OPTIMIZATION OF THE DIAGNOSTIC AND TREATMENT ALGORITHM FOR ACUTE ADHESIVE SMALL BOWEL OBSTRUCTION

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https://doi.org/10.5281/zenodo.19092616

Abstract: Acute adhesive small bowel obstruction (ASBO) remains one of the most common causes of emergency hospitalization in abdominal surgery and is characterized by a high risk of intestinal ischemia and postoperative complications. To evaluate the effectiveness of an optimized diagnostic and treatment algorithm in patients with ASBO. An analysis of treatment outcomes for patients with ASBO was conducted, including clinical assessment, laboratory parameters, instrumental methods (X-ray, ultrasound, CT as indicated), and dynamic observation during the first hours of hospitalization. Criteria for selecting a conservative approach and indications for early surgical intervention were developed. Application of the algorithm has improved the accuracy of early detection of complicated forms of obstruction, reduced the time to surgical decision-making, and reduced the incidence of postoperative complications. The optimized algorithm enables a rational choice of treatment tactics and contributes to improved clinical outcomes in patients with ASBO.

Keywords: acute adhesive small intestinal obstruction; adhesive disease; intestinal ischemia; diagnostics; treatment algorithm; conservative therapy; surgical tactics.

O‘TKIR BITISHMALI INGICHKA ICHAK TUTILISHIDA TASHXIS VA DAVOLASH ALGORITMINI OPTIMALLASHTIRISH

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Annotatsiya: O‘tkir bitishmali ingichka ichak tutilishi (O‘BIIT) abdominal xirurgiyada shoshilinch gospitalizatsiyalarning eng ko‘p uchraydigan sabablaridan biri bo‘lib qolaveradi hamda ichak ishemiyasi va operatsiyadan keyingi asoratlarning yuqori xavfi bilan tavsiflanadi. Maqsad: O‘BIIT bo‘lgan bemorlarda optimallashtirilgan tashxis va davolash algoritmining samaradorligini baholash. Usullar: O‘BIIT bilan og‘rigan bemorlarni davolash natijalari tahlil qilindi. Tadqiqot klinik baholash, laborator ko‘rsatkichlar, instrumental usullar (rentgenografiya, UTT, ko‘rsatmalarga ko‘ra KT) va gospitalizatsiyaning dastlabki soatlarida dinamik kuzatuvni o‘z ichiga oldi. Konservativ taktikani tanlash mezonlari va erta jarrohlik amaliyotiga ko‘rsatmalar ishlab chiqildi. Natijalar: Algoritmning qo‘llanilishi ichak tutilishining asoratlangan shakllarini erta aniqlash aniqligini oshirish, operatsiya to‘g‘risida qaror qabul qilish muddatlarini qisqartirish va operatsiyadan keyingi asoratlar chastotasini kamaytirish imkonini berdi. Xulosa: Optimallashtirilgan algoritm davolash taktikasini oqilona tanlashni ta’minlaydi va O‘BIIT bo‘lgan bemorlarda klinik natijalarning yaxshilanishiga yordam beradi.

Kalit so‘zlar: o‘tkir bitishmali ingichka ichak tutilishi; bitishma kasalligi; ichak ishemiyasi; tashxis; davolash algoritmi; konservativ terapiya; xirurgik taktika.

ОПТИМИЗАЦИЯ ДИАГНОСТИКО-ЛЕЧЕБНОГО АЛГОРИТМА ПРИ ОСТРОЙ СПАЕЧНОЙ ТОНКОКИШЕЧНОЙ НЕПРОХОДИМОСТИ

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Аннотация: Острая спаечная тонкокишечная непроходимость (ОСТКН) остаётся одной из наиболее частых причин экстренных госпитализаций в абдоминальной хирургии и характеризуется высоким риском ишемии кишечника и послеоперационных осложнений. Оценить эффективность оптимизированного диагностико-лечебного алгоритма у пациентов с ОСТКН. Проведён анализ результатов лечения пациентов с ОСТКН, включающий клиническую оценку, лабораторные показатели, инструментальные методы (рентгенография, УЗИ, КТ по показаниям) и динамическое наблюдение в первые часы госпитализации. Разработаны критерии выбора консервативной тактики и показания к раннему хирургическому вмешательству. Применение алгоритма позволило повысить точность раннего выявления осложнённых форм непроходимости, сократить сроки принятия решения об операции и снизить частоту послеоперационных осложнений. Оптимизированный алгоритм обеспечивает рациональный выбор тактики лечения и способствует улучшению клинических исходов у пациентов с ОСТКН.

Ключевые слова: острая спаечная тонкокишечная непроходимость; спаечная болезнь; кишечная ишемия; диагностика; алгоритм лечения; консервативная терапия; хирургическая тактика.

