

The indisputable value of ultrasound diagnostics in acute small bowel obstruction

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Abstract: *The use of ultrasound in the diagnosis of acute small bowel obstruction is justified from a tactical point of view, since it is not delayed in time, does not weigh down the patient's condition, has sufficient information and does not carry radiation load. Due to its safety and ease of use, this technique can be used repeatedly in the process of conservative treatment to determine further treatment tactics.*

Key words: *acute small bowel obstruction, ultrasound examination.*

1. The purpose of the research

Was to study the informative value of transabdominal ultrasound in the diagnosis and evaluation of the effectiveness of conservative and surgical treatment of acute intestinal obstruction.

2. Material and methods of research

The analysis of 69 clinical cases of acute small bowel obstruction in patients who were on inpatient treatment at the clinical base of the Department (rscemp Bukhara branch) for the period from 2017 to 2020 was carried out. All patients admitted to the hospital initially underwent physical, laboratory and instrumental examination methods. All patients were divided into two groups: the first group included 48 (69.6 %) patients whose intestinal obstruction was resolved by conservative measures, the second group - 21 (30.4%) patients who underwent surgical treatment.

Acute small bowel obstruction (OTN) it is one of the most rapidly and dramatically developing conditions among acute surgical diseases of the abdominal cavity in emergency surgery, which is characterized by a severe clinical course and an unfavorable prognosis. Almost OTKN occurs in all age groups, without selecting populations and ranks first among acute diseases of the abdominal cavity in terms of mortality, which ranges from 4.2 to 30.8 % [2; 5].

The main reason for high rates of death is severe conditions that are caused by late treatment of patients, diagnostic and tactical errors, as well as a significant number of postoperative complications against the background of uncorrected severe conditions. The frequency of diagnostic errors even in hospital settings reaches 13-33%. Many issues of diagnosis and treatment of OTN remain unresolved and controversial [1; 9]. Difficulties arise in the diagnosis of high small bowel and gallstone obstruction, where a significant number of diagnostic errors are observed [3; 4; 12].

In OTN, many traditional radiation diagnostic methods are in some cases uninformative [7; 11], and the availability of computed tomography is limited [10; 13]. Therefore, it is very important for clinical surgery to conduct research to assess the informative value of ultrasonography in the diagnosis of acute intestinal obstruction, which is a painless, quickly implemented method of visual diagnostics that assesses the structure of various organs and soft tissues, including the intestines, taking into account a number of advantages of the method – accessibility, the possibility of use in seriously ill patients, ease of implementation, high information content, non-invasiveness, the need to further expand the role of ultrasound in the diagnosis of emergency surgical diseases in General and in particular acute intestinal obstruction is obvious [8; 12].

The data were compared with the results of x-ray (57 patients) and laparoscopic (10 patients) research methods. Echography was performed on ultrasound devices "Esaote MyLab 40" and "SonoScape S40" using convex and sector sensors with a frequency of 1-22 MHz. The study was performed without preliminary preparation in the patient's supine position using a convex sensor with a frequency of 1-22 MHz. In some cases, ultrasound was performed in a sitting position leaning against the wall or, if the patient's condition allowed, standing. A polypositional study of all parts of the abdominal cavity was performed, including a polypositional study and dosed compression of both parenchymal organs, as well as the small, large intestines and stomach. Initially, acute surgical diseases of the liver, gall bladder, pancreas, spleen, pelvic organs and retroperitoneal space were excluded. Examination of bowel loops in patients with suspected OTN was performed polypositionally and polyprojectively using metered compression with an ultrasound sensor on the anterior abdominal wall to minimize interference from gas in the expanded loops. Special attention was paid to the search for expanded loops of the small intestine with intraluminal deposition of liquid contents and with complete absence of movement of echo inclusions in its composition during continuous observation for 4-5 minutes. The depth and frequency of peristalsis of loops are investigated, and the absence of it in individual loops is established. In addition to the generally accepted method for determining the cause of obstruction, the mobility of the peritoneal leaves in the zone of greatest pain and in other parts of the abdominal cavity during forced "abdominal breathing" was studied. During laparotomy, visceroparietal and viscerovisceral adhesions were detected in the areas with limited mobility of the loops relative to the anterior abdominal wall registered during ultrasound.

