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**KEY MECHANISMS OF THE EMERGENCE OF ACUTE INTESTINAL OBSTRUCTION
AND SELECTION ARGUMENTATION OF THERAPEUTIC AND DIAGNOSTIC
TACTICS (LITERATURE REVIEW)**

**КЛЮЧЕВЫЕ МЕХАНИЗМЫ ВОЗНИКНОВЕНИЯ ОСТРОЙ КИШЕЧНОЙ
НЕПРОХОДИМОСТИ И АРГУМЕНТАЦИЯ ПРИ ВЫБОРЕ ЛЕЧЕБНО-
ДИАГНОСТИЧЕСКОЙ ТАКТИКИ (ОБЗОР ЛИТЕРАТУРЫ)**

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Abstract. In this literature review, the main etiological factors of intestinal obstruction, key aspects of a number of mechanisms of development of intestinal obstruction are considered. The problems of modern diagnostics of acute intestinal obstruction of various genesis are considered, including the erased picture of the disease on the basis of which the optimal therapeutic diagnostic algorithms were formed.

Argumentation of methods of treatment proceeding from pathogenetic features of the given pathology is resulted.

Аннотация. В данном литературном обзоре рассмотрены основные этиологические факторы кишечной непроходимости, ключевые аспекты ряда механизмов развития кишечной непроходимости. Рассматриваются вопросы современной диагностики острой кишечной непроходимости различного генеза, в том числе, при стертой картине заболевания на основании чего были сформированы оптимальные лечебно–диагностические алгоритмы.

Приводится аргументация методов лечения исходя из патогенетических особенностей данной патологии.

Keywords: acute intestinal obstruction.

Ключевые слова: острая кишечная непроходимость.

Acute intestinal obstruction (AIO) is the most formidable complication of both tumor and non-tumor etiology, which occurs in abdominal surgery. The reliability of this judgment is evidenced by constant examples of clinical practice, accompanied by a number of difficulties in the diagnostic and tactical plan.

According to statistics, intestinal obstruction occurs in about 5 cases per 100,000 population. The share of diagnostic errors at the prehospital stage is about 51%, up to 19% in the hospital. The standardized mortality rate for this pathology is about 9–13%, and in severe forms it can reach 50–70%, but at the present time there is a distinct tendency to decrease these values, but in spite of this, the pathology by the number of deaths in absolute figures occupies 1-2 places among all acute conditions in abdominal surgery [14, p. 147].

Currently, for classification of this pathological condition, the most relevant is the morphofunctional classification, according to which the dynamic (functional) and mechanical intestinal obstruction are distinguished according to the mechanism of origin. With dynamic obstruction, the motor function of the intestinal wall is broken without a mechanical obstruction to promote intestinal contents. There are two types of dynamic obstruction: spastic and paralytic [14, p. 145].

With mechanical obstruction there is an occlusion of the intestinal tube at some level, which is the reason for the violation of intestinal transit [1, p. 9].

With strangulation obstruction, the blood circulation of the intestinal tube involved in the pathological process first of all suffers. This is due to the compression of the mesenteric vessels due to infringement, curvature or nodulation, which causes a fairly rapid (within a few hours) development of necrobiotic processes in the intestinal tract. With obstructive intestinal obstruction, the circulatory of the above obstruction (leading) of the gut region is disturbed again due to its overgrowing with intestinal contents. Therefore, with obturation, necrosis of the intestine is possible, but for its development it is necessary not several hours, but several days. Obturation can be caused by malignant and benign tumors, feces and gallstones, foreign bodies, ascarids [15, p. 37].

Mixed forms of mechanical obstruction include invagination, in which the intestinal mesentery is involved in the invaginate [2, p. 45], and the adhesion obstruction, which can occur both according to the strangulation type (compression of the intestine together with the mesentery), and by the type of obturation (kink in the form of a «double-barreled» [3, p. 3]. Diagnostic and therapeutic tactics largely depends on the localization of the obstruction in the intestine, in connection with this, the level of obstruction distinguishes between high (small intestine) and low (colonic) obstruction [6, p. 235]

To date, the features of pathogenetic mechanisms play a decisive role in the choice of treatment tactics. There are more than 20 theories in which the complex of pathophysiological and morphofunctional foundations of this disease is considered [7, p. 40].

