

WAYS TO PREVENT INTESTINAL INSUFFICIENCY SYNDROME IN ACUTE INTESTINAL OBSTRUCTION

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Abstract

The article analyzes the results of examination and treatment of 119 patients with acute intestinal obstruction of non-tumor etiology. The syndrome of intestinal insufficiency in acute intestinal obstruction becomes the initial link in a severe pathological process that causes catastrophically increasing metabolic changes with the development of multiple organ failure against this background and leading to the death of the patient. Therefore, after eliminating the cause of AIO, complex treatment should include the prevention of SCI and endogenous intoxication syndrome. Timely and adequate enteral measures are an important stage in the complex treatment of patients with acute intestinal obstruction and prevent intestinal failure syndrome and improve treatment outcomes. Conducted enteral methods of correction allowed to reduce the incidence of postoperative complications from 34,1% to 12,8%, and deaths from 7,1% to 3,2%.

Key words: *Acute intestinal obstruction, intestinal failure syndrome, enteral measures, enterosorption, multiple organ failure.*

Introduction: Initial manifestations of intestinal failure syndrome (IFS) in acute intestinal obstruction (AIO), especially of mechanical etiology, reflecting, first of all, a pronounced inhibition of intestinal motor activity, may be a reflex consequence of a previously developed pathological process. Surgical intervention performed against this background becomes another factor that aggravates the inhibition of intestinal motility. According to a number of authors [1, 3, 4, 5], these disorders are based on a change in the “balance” of sympathetic and parasympathetic nervous influences: against the background of hyperexcitation of the sympathetic nerves, depression of the parasympathetic nervous system is revealed. A common trigger for inhibition of intestinal contractile activity is inhibitory impulses conducted by autonomic nerves directly to the smooth muscles of the intestinal wall and smooth muscle cells of blood vessels [9, 10]. Humoral factors are also of no small importance in the mechanisms of development of motor disorders of the intestine. Thus, in the immediate postoperative period, the content of adrenaline in the blood increases significantly with a simultaneous decrease in the concentration of acetylcholine [7, 9, 10]. In this regard, postoperative reflex inhibition of motor skills in AIO can be considered as the first stage of the SIO syndrome. At this stage, according to Popova T.S. et al. (1991), despite the deep

inhibition of motor activity, gases and fluid in the intestinal lumen do not accumulate, because due to the preservation of hemocirculation in the intestinal wall, absorption processes are not disturbed. In most cases, even in the absence of therapeutic and preventive measures aimed at stimulating the contractile activity of the intestinal muscles, intestinal motor activity is restored independently and intestinal paresis, especially SCI, does not occur [8, 9, 11]. In cases where AIO is accompanied by peritonitis or severe organ disorders, reflex circulatory disorders in the intestinal wall join the inhibition of motility, absorption is inhibited, evacuation of the contents stops, the second stage of the SIO syndrome develops, which is characterized by the accumulation of fluid and gases in the intestinal lumen, which enter mainly due to aerophagia. All this leads to stretching of the loops of the small intestine [1, 2, 7]. Progressive stretching of the intestinal loops and, as a result, an increase in intra-intestinal pressure (IP) inevitably cause both local and reflex disorders of both the entire digestive system and other functional systems of homeostasis [3, 8, 14, 16]. According to the same authors, the local effect of this factor is reduced to circulatory disorders, primarily in the venous system of the intestine. The resulting stagnation, accompanied by an increase in local venous pressure, leads to a violation of the absorption of gases and a further increase in IP. When the latter reaches the level of diastolic pressure, fluid absorption stops, causing further stretching of the intestinal loops and disruption of the intestinal wall trophism [5, 7, 9].

The local effect of increasing ICP is reduced to disruption of microcirculation in the intestinal wall, reduction and then cessation of absorption of gases and liquids, and further stretching of intestinal loops [7, 9]. The result of irritation of the interoreceptors of intestinal loops is a reflex impairment of motor function, increased secretion of the stomach and intestines, regional circulatory disorders caused by a decrease in vascular tone, increased vascular permeability with significant extravasation of fluid into the lumen of distended intestinal loops [1, 2, 9].

