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Stomach Injury in Multiple and Polytrauma

Mustafakulov I. B. MD.*

Samarkand State Medical Institute, Surgery department of RSCUMA, Samarkand, Uzbekistan
*Corresponding author: x.karabaev@yandex.ru

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Abstract Stomach injury is one of the most severe types of injuries and among severe injuries of piece abdominal injuries makes 25%. Post traumatic stomach ruptures make 1% of abdominal injuries in isolated abdominal traumas and up to 6% in combined. During 1999-2012 periods we have analyzed 57 observations, of them 12 isolated and 45 combined gastric injuries. Injuries of anterior gastric wall were revealed in 42 patients, of posterior wall in 4 persons with thoracoabdominal wounds and of both walls in 11 patients. Study proved some different surgical treatment tactics of stomach injury have been presented**.** Complications in the postoperative period developed in 9 (15, 8%) patients with ruptures in all layers of the stomach. Relaparatomy became necessary in 5 patients due to the following indications: ileus (2), pancreatitis (1), bleeding to gastric lumen (1) insolvency of stomach wound sutures. 3 of 5 reoperative patients died, all of them had combined traumas; 2 mortality of shock and blood loss, 1 from pancreatitis and peritonitis. An adequate intervention volume in gastric injuries appears to be two-layer suturing of the wound with previous ligating of bleeding vessels and following decompression of the organ through nasogastral probe.

Keywords: *stomach injury, different surgical treatment*

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1. Introduction

Stomach injury is one of the most severe types of injuries and among severe injuries of piece abdominal injuries make 25% [1]. Post traumatic ruptures of the stomach make 1% of abdominal organs injuries in isolated gastric trauma and up to 6% in the polytrauma. These injuries are considered to be the most severe as they have lethal outcome in 72% of cases [2,3,4,5]. High death rate takes place due to plurality and severity of injuries in the abdominal cavity and other areas of the body. High lethal outcome is mostly caused by multiple and severe abdominal injuries and also other anatomic area. Stomach injuries occur frequently and make 6-12% of all abdominal organs injuries according to the data of medical literature [6,7]. Stomach is one of the most frequently injured organs in left side thoracoabdominal injuries. Complete rupture of the stomach resembles perforated gastric of duodenal ulcers but its course is considerably severe. It is characterized by presence of blood in the gastric contents which is discharged with vomiting masses or removed through gastric tube. However this symptom occurs relatively seldom. Besides, vomiting with blood admixture may be observed in traumas of pharynx, esophagus and duodenum as well [8].

There is real danger not to recognize gastric trauma or underestimate severity of damage to the organ even during revision of the abdominal cavity. Greater and lesser curvature of the stomach should be examined particularly carefully. Hematomas like there are often revealed in pellet wounds of the stomach and wounds caused by small splinters. Defection of injury on the anterior wall of the stomach, penetrating into its lumen, makes it necessary to dissect widely gastro colic ligament in order to exclude perforating wound [9,10,11,12].

Contrast examination of the stomach in polytrauma abdominal trauma is not performed as a rule [13,14,15,16,17]. Verification of gastric wound can be supported by laparoscopy, though only indirect signs can be revealed if its posterior wall is injured – hematoma of the lesser omentum, bulging of omental bursa.

The outcome of gastric injuries depends on the degree of injuries, their combinations and terms of the operative interventions.

The purpose of the study – to make analysis of the results of surgical treatment for gastric injuries in polytrauma.

2. Materials

During 1999-2012 periods we have analyzed 57 observations, of them 12 isolated and 45 polytrauma gastric injuries (Table 1).

Table 1.

Character of trauma	Number of patients		Of them died
	Isolated	Polytrauma	
blunt abdominal trauma	1	33	1
Stab-cut wounds	11	10	-
Gunshot wounds	-	2	-
Total:	12	45	1 (1,75%)

Injuries of anterior gastric wall were revealed in 42 patients, of posterior wall in 4 persons with thoracoabdominal wounds and of both walls in 11 patients. Injuries of the posterior gastric wall cold only are revealed in following the algorithm of abdominal cavity examination, which required opening of omental bursa and revision of the posterior gastric wall, pancreas, and retroperitoneal space.

According to our observations the most frequent blunt abdominal combined stomach injuries in blunt abdominal trauma were the following: cranial injuries (77, 8%), musculoskeletal apparatus (68, 9%), chest (33, 3%) Table 2.

Table 2. Stomach injuries in blunt abdominal combined trauma

Blunt abdominal trauma	Number of injuries	Percentage
Isolated injuries	12	21,0
Blunt abdominal trauma with other organs	45	89,0
Duodenum	8	17,8
Pancreas	5	11,1
Liver	18	40,0
Spleen	11	24,4
Intestine	20	44,4
Mesentery	18	40,0
Bile ducts	3	6,7
Skull	35	77,8
Musculoskeletal	31	68,9
Chest	15	33,3

The whole number of revealed injuries is higher than the absolute number of patients, because the same patient could have combined and plural injuries. Injury of a single organ was revealed in 12 cases, of two organs in 18 cases, of three a more in 27 cases.