Pathogenetic features of the AIO is characterized by severe disorders that determine the severity of the course of this pathological process, and among them, key pathogenesis mechanisms can be identified: humoral disorders, motor and secretory bowel function and endotoxemia [9, p. 35].

At OKH there is a violation of the passage of contents along the digestive tract in the direction from the stomach to the anus, due to a cascade of causes in the basis of which there are violations of a dynamic nature. The intestine is one of the internal organs, the position of which is characterized by relative freedom of movement in the abdominal cavity [10, p. 42], and this feature is due to the constant adaptation of its volume to the intensity of the motor activity to the nature of the contents. The mobility and freedom of movement of segments of the intestine in the abdominal cavity depends on the fixing apparatus. The conditions of adaptation of the intestine are violated when there are changes in the fixing apparatus of congenital or acquired genesis. The complex of these changes constitutes the main predisposing factor for the development of AIO [12, p. 4;].

Most authors believe that a predisposing factor in the development of IPC is increased intra-abdominal pressure (IAP). Elevated IAP is a frequent companion of such a formidable complication as acute peritonitis, with the severity of peritonitis aggravated by the systemic effect of IAP [13, p. 291]. As you know, the amount of pressure measured in the free abdominal cavity, the lumen of the bladder, the stomach cavity or the small intestine is approximately at the same level, given the reliability of the data obtained and the permissible error of measurement, so a deviation from these values leads to a cascade of pathological changes [14, p. 151].

Intestinal pressure increases the fluid and gas, which compress the vessels located in the thickness of the intestinal wall, there is a violation of blood and lymph circulation, resulting in edema and hypoxia of tissues [16, p. 36].

In the works of the last few years, which are devoted to restrictive processes in the intestine, the leading role of the disturbance of humoral factors of nonspecific immunity is noted, while the quantitative and qualitative ratio of immunocompetent cells and their regulatory substances is changing. It is well known that specific immune defense of the digestive tract is realized with the participation of lymphocytes, and in all lymphoid formations of the intestine there are subpopulations of T-lymphocytes that take a direct part in the cellular immune response [17, p. 38]. In the case when there are dysbiotic disorders of the intestinal microbiota, a manifestation of the inflammatory process occurs, and the white blood cells circulating in the blood rush to the lesion with further mobilization of the pool of immune cells [18, p. 45]. The resulting violation of the integrity of the intestinal wall, favors such a phenomenon as the translocation of bacteria [20, p.69].

The possibility of penetration of bacteria is due not only to invasive properties [19, p. 17], but also a decrease in colonization resistance of normal microbiota. Bacteria begin to circulate through the blood and lymph flow into the mesenteric complex of lymph nodes, the liver, spleen, kidneys and systemic bloodstream, and secrete toxins. Toxins begin to be transported by the mechanism of diffuse transport, but they can spread from the intestine and in complexes with chylomicra. In this case, there is a violation of bile acid metabolism, which are natural detoxicants, increases toxin formation in the intestine [21, p.22], in addition, a deficiency of bile acids enhances the penetration of lipopolysaccharides through the wall of the intestinal tube, which ultimately leads to an increase in the phenomena of endotoxemia [23, p.58].

The role of the source of intoxication is determined by: a violation of the barrier function of the intestinal wall due to microcirculatory and hypoxic changes, a violation of the humoral factors of nonspecific immunity, the development of cavitary digestion with the participation of a microbiota, where the final product of metabolism will be unhydrolyzed protein products and biologically active polypeptides [25, p. 228].

Among the immediate causes that can lead to AIO, in the presence of predisposing factors include, first of all, increased motor function of the intestine, associated with increased nutritional load, inflammatory changes in the gastrointestinal tract, drug stimulation, or increased VBD at physical stress [26, p. 957].

