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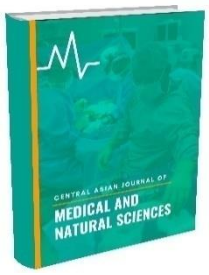

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Surgical Care for Injuries to the Duodenum

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Abstract: The article describes the experience of surgical treatment of 50 patients with isolated injuries of small and large intestine. The diagnostic algorithms were studied. The diagnostic program included a medical history, clinical and objective data, the results of ultrasonic, X-ray methods and videolaparoscopy. Depending on the nature of the damage, the indications for surgical treatment of patients with this pathology are specified. The developed diagnostic program and selection of the optimal option of surgery allowed the reduction of the number of adverse outcomes among patients with injuries of the small and large intestine.

Key words: injury, small intestine, large intestine, diagnostics, surgical treatment.

Introduction. Damage to the duodenum (Duodenum) is rare in gastrointestinal trauma.

There is no single universally accepted surgical tactic for injuries to the duodenum [9], but there are basic guidelines for surgical treatment of duodenal tears. A number of authors suggest to eliminate the defect by double-row suturing [10], others apply technique of the duodenum isolation from food passage [3], resection of intestine [9], or use serosalmo-muscular-submucosal flap from major curvature of the stomach to strengthen the defect [5]. The success of a particular operation depends on the condition of the patient, the length of time since injury, the correct diagnosis, and the practical skills of the surgeon [2]. In trauma, the nature of the injury dictates the type and extent of surgical intervention. In the postoperative period, 25-60% of patients develop complications: incompetence of the duodenal sutures, stumps of the duodenum (in operations for disconnection or resection), pancreatitis, retroperitoneal phlegmon. As a consequence, the lethality rate in intraduodenal trauma is 11-30%, and in the development of retroperitoneal phlegmon reaches 100% [4].

Purpose of the study: Improving the surgical treatment of patients with injuries to the duodenum by improving diagnosis as well as the use of surgical interventions aimed at disconnecting the duodenum from the food passage.

Material and Methods: The study was based on the results of treatment of 32 patients with duodenal injuries who were in the department of general surgery in Samarkand during the period from 2016 to 2023. Blunt trauma was the cause of DIC injury in 27 victims (car accident - 4, fall from height - 15,

bicycle steering - 2, beating - 6), gunshot wound - 2, wounding with cold weapons - 3. Among the injured there were 6 females and 26 males. The average age of the patients was 30±18.5 years and the average length of hospital stay was 12±11 days.Большинство пострадавших были госпитализированы в сознании и могли самостоятельно рассказать об обстоятельствах травмы.

All patients underwent mandatory clinical and instrumental examinations: collection of complaints, clarification of the circumstances of the injury, physical examination, blood and urine tests, ECG, abdominal radiography and gastrointestinal tract fluoroscopy (Siemens Axiom Iconos R-100 device), gastroduodenoscopy (device Olympus JFType E), fibrogastroscopy (device Pentax FG 29V and Pentax FG 29W), ultrasonography (device Toshiba Nemioxa) in usual and Doppler modes. The severity of peritonitis was assessed according to V.A. Popov [6] and using Mannheim index [12]. The severity of endogenous intoxication was determined by SAPS scale [8].

All patients were divided into three groups according to the period from injury to admission to hospital: Group 1 (up to 6 h) - 16 patients, Group 2 (6-12 h) - 12 patients, Group 3 (more than 12 h) - 4 patients. The diagnosis was made according to the Abbreviated Injury Scale 2008 (AIS) [13].

Results and discussion. In 11 (34.4%) of 32 patients a free gas accumulation under the right diaphragmatic dome was detected during an overview X-ray of the abdominal cavity organs. These patients were diagnosed with abdominal trauma, hollow organ rupture, peritonitis and surgical intervention was performed on an emergency basis after preoperative preparation.

Free gas in abdominal cavity and retroperitoneal space was not detected in the remaining 21 patients (65,6%). In these cases we used proposed method of diagnostics of the duodenum rupture. It consists of the injection of 3% hydrogen peroxide solution through the stomach tube (9 patients) or 5-10 ml of 3% hydrogen peroxide solution[1] through the endoscope (12). X-ray examination of the abdominal cavity was performed. When free gas appeared under the diaphragmatic dome, we were able to diagnose (or suspect) a duodenal injury.