The simultaneous action of local and reflex factors leads to the development of acute insufficiency of the function of the small intestine [7, 9, 11]. This disorder characterizes the third (terminal) stage of the SCI syndrome. Stretching of the intestinal loops increases the secretion and transudation of fluid into the intestinal lumen, which, in case of malabsorption, causes further overstretching of the loops and reflex inhibition of motility. These changes lead to an increase in intra-abdominal pressure, a decrease in diaphragm excursions and, as a result, respiratory failure, causing an increase in tissue hypoxia and aggravating the condition of patients [12, 13]. Consequently, the initial disorders of intestinal motility contribute to the development of SCI, which becomes the initial link in a severe pathological process that causes catastrophically increasing metabolic changes with the development of multiple organ failure (MOF) against this background and leading to the death of the patient [12, 16]. Therefore, after eliminating the cause of AIO, especially when complicated by peritonitis, complex treatment should

include the prevention of SCI and endogenous intoxication syndrome (ESI), starting with powerful detoxification therapy, drainage of the abdominal cavity, intestinal intubation with nasointestinal probes and ending with intra-abdominal (lavage or dialysis) , as well as the performance of enteral therapeutic measures in the early postoperative period: intestinal decompression (ID), intestinal lavage (CL), enterosorption, etc. [2, 3, 6, 15, 16]. Without their implementation, intestinal stimulation by various methods very often does not give an effect [5, 8]. Due to the lack of clear criteria, indications and optimal methods of enteral therapeutic measures, as well as the use of nasointestinal probes of various designs for their implementation, which do not always allow adequately performing these procedures, it is necessary to reconsider views on solving this problem.

The purpose of this study was to improve the results of treatment of patients with AIO by developing and improving enteral therapeutic measures: DC, CL and enterosorption.

Material and methods. In accordance with the goal and objectives of the study, we analyzed the results of treatment of 119 patients with acute mechanical intestinal obstruction of non-tumor origin, admitted to the clinic of faculty and hospital surgery of the Tashkent Medical Academy for the period 2014-2024 years. The age of the examined patients ranged from 16 to 80 years. Among them, men - 74 (62,2%) patients, and women - 45 (37,8%).

Types of AIO in this group of patients are presented in table-1.

Table 1.

Characteristics of patients with AIO, abs. (%)

Type of intestinal obstruction	Control group	Main group
Mixed	29 (51,8%)	41 (65,1%)
Adhesive	27 (48,2%)	23 (36,5%)
Intussusception	2 (3,6%)	-
Strangulation	20 (35,7%)	15 (23,8%)
Intestinal volvulus	17 (30,4%)	10 (15,9%)
Knotting	3 (5,3%)	5 (7,9%)
Obstructive, due	7 (12,5%)	7 (11,1%)
Foreign bodies	2 (3,6%)	2 (3,2%)
Gallstones	2 (3,6%)	4 (6,3%)
Bezoars	3 (5,3%)	1 (1,6%)
Total:	56 (100%)	63 (100%)
Types of surgical interventions		
Dissection of adhesions	27 (48,2%)	38 (60,3%)
Resection of the intestine with restoration of the intestinal passage	15 (26,8%)	15 (23,8%)
Reversal of the intestine	8 (14,3%)	4 (6,4%)

Enterotomy, removal of a foreign body	4 (7,1%)	6 (9,5%)
Disinvagination	2 (3,6%)	-

As can be seen from Table 1, the most common cause of AIO was mixed intestinal obstruction (70 patients), with the largest proportion being adhesive (65). A day or more after the onset of the disease, 57% of patients were admitted. A direct correlation was established between the period elapsed from the onset of the disease, the severity of the patient's condition and pathological changes in the abdominal cavity.