With Ileus, the targeted mechanism that inhibits the motor activity of the intestine is the transfer of inhibitory impulses to the smooth muscles of the intestinal wall and to smooth muscle cells of the blood vessels [27, p. 1927].

The main transformations that occur with AIO and affect the motor function of the digestive tube are directly related to the formation of inter-digestive motor activity [28, p. 158]. In the event of an obstacle in the passage of intestinal contents, the spread of the myoelectric complex terminates, and thus initiation takes place [5, p. 67] of the new complex. As a result, peristaltic movements are shortened along the length of the intestinal tube, but acquire a more intense character. Preservation of an obstacle can lead to the appearance of antiperistalsis, since the activation of the parasympathetic nervous system takes place. When hypersympathicotonia appears, suppression of the motor activity of the intestine occurs [18, p.36]. Destructive changes in the walls of the digestive tube with AIO arise due to the factor of ischemia [12, p. 4]. The mechanism of circulatory disorders and ischemic disorders with AIO in most cases have a single similar development scenario, which is directly related to the violation of microcirculation, which eventually leads to circulatory hypoxia of the intestinal wall. With the development of ischemia of the intestinal wall, enterocytes, the main cells of the mucous membrane, are most affected [14, p. 156]. Factors contributing to increased susceptibility of enterocytes to hypoxic damage are: low level of oxygen tension in tissues at the tops of villi due to reverse perfusion of oxygen [15, p. 36] (from tissue to blood) with the development of intestinal ischemia; concentration of active oxidants (xanthine dehydrogenase) in the development of hypoxia of the intestinal wall in the distal half of villi; a violation of the absorption of amino acids, glucose and electrolytes, which are most pronounced in enterocytes [12, p. 4]. The mucous membrane undergoes destructive changes up to the serous layer, this is manifested primarily by leukocyte infiltration. At the initial stages of development of the pathological process [5, p.67] there is edema, which increases the venous stagnation of blood, which leads to the predominance of edematous hemorrhagic and necrotic changes. With the activation of biogenic amines, the blood flow in the vessels of the microcirculatory bed is stopped and progression of ischemic paralysis of precapillary sphincters occurs. [13, p. 291].

Against the background of progressive ischemia, the effects of microbial and tissue endotoxins are attached, which entails necrobiotic changes in the intestinal wall, and then total necrosis of the involved site with perforation and attachment of peritonitis [7, p. 39]. It should be noted that the necrobiotic processes taking place in the intestinal wall develop within 1-2 hours, provided that the venous vessels are compressed, and the arterial blood flow is preserved. In the case when the arterial blood flow is switched off together with the venous blood, necrosis occurs in 4-6 hours. In the pathogenesis of AIO, one of the key places is occupied by membrane-destabilizing phenomena in the cellular structures of the intestinal wall, leading to the syndrome of enteral insufficiency. The development of enteral insufficiency, reflecting the severity of the pathological

process, is one of the main manifestations of multi-organ failure, which, in turn, is the universal clinical and physiological basis of any critical condition. The process of its formation does not depend on the etiology of the critical state and is not specific. Early diagnosis of OCS, is one of the pre-decisive measures to achieve success in the treatment of this serious disease.

For the AIO, the staging is typical with a definite clinical picture, which was repeatedly emphasized by many authors. The duration of the initial stage varies from 2 to 12 hours and is accompanied by a marked pain syndrome. The second - an intermediate stage, which is based on ischemic disorders with a progressive disorder of intra-wall blood flow and endotoxemia, lasts from 12 to 36 hours [13, p. 291]. Extremely severe is the late stage occurs after 36 hours, characterized by a severe systemic inflammatory response [10, p. 42], multiple organ dysfunction and progressive hemodynamic disorders.

The most difficult in the diagnostic plan is the initial period, because it is caused only by pain syndrome and local symptoms on the part of the abdomen, and the risk of infectious and inflammatory complications in this stage directly depends on the correct choice of treatment tactics. The basis for the urgent direction and hospitalization in the medical organization of the surgical profile is the very assumption that the patient has ileus.

Formation of the program of medical and diagnostic measures is the key task of the surgeon, and it provides for parallels between diagnostic and early treatment measures [7, p. 40].