One patient had a small intramural haematoma on the anterolateral wall of the descending duodenum. There was no free gas in the abdominal cavity or retroperitoneal space, he recovered after conservative treatment with daily ultrasound monitoring. In 11 patients, FGDS revealed a ruptured duodenal bulb, and they underwent urgent surgery. A total of 31 (96.8%) patients were operated on for abdominal trauma (open or closed), suspected duodenal injury, and peritonitis. Eight (25%) patients died. After the operation the following complications developed: duodenal fistula (2 patients), destructive pancreatitis (3), sepsis (1), multiple organ failure (7), abdominal abscesses (2), retroperitoneal hematomas and phlegmon (3). These complications, resulting from posttraumatic pancreatitis, almost always accompany the damage to the duodenum (7).

In our opinion the simultaneous injury of the pancreas is the cause of such complications as acute posttraumatic pancreatitis, parapancreatitis, shock, pancreatogenic peritonitis, purulent-septic complications, suture insufficiency. In our observations isolated damages of the duodenum were in 7 patients, the combined damages were in 25 patients (stomach - 2, small intestine - 4, colon - 2, pancreas - 17). Hollow organs (stomach, small and large intestine) were sutured with double stitches; the scope of the operation on the pancreas depended on the degree of its damage. In accordance with the classification of American Association of Trauma Surgeons (AAST-2009), 16 patients had damages of the pancreas of the I-II degree, and 1 patient - III degree. 31 patients (96,8%) were operated for abdominal trauma (open or closed), suspected intestinal trauma, peritonitis. Eight (25%) patients died. After the operation the following complications developed: duodenal fistula (2 patients), destructive pancreatitis (3), sepsis (1), multiple organ failure (7), abdominal abscesses (2),

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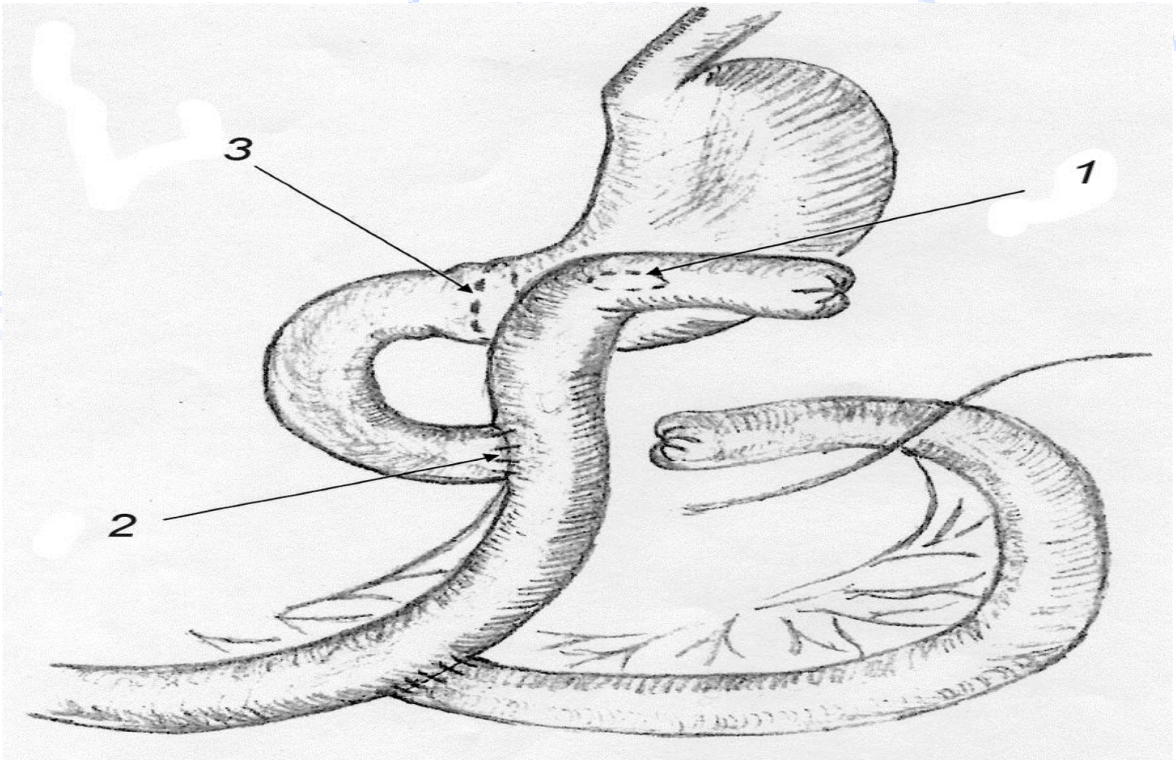

Figure 1. A defect in the horizontal part of the duodenum greater than 50% of the circumference. 1 - retroperitoneal tear; 2 - Treitz ligament.DPC (Figure 1) we did not close the intestine at the defect site, but crossed it, with the distal end silenced.