12 examined patients had postoperative ventral hernias. These patients needed to assess the state of aponeurosis and the possibility of defects in it, which we took into account in a descriptive manner. They also studied the contents of hernia sacs in the thickness of the anterior abdominal wall, the presence of small bowel loops in them, and limited fluid accumulations. At the time of forced "belly breathing" and when the patient was straining in a lying or standing position, special attention was paid to changes in the intestinal loops leading to the zone of infringement: their expansion, intraluminal fluid deposition, and the pendulum-like nature of the movement of echo inclusions in the intestine. During this examination, 9 patients were found to have signs of small bowel obstruction, which then followed to examine the stomach in order to detect stagnant contents in it. At the end of the ultrasound examination, free fluid was searched in the area of greatest pain and in other parts of the abdominal cavity. 6 patients had complex diagnostic cases. With such an atypical clinical, ultrasound picture, we considered it appropriate to conduct subsequent ultrasound observation at intervals of 2 to 5 hours. In our observations, the most common cause of mechanical small bowel obstruction was postoperative adhesions in the abdominal cavity (29 cases). In 12 patients, the cause of obstruction was a pinched loop in the hernial SAC, in 3-inversion of the small intestine. In 4 cases, violation of the passage of intestinal contents followed due to obturation of the lumen due to compression of the intestine by tumors. The diagnosis was based on ultrasound criteria for small bowel obstruction: expansion of small bowel loops with intraluminal fluid deposition. Among 17 patients with adhesive strangulation obstruction, 8 patients with a disease duration of up to 12 hours with dosed compression by a sensor in the zone of greatest pain were found to have a loop of the small intestine absolutely akinetic, without peristalsis and without movement of echo inclusions in the liquid content during 5-6 minutes of ultrasound examination. In the loops of the small intestine leading to the strangulation zone, at a short time from the onset of the disease, 5 patients had a propulsive movement of echo inclusions in the intraluminal contents, and frequent peristalsis of the loops. With a disease duration of more than 12 hours, in the remaining 3 cases of strangulation adhesive obstruction, against the background of an increase in the amount of liquid content in the loops, a change in peristalsis to surface was noted, and the movement of echo inclusions in the lumen became pendulum-like. The search for loops with signs of impaired innervation and blood supply to the intestinal wall in these patients was difficult due to the overflow of the adductor loops of the small intestine with liquid contents. Distal to the strangulation zone, in all cases, the bowel loops were collapsed, which helped to clarify the level of obstruction. The diameter of the expanded loops of the small intestine ranged from 2.7 to 4.8 cm.

One of the informative ultrasound signs of adhesive obstruction is the ability to detect fixation of intestinal loops with adhesions to the anterior abdominal wall during scanning. In our studies with disease duration up to 12 hours in 6 patients in the study of the abdominal cavity on the background of forced breathing "belly" mobility of the bowel loops relative to the anterior abdominal wall was reduced to 1.4 ± 0.8 cm, in the abdomen, distant from the zone of strangulation, she was equal to 3.8 ± 0.8 cm. The difference in mobility of the peritoneal leaves averaged 2.3-4.1 cm. When the duration of the disease is more than 12 hours in the remaining 5 patients, there is no difference in the mobility of the peritoneal leaves in different parts, which is associated with an increase in the amount of intraluminal contents in the loops of the small intestine located proximal to the strangulation zone. At the same time, there was a disposition of overstretched loops, restriction of the respiratory excursion of the diaphragm due to an increase in intra-abdominal pressure, and, accordingly, a decrease in the mobility of all loops.

In 8 cases of postoperative ventral hernias, ultrasound revealed a defect in aponeurosis of the anterior abdominal wall, the contents of the hernial SAC showed loops of the small intestine with a thickening of the walls from 0.5 to 1.1 cm and reduced echogenicity. The peristalsis of the loops was very weak or absent. In the loop lumen, the liquid content was determined without the movement of echo connections. Limited fluid accumulations were visualized along the contour of the loops in the contents of the hernia bags. The main criterion for loop infringement in all 10 cases was the expansion of the adductor loops of the small intestine in the abdominal cavity with intraluminal deposition of liquid contents, the presence of pendulum-like movements of echo inclusions in its composition, and free fluid in the abdominal cavity in the area of the hernia SAC gate.