The gold standard of diagnosis is still the X-ray study, in order to confirm the diagnosis on a number of grounds. At the initial stage of the diagnosis, an overview radiography of the abdominal cavity organs is performed. At the same time, «intestinal arches» are characteristic signs of the presence of AIO. This symptom occurs when the small intestine is swollen with accumulating gases, while horizontal levels of liquid are visible in the lower arches of the arch, the width of which is inferior to the height of the gas column. Another manifestation of intestinal obstruction is the appearance on the roentgenogram of the “Claustr Bowls”. This sign is given a key importance in the diagnosis of ileus, since it occurs only after 1 to 3 hours from the time of the onset of the obstruction, and indicates a deep paresis of the intestine [20, p. 69]. The neglect of the process can also be indicated by such a sign as a symptom of a peristaltic. This symptom is a consequence of edema and dilatation of the jejunum, and is manifested by transverse striation of the intestine in the form of a «stretched spring» [13, p. 291]. Radiography is the optimal method for diagnosing AIO, which allows us to ascertain the presence of ileus, to make differential diagnostics and, on the basis of verification of the diagnosis, to determine the diagnostic algorithm [14, p. 150]. In difficult situations and, if necessary, differentiation between different forms of intestinal obstruction, resort to radiopaque methods of examination of the gastrointestinal tract. The essence of this procedure is as follows: depending on the level of occlusion of the intestine, the radiopaque preparation is either given or taken rectally. X-ray control is performed every 3 hours to observe the passage of the x-ray contrast preparation over the intestine with a timely evaluation of the result. With a delay in the stomach over 6 hours and 12 hours in the small intestine gives reason to suspect impaired patency or motor activity of the intestine [20, p. 69]. In the opinion of a number of authors, the use of the angiography method for suspected thrombosis of mesenteric vessels is promising, it is very effective, but is only available to specialized medical organizations.

Ultrasound research in recent years is particularly popular because it has great informativeness in the diagnosis of a variety of diseases of the abdominal cavity.

Ultrasound is most effective in diagnosing high intestinal obstruction, as well as in differential diagnosis. The results of ultrasound help determine the tactics of treatment, which is necessary to achieve the maximum effect.

For a long time there was a view that gas-containing structures visualization using ultrasound uninformative due to concomitant variations pneumatosis since ultrasound attenuates with fast speed in gassy structures and almost totally reflected at the gas - the soft tissue.

Beginning in 1983, a group of researchers led by G. Meiser in the experiment proved the expediency of using ultrasound with AIO and described in detail the ultrasound picture in this state, which is still very relevant to this day.

With ileus, the following ultrasound signs are noted: an increase in the diameter of the intestinal tube, a «sequestration of the contents» in its lumen, a swelling of the intestinal wall occurs as a result of edema, a free fluid in the abdominal cavity is determined [14, p. 152].

The active introduction of modern methods of radiation diagnostics into clinical practice significantly improves the efficiency of diagnosing OCP [11, p. 51].

In the opinion of a number of authors, at the current stage of medical development, computed tomography (CT) is the most informative method that allows to establish with a high validity both the nature of the obstruction and the significantly shortened time of examination of the patient. There is a point of view that the use of CT in the diagnosis of OCOS at a preoperative stage is very promising, as this method of research allows you to get answers to many controversial questions, differentiate thin and large intestine with a confidence greater than 95% and establish the cause of obstruction. The presence of enlarged proximal and collapsed distal intestine with accompanying changes in the mesentery and adjacent organs, as well as ischemic parts of the intestinal tube with attached submucosal edema are the most typical signs of the CT scan of the AIO.

Long-term studies of the use of CT techniques have shown in practice excellent results, which allow finding with high confidence the ischemic involvement of the intestinal wall, as well as the concomitant thickening of the intestinal wall in the zone subjected to necrobiotic changes. When diagnosing all types of intestinal obstruction of both tumor and non-tumor genesis, a very informative method is laparoscopy. Laparoscopy refers to invasive techniques and therefore has its limitations and contraindications, which are associated with overgrowing of the intestinal tube and a tendency to spike formation, which ultimately can lead to intestinal injuries and other serious complications [15, p. 36].