After freshening of the wound edges, the proximal end of the duodenum was sutured to the excised loop of small intestine, 40-50 cm away from the Treitz ligament, and end-to-side Roux anastomosis was applied. A low gastroenteroanastomosis was formed with the same intestine, having previously

applied a cotgut suture to the mucosa of the pyloric part of the stomach. The severed part of the small intestine was sutured to the Roux diverting loop end-to-side (Fig. 2)

Figure 2: Final result of the operation. 1 - low gastroenteroanastomosis; 2 - duodenoanastomosis with Roux diverting loop at the rupture site; 3 - acidic suture to the gastric mucosa. We did not observe any complications after using the proposed technique. This surgical tactics enables to prevent the development of suture and anastomosis incompetence, duodenostasis by liquidation of the traumatized intestinal area and complete, temporary isolation of the duodenal passage in the early postoperative period. Due to the ability of catgut to be resorbed, the duodenal passage resumes after 7-10 days.

We could not find any reports in the available literature on the use of 3% hydrogen peroxide solution for the diagnosis of preoperative duodenal tears, and we considered it possible to present our own observation.

Patient M., 13 years old, came to the emergency room conscious with complaints of dizziness, general weakness, pain in the right side of the abdomen, urge to vomit, and hyperthermia. His medical history revealed that he had fallen from a bicycle 3.5-4 hours earlier and hit his abdomen on the handlebars. After the injury, the abdominal pain decreased after 30-60 min, but the victim went to the hospital after 3-3.5 hours due to aggravation. On examination, the skin and visible mucous membranes were pale, heart rate 98 per 1 min, BP 100/60 mm Hg, body temperature 37.6°C, abdomen was painful on palpation, especially on the right side. Peristalsis is weak. There are no signs of peritoneal irritation. Ultrasound examination of the abdominal cavity revealed no pathological changes. An FGDS was not performed due to patient and parental refusal. No pathological changes were found on chest and abdominal radiography. Blood count: Hb 126 g/l, er. 3.95'1012/l, l. 22,1'109/л. Diagnosis: blunt abdominal trauma, contusion of internal organs. Decision on conservative treatment was made. Detoxification therapy was started, analgesics (Dexalgin 2.0 ml intramuscularly), antibiotics (Ceftriaxone 1.0 g intramuscularly 2 times a day) were used. The condition improved slightly, but symptoms of intoxication and peritonitis appeared. A control ultrasound scan revealed a small amount of fluid in the pelvis. A trauma to the duodenum was suspected. Repeated plain radiography revealed no pathological changes. 50 ml of 3% hydrogen peroxide solution was administered through a nasogastric tube and repeated abdominal radiography was performed 4 minutes later. A gas accumulation was detected under the liver, in the right lateral canal. A rupture of the retroperitoneal part of the duodenum was diagnosed. A midline laparotomy was performed. Inspection of the abdominal organs revealed a small amount of serous haemorrhagic effusion, there was a retroperitoneal haematoma near the bulb of the duodenum downwards. When examined from below (from the Treitz ligament), the hematoma had spread below the horizontal part of the duodenum towards the mesentery root. An area of peritoneal damage was also found there, and bile was seen through it. After mobilization of the duodenum from the Treitz's ligament, a tear of the horizontal part of the intestine on the anterolateral side was found (the size of the defect was up to 50% of the intestine circumference with bile discharging through it). The above operation (see Figure 2), sanation and drainage of the retroperitoneal space and the abdominal cavity were performed. His condition gradually improved and he was discharged to outpatient treatment in a satisfactory condition 22 days after admission. Based on the analysis of treatment results of 32 patients with duodenal ruptures, causes of death (25% of cases) and complications (46.8%), we have established that the existing methods of diagnostics and surgical treatment of ruptured duodenum both before and during operation are imperfect.

Since the most frequent rupture of the retroperitoneal part of the duodenum [1, 3, 7, 10] occurs in the horizontal part [8, 11], we consider the effectiveness of our improved method of surgical treatment to

be proven. In our opinion, the choice of surgery should depend on the period since injury, localization of the defect, and the presence of adjacent organ damage.

Conclusions Thus, the use of a 3% hydrogen peroxide solution improves and facilitates the diagnosis of intestinal damage in the preoperative phase. The technique we have developed to repair a defect in the duodenum with complete disconnection from the intestinal passage is effective. Our operation provides an adequate drainage of the stomach and makes it possible to temporarily fully exclude the intestine from the duodenal passage, excluding the stage of suturing the damaged intestine.

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