

THE ROLE OF ULTRASOUND DIAGNOSTICS OF ACUTE ADHESIVE INTESTINAL OBSTRUCTION IN CHILDREN

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Abstract. *Acute intestinal obstruction is one of the most common diseases in emergency surgery. This paper presents the results of a survey of 47 children with acute adhesive intestinal obstruction. All patients were treated at the clinic of the Tashkent Pediatric Medical Institute from 2020 to 2022. Of the total number of patients, 43 were operated on for early adhesive intestinal obstruction. Surgical interventions are represented by two methods of operation: open 12 children and laparoscopic 31 children. Conservative measures were successful in 11 cases. Ultrasound is also widely used for dynamic monitoring of children undergoing conservative treatment, which allows to assess the wall, the structure of the intestine, as well as the restoration of peristalsis. Ultrasound plays an important role as the first screening study to confirm or exclude acute adhesive intestinal obstruction, which allows timely diagnosis and inclusion of the patient in the treatment process.*

Keywords: *acute adhesive intestinal obstruction, diagnosis, children, ultrasound, computed tomography, informativeness.*

Relevance. Acute intestinal obstruction (AIO) is one of the most common diseases in emergency surgery. Acute intestinal obstruction accounts for 9.4 - 27.1% of all surgical diseases. According to literature data, in 85%-90% of cases, acute adhesive intestinal obstruction develops in patients who have previously undergone surgery. From 40% to 75% of all intestinal obstruction is associated with the formation of adhesions, and the mortality rate in acute adhesive intestinal obstruction is (AAIO) 6-10% and does not tend to decrease [5, 6, 9].

Imaging methods used in the examination of a patient with suspected AAIO are radiography, ultrasound, computed tomography (CT) and magnetic resonance imaging (MRI). Overview radiography of the abdominal cavity in the supine and standing position has diagnostic accuracy in the range of 50-70% and has low specificity; moreover, radiographs may seem normal in patients with complete, closed or strangulation obstruction. CT is the gold standard of imaging in the diagnosis and determination of the stage of small bowel obstruction, but has some contraindications associated with high radiation load on the child's body. MRI is a reliable method, but it has some limitations that prevent its wider use in this area, such as a long time of emergency care, reduced image quality during breathing and defecation.

The use of CT and MRI is not feasible in all cases, especially in remote areas where it is not advisable to purchase expensive equipment and there are no surgeons with experience in interpreting CT and MRI data.

One of the methods of diagnosis of acute intestinal obstruction is laparoscopy, which has specific contraindications [7,10] During laparoscopy in patients with adhesions, there is a high probability of damage to the intestinal wall. Ultrasound examination (ultrasound) occupies a leading position in the diagnosis of acute surgical diseases of the abdominal cavity. To date, ultrasound examination occupies a leading place among all methods of diagnosis of acute intestinal

obstruction, due to: accessibility, speed of implementation, manifestation of signs of AIO in earlier stage, high informativeness, non-invasiveness, unlimited repeated examinations, absence of side effects for the patient and medical workers.

The aim of the study was to study the possibilities of the ultrasound method in the diagnosis of acute adhesive intestinal obstruction in children.

Material and methods of research. This paper presents the results of a survey of 47 children with AIO. All patients were treated at the clinic of the Tashkent Pediatric Medical Institute from 2020 to 2022. Of the total number of patients, 43 were operated on for early adhesive intestinal obstruction. Surgical interventions are represented by two methods of surgery: open 12 (25.5%) children and laparoscopic 31 (65.6%) children. Conservative measures were successful in 11 (23.4%) cases. A predisposing factor in the formation of AAIO is the existence of an adhesive process in the abdominal cavity (in most cases due to previously undergone surgery on the abdominal organs). So, out of 47 children, 43 (91.4%) had a history of some kind of abdominal surgery.

Only 4 (8.6%) children had not been operated on before. Chronic inflammatory diseases of the intestines and pelvic organs were the cause of AAIO in them. According to our data, the average duration of the occurrence of AAIO was 3.2 years after the last intervention. Early adhesive intestinal obstruction occurred 2-14 days after the initial surgical intervention.

Ultrasound diagnostics for all children was performed on devices manufactured by "Sonoscape S 22" (China) and "Aplio 500" (Japan), functioning in real time, gray scale with components of color Dopplerography. Ultrasound examination was performed in the position of the child lying on his back on his own breathing using a convex transducer (2-6 MHz), sequentially moving the sensor from the epigastric, then mesogastric and hypogastric areas to the right and left, examining the loops of the small and large intestines, then the pelvic area was examined. Ultrasound was performed polypositionally. At the same time, the condition was differentiated with other possible acute surgical pathologies of the abdominal cavity. A high-frequency linear sensor (7-12 MHz) was used to better characterize the state of the loop and display the level of obstruction.

Dynamic studies were conducted from 1 to 3 times during the period of conservative therapy, with a control time of 2-4 hours. When positive dynamics was detected in patients with AIO when performing conservative measures, a control ultrasound was performed every 4 hours.

