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Acute Adhesive Obstruction at The Present Stage: Possibilities of Laparoscopy in Diagnosis and Treatment (Literature Review)

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Abstract: Acute adhesive intestinal obstruction is one of the most urgent and finally unresolved problems of modern abdominal surgery. This is characterized by an increasing number of this complication, high mortality, and many difficulties in its diagnosis and treatment. The paper outlines the etiology, epidemiology, differential diagnosis of acute adhesive obstruction, as well as the modern principles of diagnosis and surgical treatment of this disease.

Keywords: intestinal obstruction, laparotomy, diagnostic laparoscopy, CT.

One of the most formidable and difficult both in diagnostic terms and in clinical manifestations among postoperative complications is acute adhesive intestinal obstruction (AAIO), which develops in 0.5-8% of operated patients. And among all the complications for which relaparotomy was performed, it is 8-14% [1, 2]. The incidence of AAIO ranges from 58 to 96% of all forms of mechanical obstruction of non-tumor etiology and 12-30% of the total number of all postoperative complications. The mortality rate for this complication is 17-55%, and can reach 75% in patients over 60 years of age with significantly pronounced concomitant pathology [3, 4].

According to a retrospective analysis of studies by S. Sajja et al., the recurrent course of this complication in the form of acute adhesive small-bowel obstruction in postoperative for adhesive small-bowel obstruction, where the proportion of recurrence for patients who had at least once suffered small-bowel obstruction after 12 years was 23%, after 32 years - 35% [5]. Surgical treatment certainly reduces the risk of developing repeated episodes of AAIO, but not the risk of repeated surgical interventions.

According to many authors, the total percentage of relapses due to AAIO is 20-54%. R. Stewart et al. postoperative intestinal obstruction was noted as persistent dilation of the intestine and constipation [6].

AAIO is divided into early, which occurs during the first 30 days after surgery, and late AAIO, which develops after 30 days [7, 8, 9].

This is due to the fact that these terms correspond to the completion of the process of adhesions in the abdominal cavity. Adhesions can form after any intraoperative violation of the integrity of the peritoneum or as a result of contamination and infection of the peritoneum. These factors lead to the progression of the inflammatory reaction with the activation of the complement system and the coagulation cascade, supplemented by exudation of a fibrinogen-rich secretion. Thanks to thrombin, fibrinogen turns into fibrin, which attaches to damaged surfaces. If fibrin does not degrade at this stage, then the accumulation of the developed matrix by fibroblasts and intensive formation of collagen begins, which leads to the formation of fibrinous adhesions into fibrin. If fibrin is degraded to the end, fibrinous adhesions begin to dissolve and the mesothelium is completely regenerated. However, a violation of the integrity of the peritoneum caused by surgery or peritonitis reduces fibrinolytic activity. This early balance between the occurrence and degradation of fibrin in the abdominal cavity during and after surgery is, apparently, the main factor determining the development of postoperative adhesions [10, 11].

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Differential diagnosis

In the early postoperative period, AAIO should be particularly distinguished from postoperative intestinal paresis and functional, paralytic intestinal obstruction, as well as acute intestinal postoperative obstruction caused by other causes [12]. Many patients after surgical interventions on the abdominal cavity have signs of postoperative intestinal paresis, the duration of which depends on several factors: the duration and volume of surgical intervention, the underlying disease for which the operation was performed, the general condition of the patient and his concomitant diseases, existing and acquired water-electrolyte disorders, the presence and severity of complications. The function of the small intestine is restored a few hours after surgery, after a while the peristalsis of the stomach begins to function; and the motility of the colon is activated 48-72 hours after surgery.

According to S. Sajta et al., a triad of symptoms is typical for AAIO: cramping abdominal pain, vomiting and complete absence of defecation on the background of flatulence [13]. In this regard, in the case of early postoperative adhesive intestinal obstruction, a so-called "light gap" occurs, which lasts 2-3 days after surgery. And with intestinal paresis and dynamic acute intestinal obstruction, there is no "light gap".

E. Friberg et al. considered it permissible to diagnose postoperative adhesive intestinal obstruction in the presence of at least one of the 4 standard clinical signs of intestinal obstruction (abdominal pain, bloating, constipation, vomiting), confirmed by X-ray examination [14].