3. Methods and Results

Preoperative diagnosis of stomach injuries in blunt abdominal trauma was possible in 25, 5% of cases. Most patients (77, 4%) were operated according to other emergency indications: profuse intra abdominal bleeding from hepatic wounds, spleen and mesentery of the small intestine or clinic of diffuse peritonitis. It becomes evident that diagnostic algorithm of closed gastric injuries must include X-ray and endoscopic examinations in addition to us and laparoscopic study. It is quite clear that not all patients can undergo these examinations but these actions will increase the quality of diagnostics in cases of gastric injuries in closed combined abdominal trauma.

Treatment of gastric injuries has its peculiarities. In revision of the stomach its anterior wall is examined, the character of wounds and presence of subserous hematomas are determined. The injury of both gastric walls in penetrating wounds takes place in 1/3 of patients. This fact is of particular importance for a surgeon performing laparotomy for penetrating abdominal injury. In anterior gastric wall injury there must be evidence of absence of posterior wall injury, particularly in the cardial part, so gastrocolic ligament is widely dissected. Gastric walls must undergo thorough examination at the curvature site attachment, where small penetrating wall defects can be masked under adipose tissue.

In most cases stomach wounds are characterized by eversion of margins and sometimes crushed mucous membrane. Hematomas are more often localized in the area of lesser curvature of stomach and omentum.

Small single wounds can be closed by purse- string or P-shaped sutures. Surgeons more often use standard two – layer intestinal closures. In cases with gunshot wounds, especially caused by high speed bullets, the tissues in the borders of visual changes should be excised. With this, the first layer of sutures has hemostatic character and is applied through all layers with uninterruptedly absorbable sutures. The second layer consists of separate serousmuscular sutures of nonabsorbable material.

In processing of large stomach wounds their margins with mucous membrane are excised and two-layer suture is applied in transverse direction that is of particular importance in the pyloric part. Indications for stomach resections arise very seldom even in significant injury wound defects can be closed by suturing of anterior and posterior walls.

In extensive injuries of the organ when it becomes necessary to remove large lifeless areas standard resection of the stomach, on the scale determined by the injury limits is indicated. Segmental resections must not be performed in such cases. Of all possible variants of resection of the organ in emergency situation, the optimal variant is to perform the most simple and easy operations, modifications of Bilrot-II ones (Gofmeister Finister, RU). The revealed subserous hematomas must be opened, with following suturing of muscular and mucous membranes with sero-serous sutures.

The following operative interventions were performed for stomach injury (Table 3).

Table 3. Types of operative interventions

Type of the operation	Number	Percentage %
Suturing of the wound	27	37,5
Suturing of posterior wall wound (two walls)	15	20,8
Pyloroplasty	3	4,2
Gastroenteroanastomosis	8	11,1
Resection of the stomach	1	1,4
Cutting and suturing of hematomas	15	20,8
Gastrostomy	1	1,4
Laparoscopic operations	2	2,8
Total	72	100,0

The general number of operations exceeds the number of patients because some patients underwent several operations (e.g. suturing of the stomach wound + opening and suturing of hematomas + pyloroplasty or gastroenteroanastomosis, etc.).

As it is seen from Table 3, most of patients underwent suturing of stomach wounds (75%). Elimination of hernatomas in bruises of organs took the second place (20, 8%). We had to perform drainage operations in 8, 8% of observations on suspicion to disturbance of food passage following the closure of stomach wounds, located in the

pyloric part, antrumectomy or resection of a half of the stomach body were performed in 1, 4% in massive ruptures as a result of catatrauma. In one case temporary decompressive gastrastoma was applied by means of Foleys catheter after suturing of the rupture in the cardial part of the stomach. Endoscopic suturing of wounds by means of hand – operated endosuture or by stepler was possible in two patients.

These observations of gastric injuries in polytrauma are typical. Of all analyzed observations gastric injury was not the cause of death. There were no complications like insolvency of sutures or disturbances in food passages after operations on the stomach.

Complications in the postoperative period were in 9 (15, 8%) patients with ruptures in all layers of the stomach. Relaparatomy became necessary in 5 patients due to the following indications: ileus (2), pancreatitis (1), bleeding to gastric lumen (1) insolvency of stomach wound sutures. 3 of 5 reoperative patients died, all of them had combined traumas; 2 mortality of shock and blood loss, 1 from pancreatitis and peritonitis.

4. Conclusions

Study has shown an adequate intervention volume in gastric injuries appears to be two-layer suturing of the wound with previous ligating of bleeding vessels and following decompression of the organ through nasogastral probe.

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