INTRODUCTION

Acute adhesive small bowel obstruction (ASBO) is rightfully considered one of the most complex and socially significant problems in modern abdominal surgery. Despite significant advances in surgical techniques, anesthesia, and intensive care, this condition remains a leading cause of emergency abdominal surgery, with a high rate of complications, recurrences, and mortality.

The relevance of studying OSTKO is primarily due to the steady increase in the number of patients with abdominal adhesive disease, which is directly related to the increasing volume of surgical interventions on the abdominal and pelvic organs. Postoperative adhesions develop in a significant proportion of patients undergoing surgery and often lead to intestinal obstruction, requiring immediate hospitalization and emergency surgery. Moreover, the mortality rate for complicated forms of OSTKO remains high, and the economic burden on the healthcare system remains significant.

The difficulty in early diagnosis of acute adhesive small bowel obstruction presents a significant clinical challenge. The initial stages of the disease often present with an insidious or atypical clinical picture, and ischemic changes in the intestinal wall may remain undiagnosed for a long time. This leads to delayed treatment decisions and an increased incidence of intestinal necrosis, peritonitis, and other life-threatening complications. In emergency surgery, the issue of timely determination of indications for surgical intervention and the optimal duration of conservative treatment is particularly pressing.

An equally important problem is the high recurrence rate of acute adhesive obstruction. Accumulated data indicate that even successful surgical intervention does not guarantee long-term

disease remission. Recurrences of acute adhesive obstruction occur in a significant proportion of patients at late stages, calling into question the effectiveness of traditional treatment approaches and highlighting the need to find new, pathogenetically proven methods of diagnosis, treatment, and prevention.

Acute adhesive small bowel obstruction is a significant problem among acute abdominal surgical pathologies. Among patients hospitalized with mechanical intestinal obstruction, acute small bowel obstruction accounts for up to 80% of cases. Despite advances in surgical practice, the mortality rate for this condition remains significant, ranging from 5.1% to 8.4%. Improvements in diagnostics, anesthesiology, and surgical techniques used in abdominal and pelvic surgeries have led to an increase in the volume of surgical procedures. Consequently, there has been an increase in the incidence of connective tissue adhesions. This, in turn, contributes to an increase in the number of patients seeking medical care in surgical departments with complications caused by adhesions.

Postoperative adhesions are a common problem in abdominal and pelvic surgery, occurring in a significant percentage of patients. As a result of adhesion formation, 70% of patients develop small bowel obstruction, requiring emergency hospitalization in a surgical department. These situations are often associated with a mortality rate of 10%.

Diagnosis of OSTKO in its early stages is often difficult and delayed. Although history taking and clinical examination are mandatory steps, the use of laboratory and instrumental diagnostic methods is limited due to the high risk of complications associated with ischemic changes. These changes may remain undetected or manifest as mild clinical symptoms. OSTKO is characterized by a tendency to recur, making surgical intervention ineffective for complete cure. Studies show that, regardless of surgery or not, 27% of patients experienced a relapse after 5 years. Notably, this rate was independent of the number of previous hospitalizations. A review of the existing literature reveals significant discrepancies in approaches to the diagnosis and treatment of OSTKO. There are disagreements regarding timeframes, criteria, and optimal treatment methods, even despite active research in this area, both in Uzbekistan and abroad.

In 2024, hospitals in Uzbekistan admitted more than 50,000 people diagnosed with non-tumor-related intestinal obstruction. Of these, approximately 30,000 patients underwent surgery, with an in-hospital mortality rate of approximately 6%. Among patients seeking surgical treatment with abdominal pain, 15% had mechanical intestinal obstruction. Approximately 56% of these patients suffered from acute small bowel obstruction (ASBO), which entails annual medical costs of over $3 billion. Research shows that small bowel obstruction accounts for 12-16% of all emergency surgical hospitalizations and 20% of emergency surgeries. According to statistics presented by the International Society for the Study of Adhesions, 1% to 2% of patients who undergo surgery require repeat surgery within a year. Moreover, in half to three-quarters of cases, readmission is due to complications related to adhesion formation. According to a study conducted by the World Society of Emergency Surgery, surgical treatment of acute bowel obstruction (ASBO) entails an average hospital stay of 16 days. With a conservative approach, the hospital stay is significantly shorter – approximately five days. In terms of financial burden, in 2016, surgical treatment of ASBO cost €16,305 per patient, while conservative treatment cost €2,227.

Diagnosis of OSTKO in the early stages is often difficult and delayed. Despite a thorough history and clinical examination, limited time and opportunities for laboratory and instrumental testing are associated with the high risk of complications associated with ischemic changes, which may remain undetected or present with minimal clinical symptoms.