According to K. Siporin et al., with a retrospective analysis of the medical histories of 1475 patients after surgery on the abdominal aorta, the incidence of the disease was 3% [15].

A distinctive feature of acute early adhesive intestinal obstruction is that it can form at any time of the early postoperative period, characterized by significant variability of clinical symptom complexes.

According to most authors, the most common period of development of acute early adhesive intestinal obstruction is 3-8 days from the initial surgery. And 2-5 days are considered the most dangerous periods for the manifestation of postoperative complications and the development of AAIO. Only with active dynamic observation of the patient, it is possible to identify a clinic that is not characteristic of the usual, uncomplicated course of the postoperative period. The lack of sufficiently reliable criteria and methods for diagnosing acute adhesive intestinal obstruction in the early postoperative period often leads to repeated surgery at a later date or, conversely, to unnecessary relaparotomy [16, 17].

According to the world literature, in these postoperative periods, early dynamic intestinal obstruction can occur in 60-80% of patients who have undergone surgery, and requires differential diagnosis with acute early adhesive intestinal obstruction. Among the main causes of dynamic obstruction, peritonitis occupies a leading place – 19-21%, and is most often manifested by a combination of several causes - 31-33% (functional inferiority of the intestine, hemoperitoneum, hematomas, inadequate decompression or early removal of decompression, intestinal eventration, etc.) [18].

In patients who have undergone surgery for AAIO, the cause of intestinal obstruction may be undiagnosed or not eliminated during the primary operation, which may lead to recurrent intestinal obstruction. Phytobezoars of the small intestine that cause intestinal obstruction are often of a multiple nature: undiscovered, thereby not eliminated bezoars can cause relapses of intestinal obstruction requiring repeated surgical intervention [19]. Similar conditions can be carried out with operations for gallstone intestinal obstruction, in which unnoticed intracellular stones or the repeated passage of a stone into the intestine through a vesico-small intestinal fistula can lead to early postoperative intestinal obstruction [20].

During operations performed for inflammatory diseases of the abdominal cavity in an emergency, a local inflammatory reaction occurs in the form of an intraabdominal abscess or phlegmon, which can lead to fixation of the loops of the small intestine between themselves and with the walls of the abdominal cavity, which leads to the development of inflammatory conglomerates and small intestinal obstruction. According to Quatromoni JC et al., such "septic" or "inflammatory" adhesions were the cause of early postoperative small bowel obstruction in 3 cases out of 41 operated [21]. In another study, intraabdominal abscess was observed in 12 out of 26 patients with early postoperative small bowel obstruction. However, in such cases it is difficult to determine whether the obstruction was mechanical or paralytic [22].

Other rare causes of acute early postoperative small bowel obstruction include intramural hematoma and intramural hematoma of the small intestine. There are even descriptions of invagination of the stump of the appendix after appendectomy [23].

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Also, a significant number of various complications in intestinal anastomoses, including strictures of the anastomosis due to its edema or leakiness, can lead to early postoperative small intestinal obstruction. Delimited swelling due to focal leakiness of the anastomosis, which leads to the occurrence of local phlegmonous inflammation, is often the cause of these conditions, but is rarely diagnosed [24].

Risk factors for the development of AAIO

The frequency of the development of AAIO depends on the urgency of the primary operation, the volume of the surgical intervention, the traumatic nature of the access and the disease for which it was performed.

This complication most often occurred after operations for atherosclerosis of the abdominal aorta and its branches (24%). In second place are patients who have undergone surgery related to acute intestinal obstruction (14%). It is observed somewhat less frequently in patients operated on due to closed trauma and penetrating wounds of the abdominal cavity (9%) [25].

According to many studies, the type of previous surgery performed due to the underlying disease also significantly affects the incidence of AAIO. Thus, it most often develops after operations on the intestine (30%), often the complication develops after appendectomies (17.9%) and surgical interventions on the biliary tract (15%).

It should also be noted that AAIO develops more often after urgent operations (69%) compared to planned. AAIO occurs more often (3-18%) after operations performed by laparotomic access compared to laparoscopic, which make up 0.04-1.6% of observations [26, 27].

According to V.V. Rybachkov et al. postoperative ileus in 125 patients often developed after appendectomy (22.0%), suturing of wounds of hollow and parenchymal organs (18.1%), dissection of adhesions (13.3%) and gastric resection (12.2%) [28].

