

OPTIMIZATION OF DIAGNOSTICS OF INJURIES OF ABDOMINAL CAVITY ORGANS IN CHILDREN

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Abstract: this article presents an analysis of the examination of 38 children with traumatic injuries of the abdominal cavity. As a result of the examination, it was found that the use of a set of special research methods for diagnostic purposes in conjunction with the assessment of clinical manifestations of the disease makes it possible to optimize the preoperative diagnosis of closed abdominal trauma and determine the indications for endoscopic diagnostic methods. The dynamic ultrasound examination and videolaparoscopy are highly informative methods of diagnosis of closed injuries of abdominal cavity organs in children.

Keywords: closed abdominal injury, abdominal injuries, diagnostics, children.

ОПТИМИЗАЦИЯ ДИАГНОСТИКИ РАЗЛИЧНЫХ ТРАВМ ОРГАНОВ БРЮШНОЙ ПОЛОСТИ У ДЕТЕЙ

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Аннотация: в данной статье приводится анализ обследования 38 детей с травматическими повреждениями органов брюшной полости. В результате обследования установлено, что использование в диагностических целях комплекса специальных методов исследования в совокупности с оценкой клинических проявлений заболевания дает возможность оптимизировать предоперационную диагностику закрытой

травмы живота и определить показания к проведению эндоскопических методов диагностики. Динамическое ультразвуковое исследование и видеолaparоскопия являются высокоинформативными методами диагностики закрытых повреждений органов брюшной полости у детей.

Ключевые слова: *закрытая травма живота, повреждения органов брюшной полости, диагностика, дети.*

Recently, closed abdominal injuries occur in every fifth victim with a combined injury and varies in a fairly wide range - ranging from 5% to 20% of cases. Concomitant trauma is one of the three main causes of death in the population, and in victims under the age of 40, this cause comes out on top. The mortality rate for combined abdominal injuries is on average 58% [6, 10, 13].

There is no consensus and clear practical recommendations on the optimal methods of diagnostic tactics and therapeutic and diagnostic algorithm for closed abdominal injuries, taking into account the multifactorial assessment of the severity of the injury, with the allocation of life-threatening consequences and prognosis criteria [14, 15].

Many authors note a high frequency (about 40%) of various types of errors and defects in the diagnosis and treatment of closed abdominal trauma. The current situation strongly dictates the need for new tactics of diagnosis and treatment of severely affected patients in the acute period. It is necessary to actively use modern achievements of technology in medicine, to look for opportunities for quick and accurate diagnosis of injuries [2, 8, 11].

According to many authors, the delay in the use of instrumental research methods at admission leads to a late diagnosis of abdominal injuries and a delay in the operation. We also hold the opinion that the algorithm of diagnostic manipulations, after a clinical examination, if the hemodynamics is stable, begins with an ultrasound examination of the abdominal organs, and then radiography of the abdominal and thoracic cavity, the damaged limb and skull according to the indications [1, 7].

Laparoscopy with the use of endovideo equipment and computed tomography are more effective and advanced in the diagnosis of abdominal injuries [4, 9]. However, the high cost, the need for special equipment and the readiness of medical personnel make them inaccessible in emergency surgery [3, 5, 12].

The above data indicate the need to search for new approaches to diagnosis and dictate the need for constant improvement of the therapeutic and diagnostic algorithm for closed abdominal trauma.

Purpose of the research: improving the effectiveness of diagnosis of traumatic injuries of the abdominal cavity.

Materials and methods of the research: This work is based on the results of examination and treatment of 38 children with closed abdominal trauma (CAT) who were treated in the Department of General Surgery № 1 of the 2-clinic of

Samarkand State medical institute from 2010 to 2020. Among the enrolled boys there were 25 (65.7%), girls 13 (34.3%). The ratio of boys to girls is 1.9:1.

Of the 38 children with CAT, there was a predominance of abdominal damage caused by ruptures of the parenchymal and hollow organs of the abdominal cavity.

Combined head injury was diagnosed in 33 (87.0%) children. In 11 cases (29.0%), CAT was accompanied by limb damage. In 5 (13.0%) of them, various degrees of damage to the soft tissues of the extremities were observed. Traumatic breast injury was observed in 6 (16.0%) cases. The chest injury was mainly accompanied by multiple rib fractures and injuries to the chest cavity.

In 16 (42%) cases, a combination of abdominal and retroperitoneal trauma was observed. The incidence of pelvic injury was observed in 2 (5%) patients.

