NEW VIEWS ON ISSUES OF ENTERAL DECOMPRESSION IN THE TREATMENT OF ACUTE INTESTINAL OBSTRUCTION

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Abstract. We have improved the standard naso-intestinal probe, the essence of which lies in the fact that at a distance of 60-70 cm from the end of the probe there are two balloons (proximal and distal balloons), the distance between which is 50 cm. space. This allows for selective decompression, drainage and enteral lavage of the area of intestinal sutures, which contributes to better healing of the inter-intestinal anastomosis and a decrease in the incidence of entero-entero anastomosis leaks. When analyzing the clinical results in the compared groups, we obtained a significant decrease in the incidence of entero-entero anastomosis suture failure from 16.7% (in group I) to 0% (in group II), as well as a decrease in postoperative mortality associated with it.
Keywords: enteral probe, entero-entero anastomosis, suture failure, proximal and distal balloons.

Background. According to the modern concept of abdominal sepsis in acute adhesive intestinal obstruction, the need to decompress the primary focus of infection - the almost changed intestine - is one of the most important stages in the treatment of this pathology (1).

Naso-enteric intubation is usually understood as the introduction of a long probe through the nasal passage, mouth, esophagus, stomach, duodenum into the small intestine for its entire length. The term “intestinal splinting” is often used in Russian-language literature (2). Performing effective decompression of the intestine mechanically evacuates toxic contents from its lumen, allowing to reduce the role of the intestinal factor in the formation of endogenous intoxication and preventing its damaging effect on the intestinal mucosa; leads to a decrease in intracavitary and intra-abdominal pressure, especially in the area of inter-intestinal anastomosis, which is accompanied by the restoration of microcirculation in the intestinal wall and improves systemic hemodynamics due to the elimination of intra-abdominal hypertension (3,4,5). According to various authors, the incidence of early adhesive intestinal obstruction after naso-enteric intubation significantly decreased, varying from 0 to 11.3% (6).

However, when using the currently existing standard double-lumen enteral probes, there is a uniform redistribution of intra-intestinal pressure along the entire length of the probe, where there is a hole, which helps to maintain a certain pressure in the anastomosis zone. In addition, due to intestinal peristalsis and mismatch between the length of the probe and the length of the intestine, the enteral probe is dislocated in the proximal direction, and if the inter-intestinal anastomosis is located in the distal part of the small intestine, the area of the inter-intestinal anastomosis remains outside the zone of decompression of the enteral anastomosis (7). The above problems prompted us to improve the design of the standard enteral tube.

The purpose of this study was to study the clinical results of intraoperative use of the enteral probe improved by us in patients with acute adhesive intestinal obstruction.

Materials and research methods. This work is a study of the results of treatment of 24 patients with acute adhesive intestinal obstruction, who were hospitalized and underwent various surgical interventions in the emergency surgery department of the multidisciplinary clinic of the Tashkent Medical Academy.

All 24 patients underwent dissection of adhesions and resection of the small intestine with the imposition of entero-entero anastomosis. The studied patients were divided into two groups: group

1 - 12 patients who received a standard gastrointestinal tube intra-operatively, group 2 - 12 patients who received a naso-enteric tube modified by us.

The design of an improved naso-enteric tube.

We have proposed the design of a naso-enteric tube, which simplifies the control of the inter-intestinal anastomosis zone. We took as a basis the principles of the structure of a standard enteral tube (standard gastrointestinal tube 25f) and Blakemore tube (Fig. 1).

Figure 1. Advanced enteral tube.

The developed tube creates a closed isolated limited space in the area of the inter-intestinal anastomosis. This allows selective decompression, drainage and enteral lavage of the area of intestinal sutures. In addition, even with the development of partial failure of the sutures, the restriction of the anastomosis zone from two sides prevents isolating this area from the intestinal contents and promotes the healing of the zone of insolvency.

The tube we offer is an analogue of the standard gastrointestinal tube 25f (made of silicone) with an outer diameter of 8-9 mm. The length of the tube is 3 meters with an olive at the end and a second olive like the standard gastro-intestinal tube 25f. At a distance of 60-70 cm from the end of the tube, there are two balloons (proximal and distal balloons) like the Blakemore tube. Balloons, like the esophageal balloon of the Blakemore tube, are 5 cm long, but expand to 8-10 cm when inflated. The distance between the two balloons is 50 cm. The probe has two lumens, like the gastro-intestinal tube 25f, only they are not communicated. The first (main) lumen has holes up to the first balloon for 40-50 cm and after the second balloon for 20-30 cm (these holes decompress the intestine above and below the anastomosis zone). The second (selective) lumen has holes between the two balloons (these holes decompress the intestine in the anastomosis zone) (Fig. 2).