The low-traumatic nature of laparoscopic interventions in planned and emergency surgery of the abdominal cavity in the form of a decrease in the development of the adhesive process in the abdominal cavity and postoperative complications have been proven by numerous publications [29]. A multicenter study conducted in France describes the prevalence of small bowel obstruction after laparoscopic surgery at 0.2%, with early postoperative adhesive intestinal obstruction accounting for up to 87% of all episodes of obstruction. Cholecystectomy, hernia repair and appendectomy were the most common causes of acute intestinal obstruction. In half of the cases, spikes were the cause of the obstruction [30].

Clinical symptoms of the course of the disease

The clinical symptoms of early AAIO differ from late AAIO and have their own peculiarities of manifestation, especially on the 3rd-7th day of the early postoperative period. At this stage, it is necessary to make a differential diagnosis with paresis of the gastrointestinal tract, paralytic small bowel obstruction and other causes of mechanical obstruction of the small intestine. The diagnosis of AAIO is usually established belatedly, or the clinical picture is interpreted as postoperative intestinal paresis. For mechanical small bowel obstruction in the later postoperative period, a triad of symptoms is typical in the form of cramping abdominal pain, vomiting and complete absence of stool on the background of abdominal distension, since for early AAIO in the early postoperative period, a smoothed clinical picture is more characteristic, "blurred" due to the dynamic component of obstruction, pain in the area of postoperative wounds and analgesic therapy. One can give an example of a study in which only 15 out of 26 patients had complaints of abdominal pain [31]. Vomiting was described by researchers with a frequency of 82% and 20 out of 26 cases, but it was absent in cases where there was a previously installed nasogastric probe. The complete absence of a stool is also uncharacteristic: patients often have scant gases, and sometimes there is a stool, which does not exclude early postoperative small bowel obstruction at all [32, 33]. Bloating is the only clinical sign consistently described as associated with early AAIO, which corresponds to the frequency of occurrence in 76-81% [34]. Although against the background of cramping pains, the auscultative picture of the "impassable" intestine makes one suspect a small intestinal obstruction, it is extremely difficult to differentiate it with high-frequency ringing sounds and uncoordinated elements of the normal sound pattern characteristic of postoperative intestinal paresis. Some authors believe that the operation is advisable in the presence of two or more of the above-

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mentioned signs; 20 out of 26 patients with three or four signs clearly needed surgical treatment for persistent early AAIO [35].

V.V. Rybachkov et al. this is how the clinical symptoms of early AAIO were characterized – the features of the clinical picture are a decrease in the frequency and a change in the nature of pain syndrome, the appearance of symptoms of peritoneal irritation, recurrent intestinal paresis, a decrease in the frequency of dyspeptic disorders, pronounced tachycardia against the background of the absence of a temperature reaction and an imbalance of homeostasis indicators [36].

Analyzing the clinical symptoms according to the literature, it can be concluded that early AAIO has an erased clinical picture of small bowel obstruction, which differs from late AAIO. It can manifest itself in a variety of symptoms characteristic of numerous postoperative complications that occur in the early postoperative period. The features of the clinical picture are due to the development of complications against the background of postoperative trauma, the use of various medications, the progression of the underlying disease and concomitant pathology. All this requires a thorough assessment of the clinical picture of the disease in dynamics and the use of modern instrumental research methods.

Diagnosis of AAIO

More often, obstruction is diagnosed in cases when the patient has already started to exhaust gases or had a stool, but then these phenomena stopped. However, patients often experience spontaneous improvement without an identified cause. If this does not happen, it is necessary to perform instrumental studies of the abdominal cavity to identify the nature of the pathology and plan a therapeutic and diagnostic program. To date, there are many diagnostic methods in the early postoperative period: laboratory tests, radiation, ultrasound and endoscopic methods. However, their use in practice is not always possible due to the complexity of application in severe resuscitation patients or the low information content of the methods [37].

