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THE ROLE OF MORPHOLOGICAL ANALYSIS IN THE TREATMENT OF ULCER AND ITS COMPLICATIONS

M.Sh. Khakimov[1], Sh.E. Ashurov[2], J.K. Dekhkonov[3], J.Kh. Kushiev[4]

1 Doctor of Medical Sciences, Professor, Head of the Department of Faculty and Hospital Surgery No. 1 of the Tashkent Medical Academy, Tashkent, Uzbekistan
E-mail: murad_72@mail.ru

2 PhD, Head of the Department of Emergency Surgery of the Tashkent medical academy, Tashkent, Uzbekistan
E-mail: sheroz100682@mail.ru

3 Head of the Department of Thoracoabdominal Surgery of the Tashkent medical academy, Tashkent, Uzbekistan
E-mail: jamol.dekhkanov@mail.ru

4 Assistant of the Department of Faculty and Hospital Surgery No. 1 of the Tashkent medical academy, Tashkent, Uzbekistan
E-mail: jackhon@mail.ru

ABSTRACT

Bleeding and pyloric stenosis from acute gastric ulcers is a common medical emergency throughout the world. Endoscopic diagnosis and hemostasis are cornerstones in disease management and mortality reduction. The number of urgent open surgical interventions for bleeding acute ulcers continues to decline; in the UK, the surgical intervention rate dropped from 8% to 2% between 1993 and 2006. During the same period in the United States, the use of endoscopic treatment for acute ulcers increased by 58.9%, and the incidence of ulcer disease in emergency surgery decreased by 21.9%.

Key words: pyloric stenosis, bleeding, forrest, ulcer, endoscopy, clipping, perforation.

INTRODUCTION

Despite these advances, mortality from this disease remains at about 10% [3]. The disease occurs more often in elderly patients with frequent comorbidities who take antiplatelet agents, non-steroidal anti-inflammatory drugs and anticoagulants [4]. The management of such patients, especially those at high risk of cardiothrombotics who are taking anticoagulants, is a challenge for clinicians.

Currently, in the diagnosis of acute gastric ulcers, the influence of the anatomical and pathomorphological characteristics of the mucous membrane around the ulcer on the prognosis of the risk of rebleeding and the outcome of the disease is not taken into account.

The aim of this study was to increase the efficiency of diagnosing acute gastric ulcers and predict the risk of rebleeding by studying the endoscopic, anatomical features and pathomorphological characteristics of tissues in the area of a bleeding gastric ulcer.

Material and methods.

1. The material of this study was 298 patients with bleeding from acute stomach ulcers who were treated in the emergency surgery department of the multidisciplinary clinic of the Tashkent Medical Academy from 2012 to 2022.
2. The inclusion criteria for the study were:
3. The patient has an acute stomach ulcer (stress, drug), complicated by the development of bleeding;
4. Consent of the patient to the proposed treatment and examination with the signing of an informed consent approved by the local ethics committee (Minutes No. 7 of February 4, 2012).
5. Criteria for exclusion from the study:
6. The presence of a verified diagnosis of gastric and duodenal ulcer complicated by bleeding;
7. Patients with chronic gastroduodenal bleeding ulcers;
8. Ulcer-cancer of the gastroduodenal region, complicated by hemorrhage;
9. Dieulafoy's ulcer;
10. Zollinger-Ellison syndrome;
11. Acute gastroduodenal ulcers not complicated by bleeding;
12. Patients entering a medical institution in a preagonal and agonal state;
13. Patients with acute gastric ulcers that have arisen against the background of acute and chronic renal and hepatic insufficiency, liver cirrhosis;
14. Patients with varicose esophagus and stomach;

Endoscopic examination (EGDFS) of the upper sections of the digestive tube was performed using endoscopes with the end position of the optics "Olimpus" with a standard instrumental channel of 2.8 mm. Dynamic EGDFS was performed after 24 and 72 hours, as well as on an emergency basis in case of any suspicion of recurrent bleeding.

Criteria for the diagnosis of acute gastric ulcer were:

1. Anamnestic data indicating a connection with the main (background) diseases or stressful effects, previous surgery, the use of ulcerogenic drugs or alcohol abuse.

2. Endoscopic picture of an acute ulcer.

Usually, when performing endoscopy, edematous, in places hyperemic, easily vulnerable, covered with viscous mucus and fibrin, the gastric mucosa was detected. On such folds of the mucous membrane, erosions were visualized, which were often multiple, sometimes merged, forming fields without clear boundaries. Acute ulcers were located on the folds of the mucous membrane and were a round or oval ulcer surrounded by a bright red rim without an inflammatory periulcerous shaft. In the protocols of endoscopic examination, one often encountered similar descriptions characterizing an acute ulcer as: "flat", "simple", "superficial".