Diagnosis of intraabdominal injuries during the initial examination was based on the clinical picture of "abdominal catastrophe", although its characteristic manifestations in the form of abdominal pain, pain during palpation, muscle tension of the anterior abdominal wall, the presence of the Shchetkin-Blumberg symptom were observed in 74% of patients.

Surgical interventions in most cases were organ-preserving: in monocombined injuries in 90%, in polycombined injuries in 70%.

The average duration of hospitalization of children with CAT was 15.6 ± 0.4 days and ranged from 6 to 12 days.

Assessment of the general condition and severity of children with PTA was carried out using objective research methods: examination, palpation, percussion and auscultation. Ultrasound, laparocentesis, laparoscopy and CT are widely used for diagnosis.

Results of the research: All patients on admission were examined for hemoglobin, hematocrit and red blood cells. When analyzing these indicators, it was not possible to establish a correlation between the number of red blood cells, the content of hemoglobin with hematocrit and the severity of blood loss (table 1).

Table 1. Indicators of hemoglobin and hematocrit in children with CAT

| Indicators | | Number of patients | |
|------------------|----------------|--------------------|--------------|
| hemoglobin (g/l) | hematocrit (%) | n | % |
| 120 or more | 36-44 | 16 | 42,0 |
| 100-119 | 30-35 | 9 | 24,0 |
| 90-99 | 28-30 | 5 | 13,0 |
| 80-89 | 26-28 | 4 | 10,5 |
| 70-79 | 24-26 | 2 | 5,2 |
| less than 69 | less than 22 | 2 | 5,3 |
| Total | | 38 | 100,0 |

The results of laboratory blood tests in the next few hours after the injury do not allow us to reliably judge the presence and degree of blood loss and cannot be diagnostic criteria for assessing the degree of blood loss in the next few hours (2-3 hours) after the injury. Focusing on these numbers can lead the surgeon astray and lead to a loss of time for surgical intervention.

After a thorough examination, all patients were subjected to X-ray examination. We detected the presence of pneumoperitoneum in 4 patients and all of them were subjected to surgical intervention. However, in 2 patients with rupture of the hollow organ, free gas in the abdominal cavity was not detected.

Radiologically, it is very difficult, and sometimes impossible, to recognize the presence of fluid in the abdominal cavity. Thus, according to our data, free fluid was not detected in any patient with a rupture of the abdominal organs.

A violation of the function of the diaphragm accompanies many injuries to the abdominal organs. Radiologically, the parietic state of the diaphragm, the high position of the dome and the decrease in its respiratory excursions are determined. Unilateral violation of the diaphragm function was found among our observations - in 4 children with a ruptured liver and in 9 children with a ruptured spleen.

Consequently, radiological methods of examination in children with CAT establish only the presence of damage to the hollow organs and indirect signs of the presence of free fluid in the abdominal cavity. However, the presence of free gas does not indicate the level and location of damage to the hollow organs.

Ultrasound examination of the abdominal organs and determination of free fluid were performed in patients with CAT. One of the main tasks was to identify damage to parenchymal organs and intracavitary bleeding. The presence of blood in the lateral channels, subhepatic space, as well as in the pelvic cavity was revealed during echographic studies in 20 children.

Echographic detection of fluid only in the pelvic cavity corresponds to a "small" hemoperitoneum, the blood volume corresponds to 150-200 ml. This picture was revealed by us - in 17 victims who were not further subjected to surgical intervention, treatment was carried out conservatively.

With "average" hemoperitoneum, except for the pelvis. Blood is echographically detected in the hepatic-renal pocket, lateral channels, and spleen, and the amount of blood spilled ranges from 200 to 500 ml. This phenomenon was found in 20 patients who, during further examination, found damage to parenchymal organs with continued bleeding, performed laparotomy and stopped bleeding.

The detection of fluid and under the anterior abdominal wall in the mesogastrium region corresponds to a "large" hemoperitoneum with a blood volume in the abdominal cavity of more than 500-700 ml. The patients we observed had a "large" hemoperitoneum in 12 cases.

Ultrasound examination of the liver was performed in 9 children. Echographically, a moderate increase in size was detected in 4 patients, and the

presence of volume formations of significantly increased echonegativity, with somewhat indistinct and uneven contours, was determined in the liver. These signs were interpreted as intrahepatic hematoma.

With a superficial (subcapsular) localization, the hematoma, as a rule, has a crescent shape, repeating the contour of the organ. Less often, there is a bulging of the capsule and deformation of the contour of the organ. Deep, including the Central gaps are visualized as the formation of different, often irregular in shape with uneven and indistinct contours.