In the literature to this day, the question of the treatment of IPOs remains unclear, which provides an opportunity to search for the most optimal methods for diagnosis, treatment, and prognosis of postoperative complications.

Currently, there is the concept of syndrome of the flow of AIO, which is used by all surgeons to determine the tactics of treatment in the intra- and postoperative periods.

To date, there is no single effective method of pre-operative prognosis, prevention, and treatment of intestinal paresis that develops in the postoperative period.

In the operational treatment of IPOs, first of all, it is necessary to solve the following problems: removal of a mechanical obstacle for the passage of intestinal contents; elimination of the disease that led to the development of the pathological condition; resection of the intestine with its non-viability; prevention of endotoxicosis increase in the postoperative period; prevention of recurrence of obstruction.

The volume and nature of the surgical intervention in patients with ICD is determined by the type of mechanical obstruction and the degree of viability of the intestine, which subsequently determines the tactics of resection of the intestinal tube followed by the application of enterostomy or anastomosis, therefore, the removal of a mechanical obstacle must be considered as a primary goal.

When revising the abdominal cavity, it is necessary to reveal the exact localization of the intestinal obstruction and its cause. Approximately the location of this zone is judged by the state of the intestine: above the obstacle the bowel is inflated, overflowed with gas and liquid contents, its wall is usually thinned and differs in color from other sections (from purple-cyanotic to dirty black color), the gut condition, its walls in the absence of peritonitis are not changed. It is important to remember that the obstacle that caused the development of obstruction can be in several places at different levels, which is why a thorough examination of the entire intestine is necessary: from the gatekeeper to the rectum. Often, the revision of the intestine, especially with «running» obstruction, is difficult because of the swollen loops of the intestine, which literally fall out of the abdominal cavity. It is inadmissible to leave overgrown, filled with a large amount of liquid contents of the intestinal loops outside the abdominal cavity, due to the fact that under gravity they can significantly tighten the mesentery, which further aggravates the circulatory disturbances in them. During the revision of the intestine should be moved very carefully, wrapping them with a towel soaked in hot isotonic sodium chloride solution.

Do not resort to attempts to direct them back into the abdominal cavity, as this can lead to rupture of the thinned intestinal wall. In such cases it is advisable first of all to empty the leading parts of the intestine from gases and liquid contents. It is best to immediately intubate the intestine by transnasal injection of a double-lobed Miller–Abbot probe, as it progresses, the absorption of intestinal contents is carried out. Nasointestinal intubation allows for an adequate revision of the abdominal cavity, provides emptying of the intestine on the operating table and in the postoperative period [11, p.51].

With small intestinal obstruction, it is necessary to achieve complete elimination of the cause, up to resection of the intestine with the application of intercursive anastomosis. This can be dissection of adhesions, resection of the intestine during a tumor, enterotomy with removal of gallstone, etc. The above-mentioned principle of treatment is not standard and is not fully applicable in the treatment of colonic obstruction, since the primary application of intercursive anastomosis can lead to the development of peritonitis due to the failure of the sutures [16, p. 36].

There are many examples in the literature of similar surgical interventions, when resection of the sigmoid colon with the tumor is performed in connection with low obturation obstruction or elimination of strangulation obstruction against the background of infringement of the hernia of the anterior abdominal wall by hernia repair followed by plastic surgery of the hernial gates. Far from always such a radical intervention is possible, this can be affected by the nature of changes in the intestine and the severity of the patient's condition.

During the operation, in addition to eliminating the mechanical obstacle, it is necessary to assess the state of the intestine. Often in the surgical practice in the treatment of IPOs, one must resort to resection of the intestine, due to necrotic processes in the leading loop of the intestinal tube, this can occur with equal frequency both in strangulation and in obstructive obstruction.