It was relatively rare to find a bleeding or thrombosed vessel in an acute ulcer. Much more often, bleeding was visualized in the form of "dew drops", which formed again after removal of the bloody discharge, or in the form of a loose thrombus (microthrombi) covering the ulceration. Quite often, acute ulcers were accompanied by erosions. Acute ulcers did not have undermined edges and an inflammatory shaft along the periphery, which is characteristic of a chronic ulcer.

In the course of endoscopic examination, the source of bleeding was diagnosed, its size and localization, the number of ulcers, the nature of the edges and bottom of the ulcer, the intensity of bleeding, and signs of hemostasis stability were determined.

The endoscopic signs of unstable hemostasis traditionally included the detection of reduced blood in the lumen of the stomach, a blood clot in the bottom of the ulcer, blood clots and small thrombosed vessels in the ulcer, and hemorrhagic plaque on its surface. A sign of hemostasis stability was the deposition of fibrin on the ulcerative surface.

Endoscopic examination was supplemented by taking material from the area of the ulcer for histological examination, including the study of the cellular composition.

To determine the volume of blood loss, in the presence of initial hemoglobin (Hb) data, it is advisable to use the modified Moore formula:

Vcr (ml) \u003d BCCd x (Hbin - Hb p / o) / Hbin

Vcr is the volume of blood loss;

BCCd - the proper volume of circulating blood;

Hb ref - Hb original;

Hb p / o - Hb determined during or after bleeding stops and hemodynamic stabilization.

In the case of unknown initial data Hb, the classical Moore formula was applied:

Vcr (ml) \u003d BCCd x (130 - Hb p / o) / 130

where is the proper BCC:

- women - 60 ml/kg;
- men - 70 ml/kg;
- obese and pregnant women - 75 ml/kg.

Statistical processing of the material was carried out using the IBM SPSS Statistics 26.0 software package. For each indicator, the mean value (M) and the mean deviation (m) were calculated.

Results

In total, for the period from February 2012 to May 2022 inclusive, 298 patients with acute stomach ulcers were observed, of which 192 (64.4%) were men and 106 (35.6%) were women. The age of the patients ranged from 18 to 76, averaging 49.6±10.3 years.

The majority of patients (227 - 76.2%) were taken to the emergency department by an ambulance team at various times from the onset of the disease: in the first 6 hours - 35 (11.7%) patients, from 7 to 24 hours - 105 (35.2%) of a person. In other patients, the period from the onset of the disease to admission to the hospital was more than a day. Directly in the hospital, bleeding occurred in 71 (23.8%) patients (in intensive care units, cardiology, nephrology, elective surgery, neurology, traumatology and orthopedics, neurosurgery, gynecology, rheumatology).

Most often, acute bleeding gastric ulcers occurred when taking ulcerogenic drugs (NSAIDs, hormone therapy) or alcohol - 123 (41.2%). Also, acute ulcers were quite common in patients with diseases of the cardiovascular system - 92 (30.9%) and acute ulcers complicated by bleeding after thoracic / abdominal surgical interventions (stress ulcers) - 56 (18.8%) (Table 1.).

Table 1

The main pathology (condition) that provokes the occurrence of an acute gastric ulcer complicated by bleeding

Pathology	Number of patients	
	Abs.	%
Cardiovascular diseases	92	30,9
Purulent-inflammatory diseases	19	6,4
Use of ulcerogenic drugs or alcohol	123	41,2
Respiratory system diseases	27	9
Injury	23	7,7
Surgery on the chest/abdomen	56	18,8
Diabetes	29	9,7

Ulcer bleeding was assessed according to the currently most commonly used classification developed by J. Forrest (1974).

During primary endoscopy, ongoing jet arrosive bleeding (Forrest IA) was diagnosed in 24 (8.1%) patients, ongoing capillary bleeding in the form of diffuse leakage (Forrest IB) was found in 56 (18.8%) patients.

Bleeding in the form of a thrombosed vessel at the bottom of the ulcer (Forrest IIA) was found in 120 (40.3%) cases, an ulcer covered by a blood clot (Forrest IIB) was found in 89 (29.8%) cases, respectively) (Fig. 1).