The control group consisted of 56 patients, most of whom were admitted to the clinic at the stage preceding this study or due to technical reasons it was not possible to perform transnasal intubation of the small intestine during the operation (massive adhesive process of the abdominal cavity, an extremely serious condition of the patient), or due to spontaneous removal of the patient nasointestinal probe. In all these patients, a nasogastric tube was placed immediately after the operation to evacuate the contents of the gastrointestinal tract in the early postoperative period. In contrast to the control group, in 63 patients of the main group, traditional therapeutic measures after elimination of the source of AIO during surgery were supplemented: transoral intubation of the small intestine with a double-lumen non-absorbable polyethylene probe and intraoperative DC. After that, the probe was removed and transnasal intubation of the small intestine was performed with a thinner silicone probe of the original design to perform enteral measures in the early postoperative period: DC, CL and enterosorption. For adequate intraoperative decompression of the gastrointestinal tract, a two-channel non-absorbable polyethylene probe (D - 10 mm) was used, proposed by H.H. Kanshin (1985), up to 180 mm long. One lumen of the probe had many perforated holes on the sides at the level of the stomach and intestines and was intended for aspiration of the contents of the gastrointestinal tract. The second lumen was opened at the end of the probe and was intended to create a vacuum with air coming from outside, excluding the suction of the probe to the intestinal mucosa. Intestinal intubation was performed during the operation. The probe was passed through the mouth to exit into the lumen of the stomach. Then, with careful stringing movements, the end of the probe was advanced along the intestine and, after it passed beyond the ligament of Treats, throughout the small intestine. Simultaneously, with the help of an electric suction, the intestinal contents were aspirated. As a rule, it was possible to free almost the entire small intestine from stagnant contents. The effectiveness of intraoperative DC was assessed by the subsidence of swollen loops of the small intestine, the termination of the separation of stagnant intestinal contents from the probe, the change and normalization of the color of the intestine, the restoration and improvement of the pulsation of the vessels of the intestinal wall, and sometimes the appearance of weak peristalsis. After that, the probe was removed and a thinner (D-8 mm) two-channel

polifunctional probe of the original design made of siliconized rubber was inserted transnasal, which was passed into the small intestine in the same way. In the early postoperative period, a nasointestinal probe was used to carry out the planned enteral measures: DC, CL, and enterosorption. The effectiveness of decompression of the gastrointestinal tract was assessed by improving the general condition of patients, the absence of bloating and pain, the appearance of intestinal motility, reducing intoxication, as well as improving peripheral and central hemodynamics, and restoring the main clinical and biochemical blood parameters. CL was performed to improve the passage from the small intestine and additional correction of the water and electrolyte balance with a saline solution developed in the Laboratory of Experimental Physiology of the Research Institute for Emergency Medicine named after N.V. Sklifosovsky N.M. Baklykova (1975). In its electrolyte composition, the solution was identical to the small intestine. CL was started immediately after the operation (on the first day), injecting 1500 ml of saline solution in drops in 4 series (per day) through a small probe lumen, with an exposure of 30 minutes and subsequent aspiration. In the future, as the methods of treatment improved, patients in the toxic and terminal stage of diffuse purulent peritonitis underwent enterosorption for the purpose of additional detoxification. In contrast to the usual conducted CL, during enterosorption, an enterosorbent (enterosgel) was added to the composition of the saline solution at the rate of 4 g/kg of the patient's weight, and the method of its implementation did not differ much. This procedure was performed 3-4 times a day, in series, and stopped as the absorption of water and electrolytes appeared, which was an indication for the implementation of a test sample.

The degree of endogenous intoxication of the body was assessed by the content of medium-weight molecules in the blood serum, as well as by the leukocyte index of intoxication (Kalf-Kalif index). The state of motor activity of the gastrointestinal tract in the immediate postoperative period was monitored according to X-ray data and indicators of peripheral polielectroenterography according to G.D. Sobakin on the EGS-4M apparatus with a built-in special filter. In 19 (16,0%), stool and gas retention - in 86 (72,3%). More often, intestinal peristalsis was increased and had a spastic character (46,2% of cases), less often it was completely absent (24,4%), although sometimes it was noted in the beginning, and later the disappearance (30,3%) of intestinal noises. On the survey radiographs, Kloiber's "bowl" was observed in 83 (69,7%) patients, and single swollen bowel loops - in 36 (30,3%).

