



SELECTION OF A TACTICAL ALGORITHM FOR SURGICAL TREATMENT OF
CLOSED DUODENAL INJURY

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Abstract

Among closed injuries of the abdominal cavity trauma duodenum (KDP) holds a special place due to the rare, large traumatic severe complications in 60% of operated patients. The aim of the study was choice of the method of surgical treatment and analysis results of surgical treatment in patients with closed trauma of the KDP. The paper analyzes results of treatment 23 patients with a closed duodenal injury. The most common cause of damage KDP was closed to road traffic injury (10 pers. - 43.5%), resulting in catatrauma in 4 (17.4%) patients. In 5 (21.5%) patients injury was received in the workplace, in 1 - sports injury, in 3 - home injury. Depending on the timing of the victims to the hospital after the injury, the size of the defect duodenal wall, level of injury, associated injuries pancreatoduodenal zone defines the principles of surgical treatment for injuries of the duodenum. According to the grade of damage (I-IV) the most suitable tactic was chosen, including mobilizations, duodenal decompression, hematoma evacuation, gastroenteroanastomosis etc. The volume of surgery at closed duodenal injury must be selected individually, depending on the severity of the injury and status of victim. In the postoperative period is mandatory drug suppression of secretion digestive tract and the appointment of broad-spectrum antibiotics against background of infusion-transfusion therapy.

Key words

Closed duodenal trauma, surgical technique, complications, mortality.

Introduction. Duodenal trauma is a significant blunt abdominal injury due to its lower intensity, greater trauma, and the development of severe complications in 49-68% of patients. Mortality rates range from 27% to 57%. However, to date, no uniform treatment strategy has been developed for patients with closed duodenal injuries, due to the relatively small number of patients with this condition.

The purpose of this study was to justify the choice of surgical treatment method and analyze the results of surgical treatment for patients with closed duodenal injury.

Material and Methods. This paper summarizes the treatment outcomes of 23 patients with closed duodenal injuries treated at the multidisciplinary clinic of Samarkand State Medical University from 2020 to 2025. Stratification was determined by the cause of closed duodenal injuries: motor vehicle trauma (10 patients, 43.5%), and catatrauma (4 victims, 17.4%). Five patients (21.7%) sustained their injuries at work, one had a sports injury, and three had a domestic injury. The average age of those admitted with closed duodenal injuries was 40.73 ± 14.0 years. Of the injured, 20 were men (86.9%) and 3 were women (3.1%). Fifteen (65.2%) were hospitalized within the first 6 hours of injury, 4 (17.4%) were admitted between 6 and 12 hours, and 4 were delivered to the emergency room 12 hours after injury in a state of shock, with clear signs of diffuse peritonitis. Upon admission, all victims were in critical condition, complaining of abdominal pain, nausea, vomiting, weakness, and shortness of breath. The diagnostic program began with a review of clinical and objective data. All of them



underwent standard examinations: clinical blood and urine tests, blood biochemistry, X-rays of the abdominal and chest organs, ultrasound and CT examination of the abdominal organs, fibrogastroduodenoscopy, consultations with related specialists; if it is impossible to rule out trauma, laparocentesis and video laparoscopy. A 5% ozonated glucose solution was used to treat retroperitoneal phlegmon in 11 patients. These patients constituted the study group. The control group included 12 patients who received standard antibacterial treatment and drainage of the retroperitoneal phlegmon.

Extent of damage	Closed injury (n=23)	
	abs.	%
Grade I	1	4,34
Grade II	3	13,06
Grade III	12	52,17
Grade IV	7	30,43
Total	23	100

Table 1. The degree of damage to the duodenum (E. Moore)

In 7 cases (30.4%) the injury was isolated. Combined and multiple injuries accounted for 11 cases (47.8%), which were more often observed in road traffic accidents. Among them, the most common combined injuries were: closed craniocerebral injury, concussion - 10; brain contusion - 3; closed chest injury - 6; damage to the pancreas - 7, liver - 6, stomach - 4, small intestine - 2, right kidney - 2, pelvic bone fracture - 1 case. To assess the degree of duodenal damage, the classification of E. Moore et al. was used (Table 1). When it comes to classification, we primarily mean identifying the nature of the injury. This classification provides the most comprehensive overview of possible options for most cases of duodenal trauma.

Results and discussion. For closed duodenal injuries, taking into account the time of arrival of the injured, the degree, location, and combination of injuries, and the severity of the injured's condition, the following tactics are used.

In patients with grade I blunt trauma, extensive hematomas of the pyloroduodenal area and retroperitoneal space were detected. These were treated with Kocher-Clermont duodenal mobilization to exclude retroperitoneal damage. All surgeries concluded with nasogastroduodenal duodenal decompression. The postoperative course was uneventful in all patients, with no complications or fatalities.

Grade II injuries were detected in 3 (13.6%) patients, including 1 patient with hematomas along the anterolateral wall of the descending duodenum with preserved peritoneal integrity. After duodenal mobilization and hematoma evacuation, ruptures of the descending portion extending to the retroperitoneal portion of the intestine were detected. In 2 cases, there was a rupture of the anteromedial duodenal wall with damage to the head of the pancreas. In such cases, it is advisable to suture the intestinal defect after excision of the edges with two-row interrupted sutures, exclude passage along the duodenum by creating a gastroenteroanastomosis with a Braun anastomosis, and perform drainage of the biliary tract, omental bursa, and retroperitoneal tissue.