There is a point of view that the greatest difficulty in carrying out the operation is the definition of the limits of the viability of the intestinal tube. Basically assessment of viability of the gut is based on the presence of peristalsis, pulsation of vessels, color of the intestine, is not always reliable. In this type of operation, technical errors are quite common, leading to insolvency of the sutures and necrobiotic changes in the intestinal wall, which is the cause of peritonitis, and as the cause of death. The above complications are often observed with economical resection of the intestine, since the known methods for determining the viability of the intestinal tube are not faulty, which complicates the true definition of the size of the segment of the intestine being resected.

With AIO, the non-viable gut should be resected within healthy tissues. Given that necrotic changes occur first in the mucosa, and serous cover is affected in the last turn and can be changed little with extensive necrosis of the intestinal mucosa, resection is performed with mandatory removal of at least 30-40 cm of the leading and 15-20 cm of the diverting bowel loops they are measured from the strangulation furrows, the zone of obturation or from the boundaries of obvious gangrenous changes). With prolonged obstruction, a more extensive resection may be necessary, but the always removed site leading the department twice as long as the outgoing one. Any doubts about viability of the intestine in case of obstruction should incline the surgeon to active actions, that is, to resection of the intestine. If such concerns relate to the vast intestine, the resection of which the patient may not suffer, one can confine oneself to the removal of an obviously necrotic part of the intestine, do not impose an anastomosis, and the leading and withdrawing ends of the intestine are tightened tightly. The wound of the anterior abdominal wall is sutured with rare sutures through all the layers. With acute intestinal obstruction the probability of inconsistency of the intestinal suture is very high. This complication is observed in 2,9-8,8% of cases with operations in the small intestine and 5-33% - on the thick. This raises the acute issue of creating optimal conditions for the healing of anastomoses and seams of the gastrointestinal tract.

The tightness of the surgical suture depends on the processes both from the side of the cross-linking organs and from extraorganic changes [7, p.40].

There are the following reasons that affect the violation of the integrity of surgical sutures: pathomorphological processes occurring in the anastomosed organs; adverse factors under which the suturing takes place; technical features of anastomosis application.

It is generally accepted that two absolutely opposite processes occur in the zone of the intestinal seam. The first is determined by the mechanical strength of the seam and having its maximum at the time of application depends more on the number of rows of superimposed seams [15, p.38]. In the following days, strength and tightness rapidly decrease, reaching a maximum reduction of these properties on the 5th-6th day. This type of strength of the seam, according to some authors, reaches a maximum by the 11th-12th day. The second, opposite process is the biological strength of the seam, which is determined by the processes of collagen formation. Dissolution of collagen reaches its maximum also by 4-6th day. The combination of these two factors and carries a threat of insolvency of the seam.

One of the most important factors that reduces the tightness of the anastomosis is the infection of the zone of cross-linked tissues. It arises as a result of the contact of suture material and seam channels (ligature infection) with the contents of the lumen of the organ, which facilitates the penetration of microflora into the thickness of the connected tissues, the development of inflammatory and necrotic processes in them.

In the zone of «fresh» anastomosis there are all favorable conditions for the reproduction of microflora — ischemia of the intestinal wall, the presence of a nutrient medium in the form of remaining small blood clots, changes in pH, redox potentials, etc. Therefore, infection of the anastomosis zone can rightly be considered a natural process, which depends on the type of intestinal suture and the concentration of microbes in the lumen of the organ.

After eliminating the obstruction, the question arises of evacuating the contents from the leading parts of the intestine, since the restoration of peristalsis and absorption from the lumen of the intestine of toxic contents in the postoperative period will certainly cause an aggravation of endotoxemia. There are several ways to solve this problem, namely, intubation of the intestinal tube through the nasal passages, pharynx, esophagus and stomach with the help of gastrostomy, cystostomy, appendicitis or through the anus. This procedure provides removal of toxic contents and

elimination of the consequences of intestinal paresis both during surgery and in the postoperative period [15, p. 38].

The restoration of intestinal motility remains a serious problem in the treatment of IPOs (Petrov V. V. et al., 2009). Early restoration of motor activity of the intestine and resumption of microcirculation [5, p. 67], as well as the removal of stagnant contents in the intestine is facilitated by the method of decompression of the intestinal tube. Currently, the widespread use of the bowel decompression method allows to achieve the removal of stagnant bowel contents, improve blood supply, microcirculation and early recovery of intestinal motor activity. There are many methods of intraoperative intubation of the small intestine, for which various designs of probes are proposed.