The results of the study. Upon admission, the most persistent complaint in children with acute adhesive intestinal obstruction was abdominal pain of various types, gas retention and/or stool. Vomiting occurred only in 1/3 of children. All children underwent an overview radiography of the abdominal cavity in a standing and/or sitting position. The direct symptoms of acute intestinal obstruction were the determination of the Kloiber bowl in 26 (55.3%) children, the visible intestinal wall 12 (25.5%), intestinal arches 15 (31.9%), and Casey's symptom - transverse striation of the small intestine 9 (19.1%).

Pneumatization of the small intestine was detected in 100% of cases. The first, at first single, Kloiber's bowls on the X-ray were determined after 2 hours from the onset of the disease. After 3-4 hours from the onset of the disease, the number of Kloiber's cups increased. With the predominance of gas accumulations over liquid conglomerates in the lumen of intestinal loops, intestinal arches were determined on the X-ray. Determination of several levels of liquid conglomerates in intestinal arches was a sign of the mechanical nature of intestinal obstruction.

And with the dynamic nature of intestinal obstruction, the surface of the liquid conglomerate in the intestinal arches was located at the same level. At the same time, the pneumatization of the loops of the small and large intestine throughout had a uniform character. With more advanced forms of intestinal obstruction, Casey's symptom was determined, which arose as a result of edema of the Kerkring folds, which became X-ray positive due to the accumulation of fluid in the intestinal wall.

Ultrasound of the abdominal cavity was performed for all children on an emergency basis upon admission. During the study, the degree of dilatation and the thickness of the intestinal wall were noted, the nature of the contents and motor-evacuation activity of the intestine, the presence and amount of free fluid in the abdominal cavity were evaluated. The "general review" made it possible to identify dilated loops of the small intestine in 27 (57.4%) children. After determining the group of expanded intestinal loops, the diameter, kinesis, thickness of the parietal and converged valves was evaluated. Among 35 (74.4%) children who were admitted to inpatient treatment in the first 12 hours from the onset of the disease, in 15 (32.0%) children who made up the majority, the average diameter of the intestine ranged from 2.0 to 2.5 cm. The group of patients who were admitted to inpatient treatment later than 12 hours from the onset of the disease was 72 children or 63.2% of the total number of children. The average diameter of the small intestine ranged from 2.6 to 3.0 cm. In 13 cases, the average diameter of the small intestine ranged from 3.0 to 3.5 cm. In 10 cases, the average diameter of the small intestine ranged from 3.5 to 3.8 cm. And only in 5 children it exceeded 4.5 cm. With intestinal obstruction in 45 (95.7%) patients, the contents in the lumen of the small intestine were anechoic in nature. In 7 (14.8%) cases, there were heterogeneous contents in the lumen of the small intestine. In some cases, it was the presence of a different number of small hypoechoic inclusions or the presence of suspensions of different echogenic density. In 39 (82.9%) children, the contents of the small intestine were almost homogeneous with a minimum number of hyperechoic inclusions. Sometimes hyperechoic inclusions were of a single character. Rarely, only in 2 (1.7%) cases, the contents in the lumen of the small intestine had slightly reduced echogenicity, heterogeneous structure and multiple dense inclusions. It should be emphasized that both of these children were hospitalized in the emergency surgery department in the first hours from the moment of the disease and the diameter of their small intestine did not exceed 2.0 cm. Dynamic ultrasound examination showed that the echogenicity of the small intestinal chyme gradually decreased up to the anechoic state. The mass of the small-intestinal chyme became more homogeneous. The features of the ultrasound picture during primary ultrasound are explained by the short duration of the disease. As well as a satisfactory functional state of the intestine.

With ultrasound in children with acute adhesive intestinal obstruction, the thickness of the intestinal wall ranged from 2 to 5 mm. The structural structure of the intestinal wall was homogeneous, its echogenicity was increased. The structural structure and echogenic characteristics on the altered sections of the intestinal wall in the area of dilated intestinal loops were the same. The thickness of the intestinal wall also had the same values in different parts of the small intestine.

Thanks to ultrasound examination, the majority of patients with acute adhesive intestinal obstruction were diagnosed and treated in the first six hours from the onset of the disease. Radiologically, it is possible to make the same diagnosis only in children with a disease duration

of more than six hours. Consequently, ultrasound examination provides more informative data at an earlier time in comparison with X-ray methods.

Conclusions. Ultrasound is a highly accurate imaging method for diagnosing and determining the stage of acute adhesive intestinal obstruction in children. Moreover, ultrasound can be used to assess intestinal motility in real time, which plays a key role in the diagnosis and monitoring of the patient's condition.

Ultrasound is also widely used for dynamic monitoring of children undergoing conservative treatment, which allows to assess the wall, the structure of the intestine, as well as the restoration of peristalsis. Ultrasound plays an important role as the first screening study to confirm or exclude acute adhesive intestinal obstruction, which allows timely diagnosis and inclusion of the patient in the treatment process.

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