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SURGICAL TREATMENT OF CLOSED ABDOMINAL INJURIES

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Abstract:

A total of 320 patients with blunt abdominal trauma (BAT) who had stable hemodynamics before abdominal surgery were selected for the retrospective analysis. Free fluid in the abdominal cavity is one of the most reliable ultrasound signs in the diagnosis of intra-abdominal injuries. Ultrasound examination of fluid showed high sensitivity of 88.3%, specificity of 87.8% and accuracy of 88.1%, respectively. The proposed method for assessing the volume of free fluid, based on measuring its layer and distribution in different areas of the abdominal cavity, does not complicate or increase the time of the FAST protocol. This method helps to determine the critical volumes of hemoperitoneum, which is an important factor in choosing a surgical intervention for patients with chronic rheumatoid arthritis (BAT).

Keywords: *Closed abdominal trauma, diagnostics, sonography.*

Introduction

Relevance. Currently, injuries are the fourth most common cause of death in people under 45 years of age. 7-10% of deaths are due to abdominal trauma. A recent study by A.M. Khadzhibaev and co-authors showed that “damage to abdominal organs is diagnosed in 28.2% of patients urgently operated on after a traffic accident.” Abdominal trauma is currently often accompanied by multiple and combined injuries, which leads to high mortality, reaching 58%, and does not show a tendency to decrease. The complexity of the condition caused by a combination of injuries to various anatomical areas, as well as the absence of obvious symptoms of intra-abdominal bleeding, are the main reason for the low efficiency of treatment of this group of victims. The number of diagnostic errors varies from 20 to 45%, and severe injuries account for 73.1%. As a result of this circumstance, many practice early exploratory laparotomy, not expecting significant hemodynamic intra-abdominal bleeding or diffuse peritonitis. However, the rate of unnecessary laparotomies is 7-28.6% when there is no evidence of ongoing bleeding and abdominal organ injuries do not pose a threat to life. This may increase to 50-80% in severe combined trauma. Especially in patients with

severe combined abdominal injuries, it is obvious that the condition of patients worsens as a result of such unnecessary surgical interventions. In such cases, the trauma of laparotomy is often disproportionate to the scope of the intervention for which it is performed. In this regard, it is extremely important to review the algorithms and protocols for the treatment of patients with isolated and combined injuries of abdominal organs.

The aim of the study. Is to improve the efficiency of diagnostics and surgical treatment of patients with closed abdominal trauma.

Material and methods. A total of 320 patients with blunt abdominal trauma (BAT) who were hemodynamically stable before abdominal surgery were selected for retrospective analysis. Inclusion criteria also included age from 18 to 60 years, stable blood pressure upon admission to the clinic (systolic pressure of at least 90 mm Hg), and stabilization of hemodynamic parameters after preoperative anti-shock therapy. Depending on how videolaparoscopy was used at the diagnostic and treatment stages, patients were divided into two groups. The control group included 218 patients, which accounted for 68.1% of the total number of patients who underwent primary wide laparotomy without the use of laparoscopy. The main group of patients in whom surgical intervention began with diagnostic laparoscopy was 102 (31.9%).

The age of the patients ranged from 33.3 to 11.4 years. Among the victims with PTSD, men predominated (133 (83.1%) versus 27 (16.9%) women), as in the case of other types of mechanical injuries. In patients with questionable clinical and sonographic signs of hemoperitoneum and as a "safety laparoscopy" for combined abdominal injuries, laparoscopic interventions were performed more often ($p = 0.0029$). Combined injuries to organs of other anatomical regions were recorded only in 55 (34.4%) patients with PTSD and stable hemodynamics. Combined abdominal injuries were diagnosed in 17 (33.3%) patients in the laparoscopic intervention group, and in 38 (34.9%) patients in the primary open intervention group ($p = 0.850$).

We found that the sensitivity (Se), specificity (Sp) and accuracy (Ac) of the method for detecting free fluid (hemoperitoneum) in the abdominal cavity in patients with PTSD were 88.3%, 87.8% and 88.1%, respectively (Table 2). indicators of the informativeness of ultrasound. These figures are not high enough for modern conditions. However, in abdominal trauma, the presence of free fluid in the abdominal cavity is a relatively reliable sign that allows predicting the presence of intra-abdominal complications of trauma with a high probability. This is due to the fact that the positive predictive value (VPV) is 94.2%. It is important to remember that the absence of pathological effusion on ultrasound does not mean that abdominal trauma has occurred, and this is not a contraindication to video-endosurgical or open interventions. Our calculation of the negative predictive value (NPV) for the free abdominal fluid criterion shows that its reliability in excluding abdominal trauma is only 76.8%.

