottom of the ulcerative defect using special tools. The biopsy sample obtained in this way (a piece of tissue) is sent for histological examination, which makes it possible to identify the possible cancerous nature of the detected ulcerative defect (ulcerative form of stomach cancer).

- Biopsy followed by histological examination of the obtained material.

This study makes it possible to exclude the malignant nature of the ulcerative lesion.

- Studies on the presence of *Helicobacter pylori* in the gastric mucosa.

- Electrogastroenterography and antroduodenal manometry can detect disorders of gastroduodenal motility.

Treatment

Benign ulcerative lesion of the antrum of the stomach.

To get rid of *Helicobacter Pylori* infection, the doctor prescribes antibiotics, and to reduce the acidity of gastric juice, acid—lowering drugs, etc. If a stomach ulcer is caused by taking painkillers (NSAIDs) or other medications that can trigger the development of an ulcer, the doctor selects other medications for the patient that do not have an ulcer-forming effect.

First, the pain is relieved with painkillers. Medications are taken only when there is discomfort in the stomach. Enterosorbents are also prescribed that neutralize the negative effects of toxins. In addition, the patient needs to drink a course of vitamins.

Food It is important for stomach ulcers not to aggravate the symptoms with the help of bad habits. You need to stop smoking and drinking alcohol. And also monitor your diet. A special diet should be prescribed for stomach ulcers.

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