Overview radiography of the abdominal cavity in the standing and supine position is usually the first radiographic examination method prescribed to patients with signs of AAIO or prolonged postoperative intestinal paresis. Stretched loops of the small intestine with fluid levels and scanty volumes of gas content in the colon allow you to suspect AAIO. However, the interpretation of the survey images is difficult, and postoperative paresis and AAIO can be manifested by stretching the loops of the small intestine and gas in the colon. The clinical reliability of the survey radiography data ranges from 19 to 73% [38, 39]. Radiopaque studies of the upper gastrointestinal tract are also used quite often. If the contrast administered orally does not reach the colon, this confirms the assumption of the AAIO, but the opposite is not necessarily true, the contrast may well reach the colon in patients with obstruction, including those who require surgical treatment for this reason. In one of the studies, the radiopaque method made it possible to localize the obstruction area in 72% of patients. While radiologists usually use barium because of its excellent radiopaque characteristics, clinicians prefer water-soluble contrast forms, since barium tends to stagnate in the impassable parts of the small intestine, which complicates subsequent CT examination [40].

In cases where the clinical picture makes one suspect the infectious or septic nature of paresis or AAIO, the use of abdominal CT with gastro-decanter contrast is indicated in order to clarify the therapeutic and diagnostic program. CT with oral contrast makes it possible to differentiate postoperative paresis from AAIO with sensitivity and specificity of 100%, compared with 19 and 100% for clinical examination with review radiography. CT has another advantage – the ability to visualize intraabdominal causes of paresis or AAIO, such as abscess, perianastomotic phlegmon or leaky anastomosis, hematoma, pancreatitis or non-calculous cholecystitis. It also allows you to identify other causes of AAIO, such as the divergence of the sutures of aponeurosis, external or internal hernias [41].

A number of authors believe that ultrasound is the most effective way to diagnose intestinal obstruction, which in the future will completely replace the traditional X-ray examination. In contrast to this opinion, E.A. Beresneva et al., analyzing the results of using different radiation methods for acute intestinal obstruction (X-ray, ultrasound, radioisotope), came to the conclusion that none of them is absolute. Sonography has an advantage in the early stages of the disease, while X-ray examination is more effective in the later stages of obstruction. The greatest diagnostic efficiency (90.3-97.8%) is possible only when they are used together. The ultrasound method allows not only to state the AAIO, but also to more reliably determine the level, cause, form of obstruction, functional state and signs of impaired intestinal blood supply [42].

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S. Suri et al. showed that with ultrasound, the sensitivity of the study was 83%, specificity 100%, accuracy 84%, while with the X-ray method these indicators are significantly lower: 77, 50, 70%, respectively [43].

Most authors, in order to successfully diagnose AAIO, use a comprehensive diagnosis of this disease with an assessment of the dynamics of the clinical picture, homeostasis indicators, X-ray and ultrasound data, and necessarily use diagnostic laparoscopy as the final diagnostic method. [44, 45, 46].

Diagnostic laparoscopy

Some domestic and foreign authors have proved the safety and effectiveness of laparoscopy in the diagnosis of complications in patients in the early postoperative period with a diagnostic accuracy of the method from 82 to 100% [47, 48, 49]. Diagnostic laparoscopy for postoperative ileus consisted of three stages: overview laparoscopy, differential diagnosis of postoperative obstruction (paralytic or mechanical), carrying out a detailed revision of the abdominal cavity. During the revision, the following tasks were solved: the safety of abdominal puncture and the absence of traumatic injuries to organs and tissues were evaluated; the presence of postoperative passage disorders along the gastrointestinal tract was confirmed; the presence of signs of diseases, primarily peritonitis, which could be the cause of postoperative ileus was determined; the possibility of further laparoscopic revision of the abdominal cavity was determined. According to their data, the effectiveness of laparoscopy in postoperative intestinal obstruction reached 100%.

Conclusions

Thus, despite numerous publications devoted to the successful use of modern non-invasive instrumental methods (X-ray, ultrasound, CT) in the diagnosis of late AAIO, even when they are used together, they cannot always answer all the questions of interest to specialists, especially in the diagnosis of early AAIO. There is still a certain percentage of diagnostic errors and inaccuracies that can lead away from choosing the right treatment tactics, which leads to a deterioration in the results of treatment of this complex and severe category of patients. Diagnostic algorithms that are used in foreign clinics may not always correspond and be used in Uzbek healthcare due to the peculiarities of domestic medicine in the field of equipment of emergency surgical hospitals. Therefore, the search for diagnostic methods of AAIO remains relevant at the present stage of medical development.

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