Decompression is usually achieved by applying colostomy, in some cases, transrectal drainage of the colon by a thick tube.

One of the promising directions of the development of surgical methods of intestinal decompression is now the introduction of sorbents in combination with the drainage of the small intestine [4, p. 36].

From the methods of intestinal drainage, the method of transnasal drainage of the small intestine is the most preferable, due to the minimal invasiveness, [14, p. 153].

This method is often called the name of T. Miller and W. Abbot or Wangenstein, although there are indications that the pioneers of transnasal intubation of the gut by the Abbot-Miller probe (1934) during the operation were G. A. Smith (1956) and J. C. Thurner (1958). The probe is carried into the small intestine during surgery and is used simultaneously for intraoperative and for prolonged decompression of the small intestine. The disadvantage of the method is the violation of nasal breathing, which can lead to a worsening of the condition in patients with chronic lung diseases or to provoke the development of pneumonia.

The method proposed by J. M. Ferris and G. K. Smith in 1956 and described in detail in the domestic literature by Dederer Yu. M. (1962), which includes intubation of the small intestine through the gastrostomy, is free of this deficiency and is indicated in patients who, for whatever reason, cannot carry the probe through the nose, or the disruption of nasal breathing due to the probe increases the risk of postoperative pulmonary complications.

To reduce peritoneal injury, it is necessary to select the most rational surgical techniques, which include gentle operation with the use of wide incisions, the use of atraumatic suture material. At the final stage of surgical intervention, it is necessary to take measures to prevent recurrence of obstruction. The deviation of the curvature eliminates the obstruction, but does not completely rule out the possibility of relapse, and it develops again in the immediate postoperative period. Performing primary resection of the sigmoid colon excludes the possibility of relapse, but if a radical operation is not possible, then it is necessary to resort to palliative interventions by dissecting the fusion that brings together the leading and diverting parts of the intestine and makes it possible to turn, perform mesosigmoplication.

Reduction of postoperative inflammation is one of the key tasks in the treatment of IPOs, for this purpose, intraperitoneal administration of steroid hormones, hydrocortisone phonophoresis, nonsteroidal anti-inflammatory drugs, analogues of prostocycline, antihistamine drugs, physioprocedures.

After surgery, complex corrective therapy is necessary. Conservative treatment of ileus should be directed to the main links of pathogenesis, including elimination of hypovolemia and elimination of water-electrolyte disorders and hemodynamic disorders, as well as correction of metabolic processes, restoration of metabolic processes, prevention of complications [1, p. 10].

The volume of infusion therapy, carried out under the control of CVP and diuresis, is at least 3-4 liters. The key is replenishment of potassium deficiency, which helps to resolve intestinal paresis. With timely conservative treatment in the postoperative period, the function of the gastrointestinal tract is restored on the 4-7th day.

To eliminate disorders of regional hemodynamics, in addition to adequate rehydration, the effectiveness of the use of rheologically active agents improving microcirculation has been proved. In addition, it is highly desirable to normalize the protein balance by transfusion of protein hydrolysates, a mixture of amino acids, albumin, protein, and in severe cases, blood plasma. Very rational is the effect on the peristaltic activity of the intestine: with increased peristalsis and cramping abdominal pain, the appointment of antispasmodics is indicated. When paresis - means that stimulate the motor-evacuation capacity of the intestine: intravenous injection of hypertonic sodium chloride solution, ganglion blockers, neostigmine methyl sulfate, etc. Conservative treatment, as a rule, suppresses the dynamic obstruction (it is possible to resolve certain types of mechanical obstruction: coprostasis, intussusception, sigmoid colon swelling, etc.). This is its role as a diagnostic and therapeutic agent. If obstruction is not permitted, the treatment performed serves as a measure of preoperative preparation, so necessary in this pathological condition [14, p. 150].

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