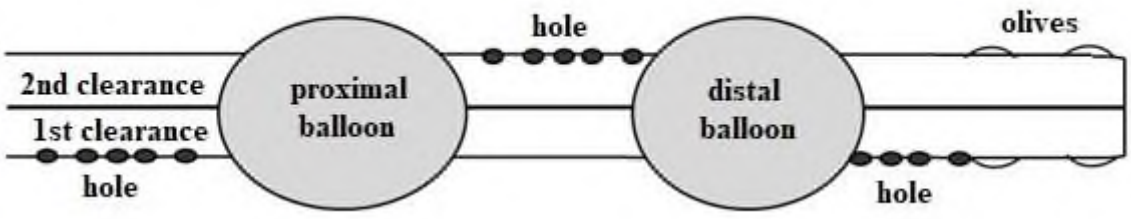

Figure 2. Schematic representation of the improved enteral tube.

Indications for naso-intestinal intubation in conditions of acute adhesive intestinal obstruction and peritonitis were: overflow of the contents of the leading intestinal loops with the expansion of the intestine more than 4-5 cm in diameter; bowel resection with anastomosis; widespread adhesive

process, especially accompanied by extensive and multiple damage to the serous cover of the intestine; repeated operations for acute adhesive intestinal obstruction; widespread peritonitis in the toxic and terminal stages; early adhesive intestinal obstruction; the presence of dark transverse stripes under the serous membrane, indicating rupture of the veins and hemorrhage due to stretching of the intestine.

Technique for installing an improved enteral tube. The installation of this tube was carried out intra-operatively. After dissection of inter-intestinal adhesions, the assistant surgeon or anesthetist inserts a tube through the nasal opening, while the surgeon ensures the translational movement of the tube by straightening the intestinal loops. Next, intraoperative decompression is performed with aspiration of intestinal contents and, if necessary, resection of the small intestine with the imposition of entero-entero anastomosis. In this case, the enteral tube is passed into the small intestine in the distal direction so that the inter-intestinal anastomosis is localized between the two balloons of the probe, after which the balloons are inflated – proximal balloon, and then distal balloon (Fig. 3, 4).

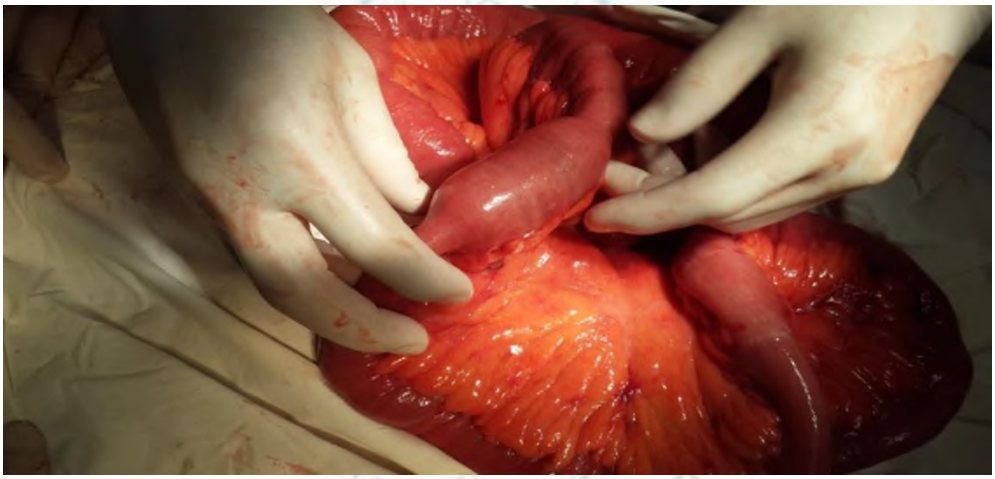

Figure 3. Installation of an improved naso-enteral tube. Rupture of the proximal balloon.