Direct echographic signs of trans-capsular ruptures are a violation of the continuity of the organ contour and visualization of the rupture line. Perifocally from the rupture zone, changes in the echostructure of the parenchyma are observed, which are characteristic of an organ injury.

With suspected spleen damage, 8 admitted children underwent ultrasound and only 2 children showed no changes in the spleen echostructure. Echography of the spleen is best performed in the position of the patient on the right side.

The direct and most permanent echographic sign of subcapsular ruptures of the spleen (2 cases) is the presence in the parenchyma of a formation (corresponding to an intra-organ hematoma), the shape of which is determined by the localization and features of the rupture (linear, stellate, etc.), and the echogenicity is determined by the time elapsed since the injury.

With a superficial (subcapsular) localization, the hematoma has a crescent shape, repeating the contour of the organ. Less often, there is a bulging of the capsule and deformation of the contour of the organ.

Deep, including central breaks are visualized as formations of various, more often irregular shapes with uneven, indistinct contours were detected - in 2 patients. Direct echographic signs of trans-capsule ruptures are a violation of the continuity of the organ contour and visualization of the rupture line.

Bruising of parenchymal organs was diagnosed in 4 children with PTA. In case of bruises of parenchymal organs, direct echographic signs (in the first 3-5 hours after the injury) are a decrease in echogenicity, "irritability" of the parenchymal echostructure and loss of clarity of contours. These changes are due to the presence of interstitial edema.

The proposed algorithm for conducting dynamic ultrasound examination of the abdominal organs should be followed in all cases, since only a systematic analysis of the resulting echograms allows you to conduct a full-fledged study, avoid possible errors, and obtain the necessary information. The accuracy of diagnostics of detected changes increases with dynamic observation.

The effectiveness of the systematic use of the developed dynamic identification of various types of parenchymal organ injuries and quantitative assessment of the hemoperitoneum allows us to recommend echography as the basis for non-invasive diagnosis of closed abdominal trauma in children.

One of the most effective methods of modern diagnostics is computed tomography. In the groups of patients we observed, CT was performed in 11

patients with closed combined damage to internal organs. Hemoperitoneum in CT is detected as an inhomogeneous structure in subdiaphragmatic spaces (on the right - crescent-shaped) with uneven, indistinct contours. The density of the hemoperitoneum in the first hours after the injury and on the 3rd-5th day significantly differ. We observed hemoperitoneum in 2 (20%) children. The accuracy of CT in detecting hemoperitoneum is 100% (figure 1).

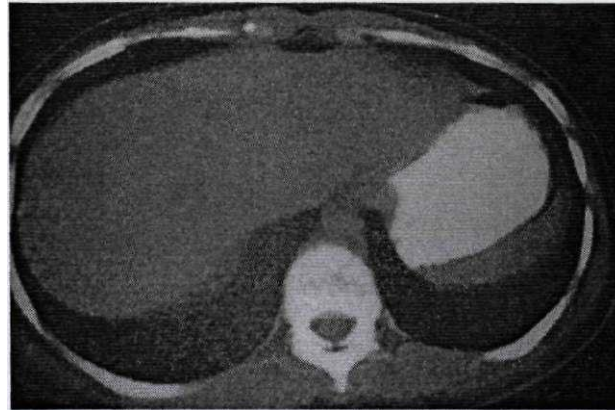


Fig. 1. Computed tomography. Patient I., 11 years old. Hemoperitoneum

In liver hematoma, the heterogeneity of the organ structure, a significant increase in the vertical dimensions of the right and left lobes, a clear deformation, a change in the clarity, evenness of the contours and heterogeneity of the structure of the central parts of the liver are noted. Biliohematoma is characterized by the presence in the projection of the liver of an irregular zone with uneven clear contours, a homogeneous structure, a density of 0 to 10 units. H, which does not change with contrast enhancement.

When rupture of the liver observed heterogeneity of the structure of the body, increasing a vertical size of the right and left lobes, changing sharpness, smoothness of contours and the heterogeneity of the structure of deep tears in the fabric. Fluid is detected near the damaged liver parenchyma. This picture was observed in 3 (27.3%) patients. The accuracy of CT examination in detecting liver rupture is 98% (figure 2).