OSA is characterized by a tendency to relapse, which calls into question the effectiveness of surgery as a sole treatment. Studies show that surgery does not provide sustained remission, as the likelihood of disease recurrence after 5 years remains high in both patients who underwent surgery (27%) and those who did not undergo surgery (34%). Importantly, this rate is independent of the number of previous hospitalizations.

A review of the existing literature reveals significant discrepancies in approaches to the diagnosis and treatment of AST. Differences are observed in the timeframes, diagnostic criteria, and choice of therapeutic strategies, even in the presence of active scientific research in this area. These discrepancies affect both domestic and international clinical guidelines.

The development of OSTKO is primarily caused by the formation of adhesions following previous surgical interventions. Therefore, the search for non-surgical treatment methods that involve a differentiated approach to patients at the diagnostic stage is increasingly important. It is important to evaluate the effectiveness of conservative therapy, taking into account the timeframe and specific features of the previous surgery.

Despite the extensive scientific literature devoted to this topic, the relevance of OSTKO in modern healthcare is obvious. The scientific community continues to debate the best approaches to diagnosis, the optimal duration of conservative treatment, and the criteria for evaluating its effectiveness. The choice of surgical approach and the extent of intervention remain open. In an effort to minimize the incidence of OSTKO recurrence, surgeons worldwide are seeking new, more advanced treatment and diagnostic approaches. The primary goal of these approaches is to resolve the bowel obstruction episode as gently as possible and improve treatment effectiveness.

MATERIALS AND METHODS

Study design. A clinical comparative study was conducted to evaluate the diagnostic and treatment outcomes of patients with acute adhesive small bowel obstruction (ASBO) treated from 2016 to 2024. The study included 140 patients with confirmed ASBO.

Inclusion criteria: clinical picture of mechanical small bowel obstruction, history of surgical interventions, confirmation of adhesion genesis based on radiological diagnostics and/or intraoperative data.

Exclusion criteria: tumor obstruction, strangulated hernias, intussusception, inflammatory bowel disease, severe decompensation of somatic pathology requiring specialized management.

Comparison groups. Patients were divided into two groups based on the treatment strategy used. The study group consisted of 65 patients who underwent an optimized treatment strategy using videolaparoscopic and laparoscopic-assisted procedures. The control group consisted of 75 patients who underwent traditional laparotomy.

Table 1. Time of admission of patients with OSTKN to hospital (n=140)

Group of patients	Hospitalization time			
	up to 6 hours	7-12 hours	13-24 hours	>24 hours
Main (n=65)	14 (10.0%)	18 (12.9%)	17 (12.1%)	16 (11.4%)
Control (n=75)	16 (11.4%)	21 (15.0%)	24 (17.1%)	14 (10.0%)
r	>0.05	>0.05	>0.05	>0.05
Total (n=140)	30 (21.4%)	39 (27.9%)	41 (29.3%)	30 (21.4%)

Note: p – statistical significance of the difference in indicators between groups (according to the $\chi 2$ criterion)

According to Table 1, 21.4% of patients were hospitalized within the first six hours, 27.9% between 7 and 12 hours, and 29.3% between 13 and 24 hours. As a result, 78.6% of all patients admitted to the clinic spent less than 24 hours there. The remaining 21.4% sought medical care more than 24 hours after illness onset.

In 94.3% of cases of acute intestinal compression syndrome (AICS), the disease was caused by various open abdominal surgeries. In the remaining 5.7% of cases, AICS developed for the first time, without prior surgery.

Diagnostic methods. All patients underwent a clinical examination, including assessment of hemodynamics, severity of intoxication, and signs of peritonitis. Radiographic diagnostics included plain abdominal radiography, which was performed in all 140 patients (100%). Radiographic evidence of small bowel obstruction, such as Kloiber cups, was detected in 117 (83.6%) patients.

Table 2. Distribution of patients with OSTKN depending on the nature of adhesion distribution (n=140)

The extent of the adhesion process	Main group		Control group		r
	abs.	%	abs.	%	
Single (limited)	37	26.5	43	30.6	>0.05
Multiple (common)	28	20.0	32	22.9	>0.05
Total	65	46.5	75	53.5	>0.05

Note: p – statistical significance of the difference in indicators between groups (according to the $\chi 2$ criterion)

In both groups, consisting of 140 patients who underwent surgery, single (local) adhesions were detected in 80 patients (57.1% of the total), and multiple (diffuse) adhesions were diagnosed in 60 patients (42.9%).

A review of the data revealed that 39 (27.9%) patients in the study group and 32.1% of patients in the control group were diagnosed with SIBO without developing small intestinal necrosis. Overall, SIBO with the complication of small intestinal necrosis was observed in 40% of patients in both groups (18.6% in the study group and 21.4% in the control group).

According to indications, ultrasound examination and multispiral CT were performed (in the presence of clinical uncertainty and suspicion of complicated forms).