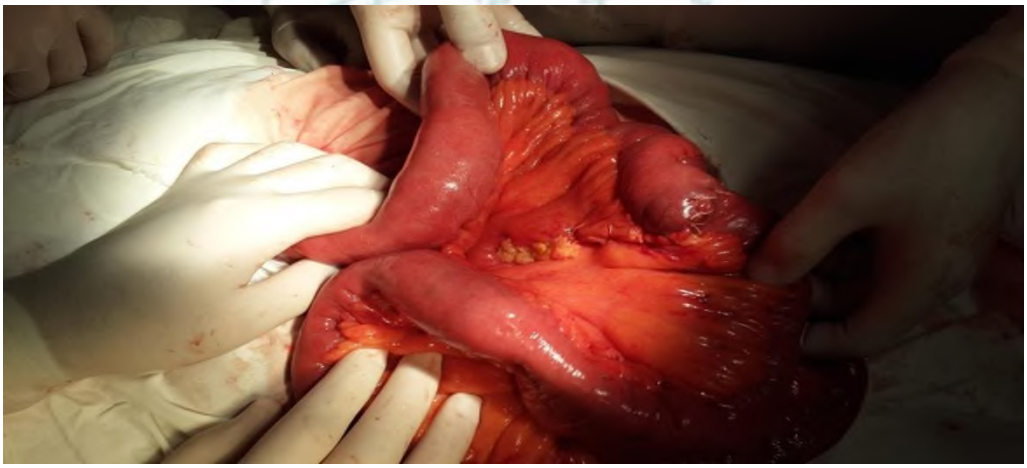

Figure 4. Installation of an improved naso-enteric tube.
The final view of the installation of the enteral tube.

In the early postoperative period, during the first 5 days, intestinal lavage with saline solution and enterosorption (ES) with “Enterosgel” were carried out through the main channel of the tube 2-3 times a day, and the anastomosis area was washed with warm saline solution through the selective channel, followed by the introduction of a drug mixture consisting of antibiotics and agents, enhancing reparation processes. On the 2nd day, an X-Ray examination of the intestine was performed by introducing 40 ml of 33% of “Triombrast” through a selective tube channel. The tube

was removed, as a rule, for 5-7 days. The length of stay of the tube depended on the restoration of the motor function of the intestine and the nature of the separated intestinal contents.

In both groups of patients, we studied the following indicators: the time of onset of intestinal peristalsis, spontaneous discharge of gas and stool, the length of stay of the tube, the occurrence of early adhesive intestinal obstruction, postoperative mortality, and the length of stay of patients in the hospital.

Results. The age of the patients ranged from 18 to 61, averaging 37.6±10.3 years. The sex ratio was dominated by males - 15 patients (62.5%). The severity of the adhesive process is also influenced by the number of operations in the anamnesis. The majority of patients (18 - 75%) underwent two or more surgeries in history (Tab 1).

Table 1

Characteristics of the compared groups

Criteria	**Group 1 (n=12)**	**Group 2 (n=12)**
Age	34,6±11,3	37,2±8,7
Sex		
Male	8 (66,7%)	7 (58,3%)
Female	4 (33,3%)	5 (41,7%)
Number of surgeries in history		
1	2 (16,7%)	4 (33,3%)
2	7 (58,3%)	5 (41,7%)
3 or more	3 (25%)	3 (25%)

According to the clinical standard for the provision of emergency medical care, after the diagnosis was established, all incoming patients underwent a set of conservative therapeutic measures aimed at eliminating acute intestinal obstruction. The failure of these measures was an indication for emergency surgery. The time from hospitalization to the start of surgery ranged from 2 to 12 hours. All 24 patients of both groups underwent adhesiolysis procedure and resection of the small intestine with the imposition of entero-entero anastomosis.

We analyzed the results of treatment of patients in both groups (Tab. 2).