All cases of infringement were confirmed promptly. As our experience shows, conventional transabdominal ultrasound can confidently diagnose acute small bowel obstruction and differentiate between strangulation and obturation forms of adhesive obstruction. With the help of echography, it is possible to determine the level of obstruction. As the analysis of studies has shown, in addition to static, there are also functional ultrasound signs that allow us to clarify the nature of obstruction, namely, to establish the presence of visceroparietal adhesions in the abdominal cavity. In comparison with the x-ray method for obturation small bowel obstruction, transabdominal echography can reveal the nature of changes not only in the lumen of the intestine, but also in the surrounding abdominal tissues, which makes it easier to determine the cause of obstruction. The sensitivity of the method in the diagnosis of mechanical small bowel obstruction was 97.3% in our studies.

3. Results

Obturation small bowel obstruction was caused by the presence of a mechanical obstacle to the movement of intestinal contents and was observed in 27 patients. In these patients, during primary ultrasound, heterogeneous liquid contents were more often observed due to intracavitary fluid deposition, impaired peristalsis in the form of its amplification and, especially, active antiperistalsis and segmental expansion of the intestine. As the condition worsened, the contents

became more uniform, acquired a mushy character, and then, as the intestinal obstruction progressed, there was a decrease in the echogenicity of the contents up to anechogenicity. This period was usually combined with a decrease in the intensity of contractile movements of the intestinal wall due to an antiperistaltic pause. In addition, attention was paid to the condition of the Kerkring folds: when the obstruction was localized within the jejunum, its folds were preserved; when the obstruction was localized within the ileum, the mucosa of the loops of the latter was devoid of folds. The closer to the site



of the obstruction, the more pronounced the thickening of the walls and folds due to edema and fibrin overlay (Fig. 1-2).

Fig. 1. Echogram of a patient with mechanical small bowel obstruction-adhesive process at the level of the proximal parts of the ileum. During longitudinal scanning at the level of the jejunum, intraluminal fluid deposition,



expansion of the lumen of the small intestine, and thickening of the folds are noted.

Fig. 2. The same patient. Cross-scan

The determination of visceroparietal junctions in the abdominal cavity was based on the presence of intestinal loops fixed to the anterior abdominal wall, which are not displaced relative to it during active respiratory movements, as well as on sharp changes in the diameter of intestinal loops. With adhesive obstruction in the patient's side position, fixation of the loops of the small intestine and their fusion were found. Moreover, a thorough examination of the bowel loops revealed the difference in bowel diameters, as well as the place of compression of the expanded loops of the sleeping "tangle" and, as a result, more accurately state the presence of the level of obturation obstruction (Fig. 3).



Fig. 3. Echogram of the same patient. Expanded loops of the small intestine compress the collapsed loops of the ileum located distal to the site of obstruction.

Our experience has shown that the use of ultrasound in the diagnosis of acute small bowel obstruction is justified from a tactical point of view, since it is not delayed in time, does not weigh down the patient's condition, has sufficient information and does not carry radiation load. Due to its safety and ease of use, this technique can be used repeatedly in the process of conservative treatment to determine further treatment tactics.

4. Conclusions

1. Determination of early ULTRASOUND signs of OTN with a disease duration of up to 6-8 hours allows you to determine not only the presence of OCN, but also to assess in detail the state of the intestinal wall, the nature of peristalsis, which contributes to the effective diagnosis of acute small bowel obstruction.

2. the Main ULTRASOUND criteria for mechanical intestinal obstruction are: uneven expansion of the loops of the small intestine, the difference in the diameter of the small intestine and the presence of a collapsed loop, pendulum-like peristalsis not associated with breathing, visceroparietal and viscerovisceral junctions.

3. Determination of visceroparietal and viscerovisceral junctions during ultrasound examination allows us to assess the presence of adhesions.

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