Laboratory and specialized tests. In addition to standard blood tests, markers of endogenous intoxication and oxidative stress, cytokine status indicators, and serotonin levels were assessed. The data obtained were compared with the severity of clinical manifestations and the severity of TSKI.

Treatment strategy. All patients received basic intensive care upon admission: gastric decompression, fluid resuscitation, correction of fluid and electrolyte imbalances, and antibiotic prophylaxis as indicated. Conservative therapy was used in patients without signs of peritonitis or intestinal ischemia, with mandatory dynamic assessment of its effectiveness during the first hours of hospitalization.

In the absence of effect from conservative therapy, as well as in the presence of clinical and instrumental signs of complicated OSTKN, surgical intervention was performed.

Outcome assessment. The time to recovery of intestinal motility, the incidence of early postoperative complications, the length of hospital stay, repeat interventions, and mortality were analyzed. The Clavien-Dindo classification (2009) was used to assess complications.

Statistical analysis. Quantitative indicators are presented as mean ± standard deviation. Nonparametric tests (Mann–Whitney U test) were used to compare groups; differences were considered significant at $p < 0.05$.

RESULTS

Plain radiography was performed in all patients and revealed signs of OSTCH in 83.6% of cases (Kloiber cups).

In patients who received the optimized strategy, an improvement in the motor-evacuation function of the intestine was noted according to laboratory and ultrasound parameters.

In the main group, minimally invasive interventions were performed in 65 patients: videolaparoscopic adhesiolysis - 39 (60.0%); laparoscopically assisted adhesiolysis + bowel resection - 17 (26.1%); diagnostic laparoscopy with conversion to laparotomy - 9 (13.9%); In the control group, 75 patients underwent laparotomy: adhesiolysis + drainage - 39 (52%), adhesiolysis + bowel resection with anastomosis - 36 (48%)

In patients with OSTKN, severe disturbances in the body lead to significant changes in blood biochemistry. The intensity of these changes usually correlates with the duration of the disease and the presence of complications. Among the complications, intestinal wall necrosis and the development of peritonitis are the most serious (Table 3).

Table 3. Results of biochemical blood tests in patients with OSTKN

Criteria	Norm (n=30)	OSCI without small intestinal necrosis (n=75)	OSCI with small intestinal necrosis (n=65)	r
Total protein, g/l	62.5±4.5	58.1±3.3	54.2±3.6**	>0.05
Urea, mmol/l	7.2±0.8	9.6±0.8**	12.9±0.8***	<0.001
Creatinine, mmol/l	85.5±5.8	97.7±5.8*	119.9±11.0***	<0.001

Note: p – statistical significance of the difference in indicators between groups; *p<0.05, **p<0.05, ***p<0.001 – when compared with the norm (according to the Mann-Whitney U-test)

In patients with OSTKN, especially in cases where necrotic changes in the intestinal wall are observed, total protein levels decrease to 54.2±3.3 g/L. This phenomenon is due to the suppression of protein metabolism, which is exacerbated by intestinal wall necrosis. As a result, blood urea concentrations increase (to 12.9±0.8 mmol/L) and creatinine (to 119.9±11.0 μmol/L).

DISCUSSION

In patients with OSTKN and OSTKN accompanied by intestinal necrosis and peritonitis, marked abnormalities in blood electrolyte levels were observed, as shown in (Table 4).

Table 4. Some indicators of electrolytes in blood plasma in patients with OSTKN

Criteria	Norm (n=30)	OSCI without small intestinal necrosis (n=75)	OSCI with small intestinal necrosis (n=65)	r
Potassium (μmol/L)	4.20±0.03	3.21±0.04*	2.76±0.05*	<0.001
Sodium (μmol/L)	138.3±10.2	132.1±11.0	125.4±9.8	>0.05

Calcium (μmol/L)	2.27±0.06	1.72±0.06*	1.4±0.06*	<0.001

Note: p – statistical significance of the difference in indicators between groups; *p<0.001 – when compared with the norm (according to the Mann-Whitney U-test)

It is important to emphasize that in all cases of OSTKN, regardless of the presence of intestinal necrosis, a decrease in blood electrolyte concentrations was observed. This decrease is primarily due to increased electrolyte loss through vomit and into the lumen of the pathologically dilated intestine.

CONCLUSION

The study showed that the use of an optimized diagnostic and treatment algorithm for acute adhesive small bowel obstruction improves the accuracy of early detection of complicated forms of the disease and allows for a reasonable differentiation between indications for conservative and surgical treatment. The use of minimally invasive technologies, primarily laparoscopic adhesiolysis, contributes to a reduction in the frequency of unjustified laparotomies, a decrease in postoperative complications, and an acceleration of the restoration of intestinal motor and evacuation function. The implementation of the proposed algorithm improves clinical outcomes and can be recommended for practical application in emergency abdominal surgery.

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