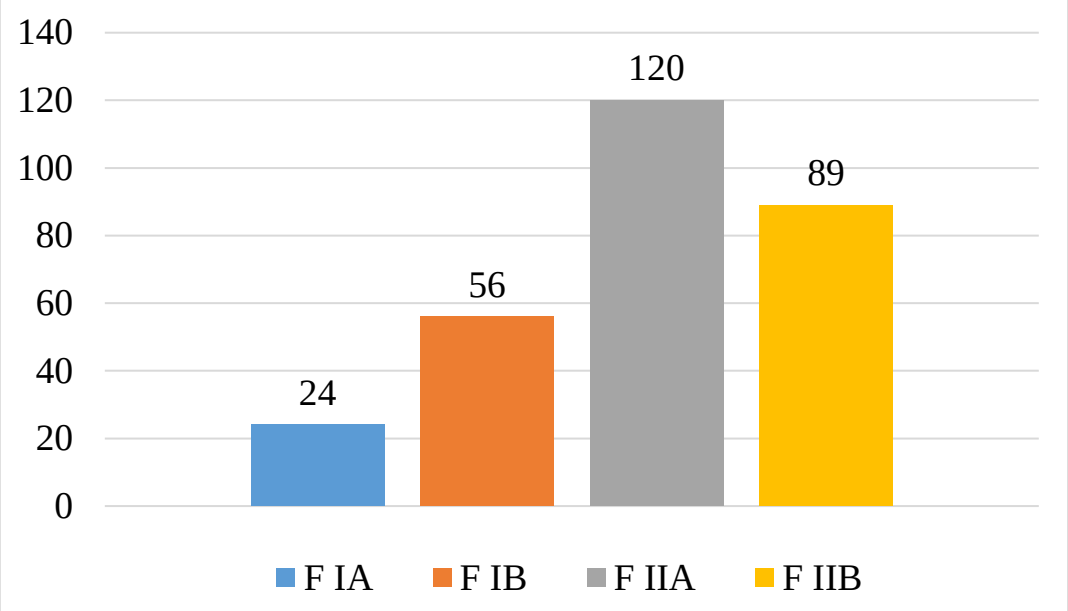

Figure 1. Distribution of patients according to the classification of J.Forrest (1974).

Most often, acute bleeding ulcers were located in the region of the posterior wall of the antrum of the stomach - 78 (26.2%) cases, the posterior wall of the body of the stomach - 65 (21.8%) patients, and along the lesser curvature - 50 (16.8%) cases. It should be noted that although ulcers located along the lesser curvature of the stomach are in third place in terms of frequency of occurrence, the volume of blood loss from these ulcers is the largest, averaging 1373±389 ml (Table 2). This is due to the fact that the vessels of the lesser curvature are located superficially, in the submucosal layer, while the vessels of other parts of the stomach are located more deeply.

Table 2.

Distribution of patients depending on the localization of acute gastric ulcer and the amount of blood loss.

Ulcer localization	Number of patients (%)	Volume of blood loss (ml)
Cardiac department	8 (2,7%)	204±65
Fundus of the stomach	11 (3,7%)	126±73

Body of stomach, posterior wall	65 (21,8%)	513±167
Body of stomach, anterior wall	14 (4,7%)	483±127
Antrum, posterior wall	78 (26,2%)	836±283
Antral part anterior wall	20 (6,7%)	517±154
Pyloric part posterior wall	28 (9,4%)	617±212
Pyloric part anterior wall	8 (2,7%)	589±187
Lesser curvature	50 (16,8%)	1372±389
Large curvature	16 (5,3%)	427±126

The size of acute gastric ulcers complicated by bleeding ranged from 2 to 25 mm (Fig. 2). The largest number were acute ulcers with sizes from 5 to 10 mm - 80 (26.8%) and less than 5 mm - 104 (34.9%) cases. The proportion of patients with acute ulcers from 11 to 15 mm was 45 (14.6%), from 16 to 20 mm - 44 (14.8%). The size of the remaining acute ulcers ranged from 21 to 25 mm - 25 (8.4%) patients.

Upon admission of patients with acute gastric ulcers, endoscopic hemostasis was performed. The choice of hemostasis method depended on the intensity of bleeding.

In case of recurrence of bleeding after endoscopic hemostasis, an attempt was made to repeat endoscopic hemostasis. If it was impossible to achieve endoscopic hemostasis or repeated recurrence, the patients underwent surgical treatment - gastrotomy with stitching of a bleeding acute stomach ulcer.

In total, as a result of the treatment we used, 24 (8%) cases of repeated bleeding from the ulcer were observed. An analysis of cases of recurrent bleeding showed that the most common rebleeding was observed when the ulcer was localized along the lesser curvature of the stomach - 7 (2.3%) patients, as well as along the posterior wall of the antrum - 6 (2%) cases (Table 3). At the same time, we would also like to note that the volume of blood loss during recurrent bleeding from ulcers of the above localization was the highest, amounting to 972±389 ml for ulcers of lesser curvature, and 733±213 ml for ulcers of the posterior wall of the antrum.