Serous-fibrinous effusion was noted in 21 patients, serous - in 18 patients, purulent - in 16. Diffuse peritonitis was noted in 2 patients from the control group and in 6 patients from the main group, admitted 72 hours after the onset of the disease. At the first stage of treatment, standard methods of treatment were used in 3 stages. In the preoperative period, correction of the water and electrolyte balance, acid-base status, hemodynamic and respiratory disorders, functions of vital organs, taking into account concomitant diseases, as well as measures aimed at eliminating AIO in a conservative way, was

carried out, which lasted a total of about two hours. Surgical intervention aimed at eliminating the cause of intestinal obstruction was performed if conservative treatment was ineffective in these terms.

Basically, surgical interventions consisted in eliminating the source of intestinal obstruction. In 30 (30,3%) patients, the operation ended with resection of the intestine with the restoration of the intestinal passage - the imposition of entero-enteroanastomosis "side to side". In patients from the control group, a nasogastric tube was installed for decompression of the gastrointestinal tract. In the presence of acute diffuse peritonitis, the exudate was evacuated and the abdominal cavity was sanitized with antiseptic solutions, the mesentery root of the small intestine was novocainized, and the abdominal cavity was drained. In the presence of diffuse peritonitis, drainage of the abdominal cavity was performed according to the method developed in our clinic (Karimov Sh.I. et al., 1991) for peritoneal dialysis in the postoperative period.

In the postoperative period, intensive infusion and antibiotic therapy was performed, including parenteral nutrition, decompression of the gastrointestinal tract with a nasogastric tube. With diffuse peritonitis, peritoneal dialysis was carried out according to the full program. In the majority of patients in the control group, ongoing intestinal paresis impeded the passive outflow of contents from the gastrointestinal tract, and attempts at active aspiration from a single-lumen gastric tube were unsuccessful due to the suction effect of the gastric mucosa, which prevented adequate decompression of the gastrointestinal tract. All this played an important role in the development of specific and nonspecific complications in 22,7% of patients.

Preoperative management of patients of the main and control groups did not differ significantly. In contrast to the therapeutic measures performed in the control group, in 63 patients of the main group, the traditional therapeutic measures carried out during the operation were supplemented with technical support for planned enteral measures both during the operation and in the early postoperative period. In the early postoperative period, the general condition of most patients of the main group remained severe due to severe intoxication upon admission. Medical stimulation of the intestine was started the next day after the operation. In the early postoperative period, the nasointestinal probe was connected to active aspiration in the mode of active DC, CL, and enterosorption. After a successful series of CL for enterosorption, a 20% enterosgel solution was injected into the small intestine, which, after a 30-minute exposure, was removed by active aspiration. The amount of aspirated fluid during intraoperative DC ranged from 900 to 2700 ml (mean $1255,0 \pm 25,5$ ml). A direct correlation was observed between the amount of discharge from the intestine and the severity of peritonitis. A similar pattern was noted in postoperative DC and in the early postoperative period. So, on the 1st day after surgery in patients without symptoms of widespread peritonitis, the discharge from the nasointestinal probe was $650,0 \pm 28,0$ ml, on the 2nd day - $240,0 \pm 11,0$ ml. As a rule, already on the 2nd day after the operation, they observed an improvement

in their general condition, a decrease in intoxication, and the appearance of intestinal motility. Discharge from the nasointestinal probe, along with a decrease in its amount, became more transparent, lost its stagnant shade, which served as an indication for the removal of the probe by the end of 2 days after the operation and transfer to gentle oral nutrition.