Grade III duodenal injuries were detected in 12 victims. In 6 patients, the injuries were localized on the anterolateral wall of the descending duodenum, in 1 on the lower horizontal part, in 2 on the retroperitoneal part of the intestine, and in 1 on the duodenojejunal flexure. In most patients, wound suturing was performed, duodenal disconnection by suturing the pyloric sphincter with a hardware suture followed by the application of a gastrojejunostomy (GEA),

drainage of the biliary tract, subhepatic and retroperitoneal spaces. In 1 case, there was combined injury to the transverse colon, in 1 case - damage to the liver and jejunum. In the postoperative period, 4 patients died, and the mortality rate was 33.3%.

Grade IV duodenal injuries were observed in 7 patients. In three cases of grade IV duodenal injuries occurring more than 6 hours after the injury, duodenal diverticulization with a jejunostomy (the duodenal wall was sutured with a double-row suture) was performed. The surgeries were completed with gastroesophageal ablation (GEA) on a Roux-en-Y loop. In two cases, a two-thirds stomach resection using the Balfour modification of Billroth II was performed. In one patient, the intestinal defect could not be reliably sutured; a drainage tube was inserted into the intestinal lumen using a catheter duodenostomy, a GEA with a Braun anastomosis was performed, and the common bile duct was drained. Nasogastric active aspiration, placement of an intestinal feeding tube, and drainage of the abdominal cavity, omental bursa, and retroperitoneum were performed. The number and location of drains depend on the severity of inflammatory changes in the peritoneum and retroperitoneum. Donovan-Hagen diverticulization (Fig. 1) was performed in one case: an antrectomy, Roux-en-Y gastroesophageal ablation, cholecystostomy, and catheter-based duodenostomy were performed. A truncal vagotomy was performed to prevent peptic ulcers in the anastomosis. In one case, given the extensive duodenal damage, the pyloric sphincter was sutured with a UO-40 device, a duodenostomy was created, and a gastroenterological anastomosis with a Braun junction was performed. Mortality for this degree of damage was 50%. Fatal outcomes were associated with suture failure (3 cases), bleeding due to vascular erosion (2 cases).

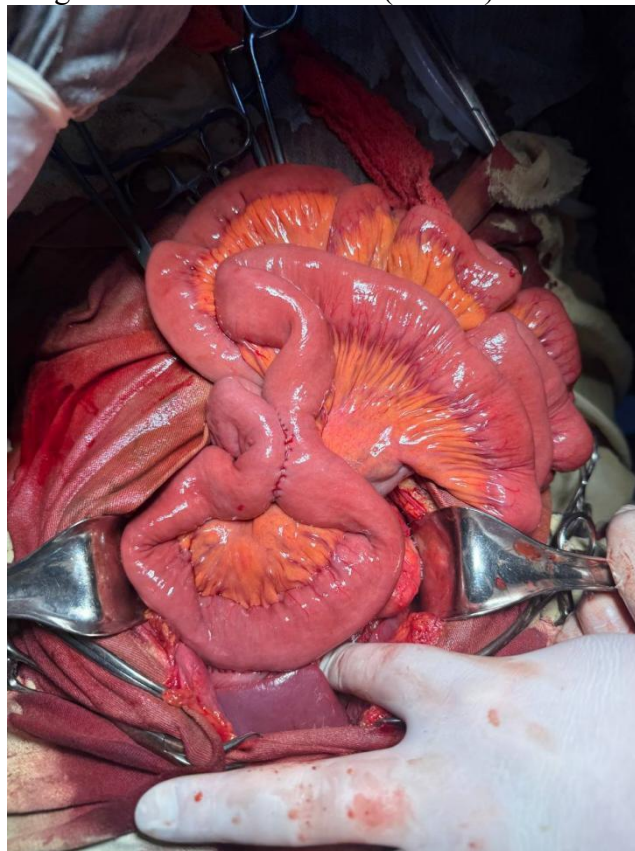


Figure 1. Donovan-Hagen diverticulization



Conclusions. The extent of surgical intervention for closed duodenal injury should be determined individually, depending on the severity of the injury and the patient's condition. For grades I-II duodenal injuries, during the first 6 hours of admission, the surgical procedure consists of suturing the defect after excision of the edges of the damaged intestine, with mandatory nasoduodenal decompression. This allows aggressive contents to be evacuated from the intestine, thereby reducing mechanical and chemical stress on the sutures. For closed grade II-III injuries admitted more than 6 hours after the injury, it is necessary to excise the wound edges, suture the duodenal defect, and temporarily interrupt the passage of food through the duodenum by ligating the pyloric sphincter and performing a gastrojejunal anastomosis. For closed grade IV injuries with crushing of the soft tissues of the intestinal wall, complete exclusion of the duodenum from digestion is indicated using the Donovan-Hagen procedure. For grades II to IV damage, decompression of the biliary tract by one of the methods, transnasal intubation of the intestine with a double-lumen tube, adequate sanitation and drainage of the abdominal cavity and retroperitoneal space are mandatory.

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