Table 3

Distribution of patients with recurrent ulcerative bleeding depending on the localization of acute gastric ulcers and the amount of blood loss.

Ulcer localization	Number of patients (%)	Volume of blood loss (ml)
Cardiac department	1 (0,3%)	154±45
Fundus of the stomach	0	
Body of stomach, posterior wall	3 (1%)	403±127
Body of stomach, anterior wall	0	
Antrum, posterior wall	6 (2%)	733±213
Antral part anterior wall	1(0,3%)	497±144

Pyloric part posterior wall	3(1%)	517±202
Pyloric part anterior wall	2(0,6%)	469±147
Lesser curvature	7 (2,3%)	972±389
Large curvature	1(0,3%)	327±96

We conducted a morphological study of biopsy material from gastric ulcers in 24 patients with recurrent ulcer bleeding and in 20 patients who did not experience recurrence of bleeding from the ulcer.

In the morphological study of the biopsy site from the localization of the ulcer along the anterior wall of the body of the stomach, the ulcerative defect spread no further than the lamina propria of the gastric wall mucosa (Fig. 2). There were large areas of the gastric mucosa with a small focus of a superficial defect with destruction of the adjacent sections of the glands, moderate polymorphic inflammatory infiltration and edema of the underlying stroma. In neighboring areas, the surface and glandular epithelium had increased secretory activity. The nuclei of epithelial cells were mainly located basally, moderately enlarged, with clearly visible nucleoli. Stroma with moderate edema, increased number of lymphocytes.

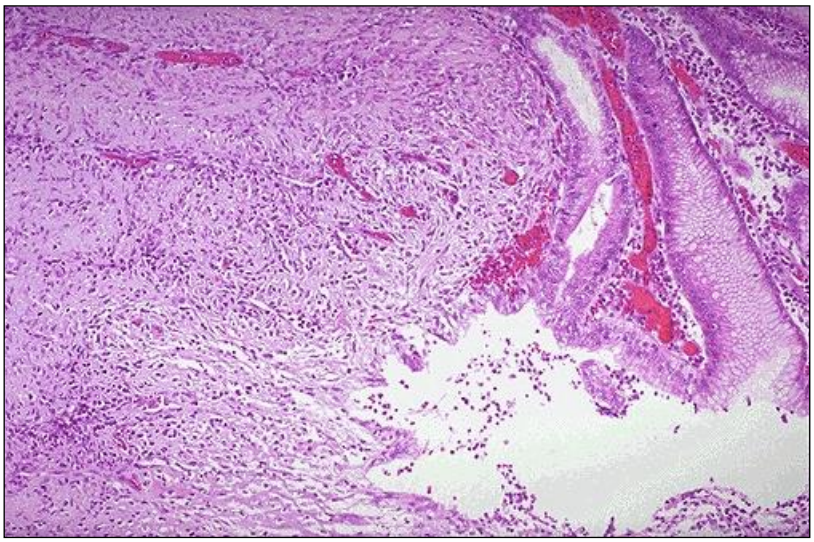

Figure 2. Wall of the stomach. Biopsy from the localization of the ulcer along the anterior wall of the body of the stomach. Hematoxylin-eosin staining. SW: c.10, rev.20.

In the morphological study of the biopsy site from the localization of the ulcer along the posterior wall of the antrum of the stomach, the ulcerative defect spread more deeply up to the submucosa (Fig. 3). The surface of the ulcer during microscopic examination is covered with loose filaments of fibrin, under which there is an ulcerative surface with necrosis, a polymorphic inflammatory infiltrate. Glands with swollen epithelium in a state of partial or complete desquamation.