In patients with diffuse peritonitis on the 1st day after surgery, discharge from the nasointestinal probe was $930,0 \pm 35,5$ ml, on the 2nd day - $650,0 \pm 28,5$ ml. A significant decrease in the total amount of discharge on the 3rd day ($300,0 \pm 25,0$ ml) was accompanied by an improvement in the general condition of patients, restoration of intestinal motility, which served as an indication for removal of the probe and transfer to gentle oral nutrition. In patients with diffuse peritonitis, despite intraoperative lavage and intestinal decompression, after surgery, the discharge from the nasointestinal probe remained significant (on the 1st day - $1250,0 \pm 46,0$ ml, on the 2nd day - $870,0 \pm 37,0$ ml, on the 3rd - $820,0 \pm 25,5$ ml). With a favorable course of the disease, by the end of 4 days, an improvement in the general condition of patients and a decrease in discharge from the nasointestinal probe to $340,0 \pm 27,0$ ml were observed, persistent intestinal motility was detected, which was an indication for the removal of the nasointestinal probe. With an unfavorable course of the disease, the condition of the patients progressively worsened, clinically this was expressed by persistent manifestations of SCI and SEI, PON, turbid, congestive discharge continued to flow from the nasointestinal probe, intestinal motility was not auscultated, and in 2 (3,6%) patients, a lethal outcome occurred from ongoing sluggish peritonitis. Our studies have shown that despite the elimination of the source of AIO and the complex treatment in patients of the control group, the use of nasogastric intubation did not allow the majority of patients to perform full decompression from the gastrointestinal tract intraoperatively and in the early postoperative period. Intestinal paresis remaining after the operation, despite medical stimulation of the intestine, also impeded the passive outflow of contents through a gastric tube, and active aspiration had no effect. Of course, all this could not but affect the results of treatment of this contingent of patients. This was evidenced by persistent intestinal paresis, which persisted in the early postoperative period in 19 (34,1%) patients in the control group. Severe endogenous intoxication of the body, electrolyte imbalance, also played an important role in the development of postoperative complications (Table 2), including such formidable ones as suture failure and ongoing peritonitis, intestinal eventration and small intestinal fistula. Mortality in the control group was 7,1% (4 patients died).

Table 2.

Structure of postoperative complications, abs. (%)

Index	Group	
	control	main
Seam failure	2 (3,6%)	-

Ongoing peritonitis	2 (3,6%)	-
Eversionation	1 (1,8%)	-
Small bowel fistula	1 (1,8%)	1 (1,6%)
Early adhesive obstruction	2 (3,6%)	-
Pneumonia	1 (1,8%)	2 (3,2%)
Acute myocardial infarction	3 (5,4%)	2 (3,2%)
Suppuration of the p / o wound	5 (8,9%)	3 (4,8%)
Complications associated with prolonged stay of the catheter in the vein	2 (3,6%)	-
Total	19 (34,1%)	8 (12,8%)

The transoral intubation of the small intestine with active aspiration from the gastrointestinal tract performed during the operation in this group of patients had quite obvious advantages. It allowed the vast majority of patients to carry out a complete decompression of the stomach and small intestine. Transnasal intubation of the small intestine with a thinner double-lumen silicone probe during surgery and active DC, CL, and enterosorption in the early postoperative period contributed to additional correction of electrolyte metabolism and enteral detoxification in the vast majority of patients. Due to the implementation of enteral therapeutic measures, we observed an earlier recovery not only of the motor activity of the intestine, but also of its other functions, even in the presence of common forms of peritonitis. The effectiveness of enteral therapeutic measures in the complex treatment of patients with AIO from the main group is evidenced by a significant decrease in the number of postoperative (primarily specific for this disease) complications and mortality. Thus, in the main group, postoperative complications were observed in 8 (12,8%) patients. Mortality was 3,2% (2 patients died). Thus, as our studies have shown, the supplemented complex of traditional therapeutic measures, with intra- and postoperative DC, CL, and enterosorption, is an important step in breaking the pathogenetic chain of SIO development in patients with AIO. It contributes not only to the prevention of SCI, but also to the reduction of endogenous intoxication, the restoration of all intestinal functions, and also creates conditions for early activation of patients and compensation for energy costs and the need for plastic materials of the body in a natural - enteral way.

Conclusions

1. Intestinal insufficiency syndrome (KIS) in patients with AIO is not only an important component in the pathogenetic chain of the disease, but also one of the leading factors in the development of MOF and adverse treatment outcomes.

2. Timely and adequate implementation of enteral therapeutic measures: intra- and postoperative DC, CL, as well as enterosorption, is an important stage in the complex treatment of patients with AIO (especially when complicated by peritonitis) and

prevention of SCI, helps to reduce postoperative complications from 34,1% to 12,8% and lethality from 7,1% to 3,2%.

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