Results and its discussion. Ultrasound was even less effective in detecting blunt injuries of the abdominal parenchymatous organs (liver, spleen, and kidneys), with a sensitivity of only 33.0% and an accuracy of 55.6%, respectively. However, the diagnostic efficiency of this method was 90.5%. The positive predictive value (VPV) was 84.2%, while the negative predictive value (NPV) was 46.7%. Thus, we believe that when performing abdominal ultrasound, especially in patients with unstable hemodynamics, it is better to focus on identifying signs of hemoperitoneum, without wasting time searching for parenchymatous organ injuries.

The aim of the dissertation was to create a method for measuring the volume of free fluid in the abdominal cavity using ultrasound. The presence of a thin (up to 1 cm) strip of free fluid in one anatomical area indicates a hemoperitoneum volume of up to 200 ml, according to our calculations. In the case of accumulation of up to 300 ml of blood in the abdominal cavity, ultrasound examination (US) can reveal a layer of inactive fluid up to 2 cm wide in one anatomical area. In hemoperitoneum with a volume of 300-500 ml, a strip of fluid up to 2 cm thick can be seen,

distributed over two anatomical areas of the abdomen or fluid more than 3 cm thick in one area. On ultrasound, free fluid spreading over three or more areas indicates that the volume of hemoperitoneum exceeds 500 ml. The presence of fluid more than 2 cm thick in two places or any accumulation of fluid more than 3 cm thick confirms the same volume of blood. "A scale for ultrasound assessment of hemoperitoneum volume in patients with abdominal trauma" was developed based on our observations and comparison of the extent and thickness of free fluid detected on ultrasound with the volume of blood removed intraoperatively.

We compared the actual volume of blood detected in the peritoneal cavity during surgery with the type and duration of surgery to evaluate the practicality of pre-operative measurement of free abdominal fluid volume using ultrasound in patients with chronic pancreatitis. In 44 patients (28.4%) with a free abdominal fluid volume of less than 300 ml, there were almost never situations requiring mandatory wide laparotomy. In addition, with the indicated fluid volume.

In patients with PTD, the hollow organs of the abdominal cavity are almost never damaged in the presence of free fluid in the abdominal cavity of more than 300 ml. In most patients (19 of 34; 55.9%), operations such as debridement and drainage of the abdominal cavity, coagulation of the bleeding vessel and suturing of ruptures of parenchymatous organs can be performed intraoperatively using laparoscopic techniques and standard instruments without the use of expensive materials in situations where the volume of intra-abdominal blood loss is from 300-500 ml. The proportion of patients for whom laparoscopic removal of intra-abdominal complications of trauma without wide laparotomy was possible was 80.8% of the total number of cases studied (44 patients with a hemoperitoneum volume of up to 300 ml).

When more than 500 ml of blood was detected in the abdominal cavity in most patients, the laparoscopic technique was applicable only in 6.5% of cases. A high probability (RR=0.000) that serious intra-abdominal injuries requiring wide laparotomy are excluded if ultrasound, MSCT or diagnostic laparoscopy detected a blood volume in the abdominal cavity of less than 300 ml. The indicator of the “absolute risk of the presence of significant damage to abdominal organs” is 44.1% with a free fluid volume of 300 to 500 ml with a relative risk (RR) of 0.472, which is an ambiguous sign. When the volume of free fluid in the abdominal cavity exceeds 500 ml, the highest relative risk (RR) is observed where the probability of serious intra-abdominal injury (EER) is 93.5%, and the relative risk value reaches an absolute value of 4.862 units with a 95% confidence interval from 3.074 units to 7.692 units.

We decided to use the volume of free fluid as the main diagnostic criterion for determining the surgical treatment strategy for patients with PTD. This is due to the strong direct correlation (R = 0.9148) between the conversion rate and the volume of hemoperitoneum, as well as the high positive predictive value (VPV = 94.2%) in detecting free fluid in the abdominal cavity.

Conclusions.

1. Different volumes of free fluid in the abdominal cavity are considered the most reliable of the various sonographic signs of intra-abdominal injuries in PTSD. Ultrasound diagnostics showed high sensitivity, specificity and accuracy of determining this sign, amounting to 88.3, 87.8 and 88.1%, respectively. A new method for assessing the volumes of free fluid, based on the assessment of its prevalence and thickness in different areas of the abdominal cavity, does not increase the complexity or duration of the FAST protocol. This method allows for the determination of important volumes of hemoperitoneum, which are necessary for surgical treatment of PTSD..
2. The study revealed the following data: high positive predictive value of the ultrasound result for the sign of “free fluid in the abdominal cavity” (VPV=94.2%), strong direct correlation between the conversion rate and the volume of hemoperitoneum (R=9.148), high relative risk

(RR=4.862, 95% CI 3.074-7.692) and a high probability of the presence of serious intra-abdominal injury (EER=93.5%)

Literature.

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