Table 2

Results of treatment of patients of both groups

	Group 1 (n=12)	**Group 2 (n=12)**	**Student's t-distribution**
Time of onset of intestinal peristalsis (days)	3,0±1,1	2,2±1,5	0,430
Gas passing time (days)	3,6±1,7	2,7±1,6	0,386
Time of independent stool discharge (days)	5,2±1,3	3,7±1,6	0,727
Length of stay of the probe (days)	5,9±2,3	4,7±2,2	0,377
Failure of entero-entero anastomosis sutures	2(16,7±10,8%)	0(0%)	1,549
Early acute adhesive intestinal obstruction (conservative measures)	2(16,7±10,8%)	1(8,3±8,0%)	0,662
Early acute adhesive intestinal obstruction (reoperation)	1(8,3±8,0%)	0(0%)	1,004
Length of stay in hospital (days)	15,4±3,5	9,7±2,4	1,343
Mortality	2(16,7±10,8%)	0(0%)	1,549

When analyzing the clinical results in the compared groups, we obtained a significant decrease in the incidence of entero-entero anastomosis suture failure from 16.7% (in group 1) to 0% (in group 2), as well as a decrease in postoperative mortality associated with it. When analyzing the length of stay of patients in the hospital registered a tendency to reduce the number of bed-days in group 2 (from 15.4±3.5 to 9.7±2.4).

The discussion of the results. Acute adhesive intestinal obstruction and associated peritonitis are one of the most severe urgent surgical diseases that lead to high overall and postoperative mortality, reaching 13.7% and 44.7%, respectively (8, 9).

Despite the use of new generation antibiotics, abdominal dialysis and lavage, many methods of detoxification, including extracorporeal detoxification, sanation staged laparotomy, treatment of acute adhesive intestinal obstruction and associated enteral insufficiency remains one of the central problems of emergency surgery.

According to many authors, one of the central causes of high mortality in patients with acute adhesive intestinal obstruction is intractable endotoxicosis (7, 10). Of no small importance in the development of the latter are disorders of the motor-evacuation function of the intestine, leading to their pathological expansion, stagnation and accumulation of enteric contents, the formation and massive entry of toxins into the blood stream from the lumen of the small intestine (11).

For the first time, according to the literature data, the Dutch surgeon Westermann resorted to passing a thin probe through the nose to treat patients with peritonitis in 1910. The American surgeon Wangesteen (1935) did a lot in developing this method (12). In Russia, N.I. Napalkov (1927) was the first to point out the expediency of using a thin probe for emptying the stomach, and for the first time he applied this procedure in patients with A.P. Nadein (1931) (13). With the start of production of long thin rubber probes (Miller-Abbott, 1934; Harris, 1944; Cantoi, 1946), surgeons began to use small intestine intubation in the 1940s (14). Subsequently, a large number of probe designs and devices for their implementation were developed. In Uzbekistan, the problem of intestinal decompression by naso-enteric intubation is devoted to the works of Sh.I. Karimov, A.M. Khadjibaev, F.B. Alidjanov (7, 13).

The main task of the surgeon during naso-enteric intubation is to perform decompression, primarily in the area of the anastomosis. If the tube has many holes, then you can never be sure that it remains passable all the way to the anastomotic area. In the event that the end of the tube is clogged with intestinal contents, the drainage of a part of the intestine will continue to be carried out, but there may not be drainage of the area we need most, i.e. the area of the anastomosis. Even by introducing a radiopaque substance into the tube, the surgeon will not be able to determine whether the tube is working or not, since it will flow from numerous holes and will not reach the end. For the same reason, the tube cannot be completely flushed to restore its patency.

According to various authors, ineffective naso-enteric intubation in patients after resection of the small intestine was the cause of suture failure of the inter-intestinal anastomosis in 12.7–21.3% of cases (15-17).

The high incidence of entero-entero anastomosis leaks prompted us to improve the standard gastro-intestinal tube. The standard enteral tube improved by us, due to the technical features of the structure, has certain advantages over existing analogues, which consists in the possibility of selective decompression, drainage and enteral lavage of the area of intestinal sutures; with the development of partial insolvency of the sutures, limiting the anastomosis zone on both sides prevents isolating this area from the intestinal contents and promotes the healing of the insolvency zone; performance of X-ray contrast study allows diagnosing the inconsistency of the sutures of the inter-intestinal anastomosis. As a result of the use of the model improved by us, it was possible to achieve a decrease in the number of complications in the area of intestinal sutures and the associated postoperative mortality, as well as to reduce the number of days spent by patients in the hospital.

Conclusion. To prevent the failure of inter-intestinal anastomoses, it is necessary to use the enteral tube, which we improved, which allows us to delimit the anastomosis zones from the intestinal contents, reduce intra-intestinal pressure, which will contribute to the speedy healing of entero-entero anastomosis.

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