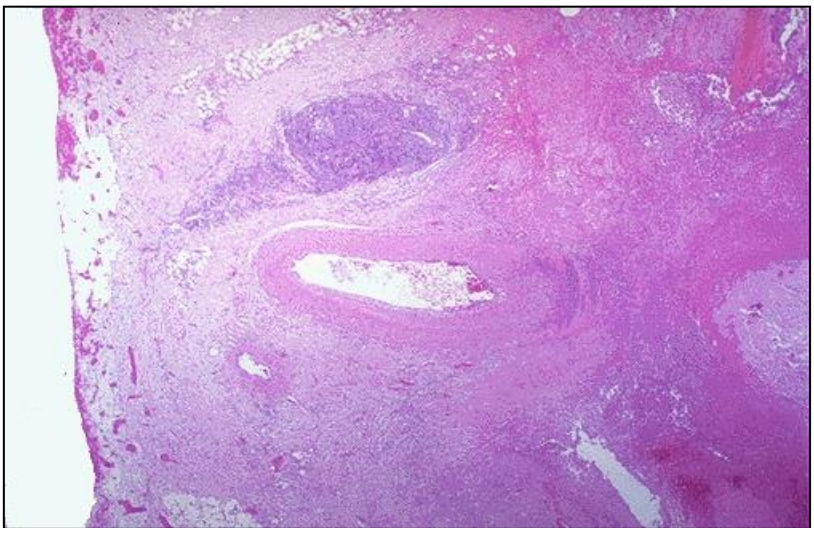

Figure 3. Stomach wall. Biopsy from the localization of the ulcer along the posterior wall of the antrum of the stomach. Hematoxylin-eosin staining. SW: c.10, rev.20.

In the morphological study of the biopsy site from the localization of the ulcer along the lesser curvature of the stomach, the ulcerative defect not only spread to the submucosa, but also passed into the muscular membrane (Fig. 4). Microscopically, the ulcer was clearly defined, the normal gastric mucosa passes into a deep ulcer, at the base of which there is purulent-necrotic detritus. The arterial branch at the base of the ulcer is eroded and bleeds. The surface of the gastric mucosa with foci of ulcerative necrotic changes with polymorphic, predominantly leukocyte infiltration. In the preserved areas, the gastric mucosa with large folds covered with proliferating, prismatic epithelium. In the thickness of the tissue there are unevenly enlarged glands with enlarged, richly colored nuclei. Stroma with increased lymphoid infiltration.

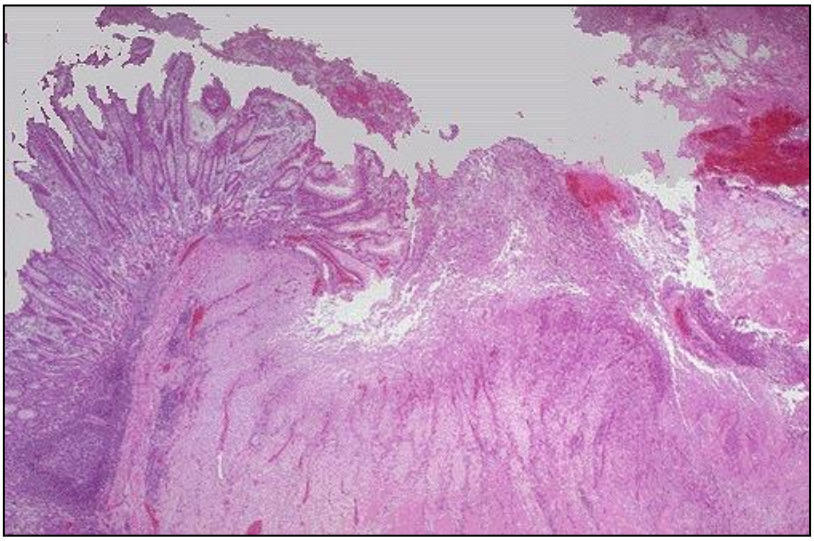

Figure 4. Stomach wall. Biopsy from the localization of the ulcer along the lesser curvature of the stomach. Hematoxylin-eosin staining. SW: c.10, rev.20.

Thus, as a result of a morphological study of a biopsy from gastric ulcers, it was noted that the spread of the ulcerative-necrotic defect is deeper, up to the muscle layer, especially when ulcers are localized along the lesser curvature of the stomach, which is reflected in a higher frequency of recurrence of bleeding.

Conclusions

The study of the morphological and anatomical features of bleeding from acute gastric ulcers led to a number of conclusions:

1. Most often, acute stomach ulcers are located along the lesser curvature of the stomach, which is the main "food path" and are more susceptible to trauma.

2. The most common recurrences of bleeding are acute gastric ulcers, which are located along the lesser curvature in the area of the angle of the stomach, along the posterior surface of the body and the antrum of the stomach. The reasons for this circumstance are:

- Insufficiency of endoscopic visualization of the source of bleeding from acute ulcers located along the posterior wall of the cardiac section and body of the stomach and of endoscopic methods of hemostasis, especially with ongoing bleeding and the presence of blood clots in the lumen of the stomach.

- Deeper spread of acute ulcers of the lesser curvature of the stomach into the underlying layers due to increased trauma.

3. A qualitative assessment of the risk of bleeding depending on the location, area and depth of the spread of the ulcer is decisive in choosing the most adequate volume of surgical intervention and an effective method of hemostasis in bleeding from an acute gastric ulcer.

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