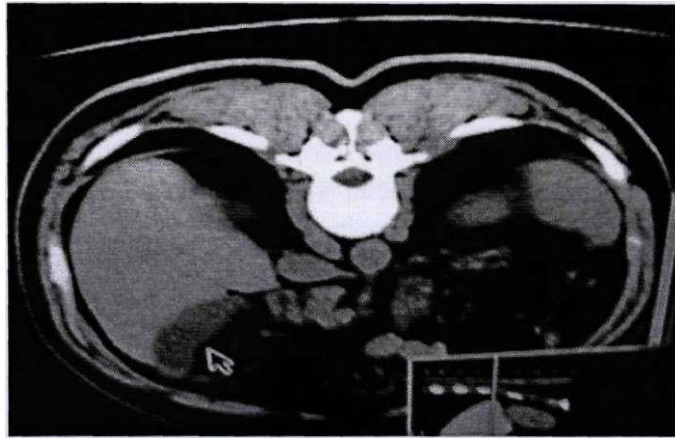


Fig. 2. Computed tomography. Patient S., 13 years old. Rupture of the liver

One of the most modern methods of direct endoscopic examination is laparoscopy. Numerous literature data indicate that laparoscopy as an auxiliary method for diagnosing injuries to the abdominal organs in closed abdominal trauma, especially in combined injuries, when diagnosis is very difficult, provides reliable information about the state of internal organs.

A total of 13 laparoscopies were performed in extremely dubious cases in children with abdominal catastrophe.

Indications for laparoscopy were the detection of small and medium-sized hemoperitoneums during ultrasound examination against the background of stable hemodynamic parameters. Laparoscopy revealed ruptures of the spleen have 3 children, rupture of the liver in 1, rupture of the mesentery of the intestine in 4 children and 1 is the margin falciform ligament of the liver. In all the above examples, the damage to parenchymal organs was insignificant and laparoscopy ended with wound coagulation, sanitation of the spilled blood and drainage of the abdominal cavity. In case of damage to the mesentery of the intestines (4 cases), clipping of bleeding vessels with sanitation and drainage of the abdominal cavity was performed. In all 9 cases, after laparoscopic interventions, the question of laparotomy was excluded. In the remaining 4 cases, laparoscopy was diagnostic and ended with sanitation and drainage of the abdominal cavity.

The main contraindication to laparoscopy is severe combined trauma and unstable hemodynamics.

All tests were performed in the operating room under conditions of strict asepsis. The choice of the insertion site of the laparoscope depends on the data history (indicate the mechanism of injury, the traumatic nature of the subject, the place of application traumatic forces) and clinical and laboratory data. Suspecting damage to the parenchymal organ (liver, spleen), an examination was performed through the upper point of the Tracing paper, which created optimal conditions for a detailed examination of the damaged organs. Duration - 45-60 min.

According to our data, in children admitted with severe injuries of the abdominal organs, laparoscopy should be performed with minor hemoperitoneums (up to 200 ml) established by ultrasound against the background of stable hemodynamics, as well as in extremely doubtful cases. Based on the study of multiple publications on therapeutic videolaparoscopy in children with CAT and our experiments in the clinic, we have developed criteria for indications and contraindications for performing videolaparoscopy with closed abdominal injuries in children.

Laparoscopy is of particular value, as it is easy to perform, and the information obtained is very valuable in the formulation of topical diagnosis and treatment of minor intra-abdominal injuries, avoiding unnecessary laparotomy.

The general condition and severity of children with CAT determines the use of an individual diagnostic algorithm, including the use of additional instrumental research methods. At the initial clinical examination, the damage to the internal organs is obvious, unstable hemodynamics and this fact is confirmed clinically and laboratory (Hb below 6 g/l), then - laparotomy is uncontroversial.

With stable hemodynamic parameters and the presence of free fluid (with ultrasound) in the abdominal cavity, it is advisable to perform endovideosurgical interventions. The presence of unstable hemodynamics and a large amount of fluid in the abdominal cavity (more than 500 ml), as well as in case of damage to the hollow organs, it is necessary to perform the operation using traditional methods.

The logical dependence of the algorithm links lies in the fact that the need to perform further studies was determined by the results of the previous stages of the survey, that is, the result of each study, which is a link in the diagnostic process, determined the need to use the subsequent method and its specific choice.

Conclusion: Thus, the use of therapeutic and diagnostic algorithms in children with CAT and its complications allows, first of all, to increase the effectiveness, and on the other hand, to avoid the unjustified use of a number of diagnostic and therapeutic measures.

In conclusion, it should be noted that we used research methods were needed for diagnosis and choice of surgical intervention and to identify the complex pathophysiological changes produced in the body after the injury and dysfunction of vital organs, and their consequences.

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