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COMPARISON OF THE DIFFERENT ANASTOMOTIC TECHNIQUES USED IN EMERGENCY ABDOMINAL SURGERY

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The chosen anastomotic technique plays an important role in the outcome of intestinal resections. However, there is no consensus among surgeons regarding the choice of anastomotic technique. In order to contribute to solving the problem, we conducted a clinical study that included 576 patients. We compared the results of end-to-end and side-to-side anastomoses that were performed in emergency surgeries. In both groups – in our own practice and in the retrospective group side-to-side anastomoses had better results. This can be explained by post-traumatic edema narrowing the anastomosis, separation of the intestinal wall from their mesentery at least 1.5–2 cm, and taking into the suture of the straight intramural arteries close to the suture line in end-to-end anastomoses. It can be concluded that side-to-side anastomoses are recommended during bowel resections in emergency surgery.

Key words: different anastomotic techniques, end to end anastomoses, side to side anastomoses, postoperative complications, anastomotic leakage.

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ПОРІВНЯННЯ РІЗНИХ ВИДІВ АНАСТОМОЗІВ, ЯКІ ВИКОРИСТОВУЮТЬСЯ У НЕВІДКЛАДНІЙ ЧЕРЕВНІЙ ХІРУРГІЇ

Обрана техніка анастомозу відіграє у результаті резекцій кишечника. Однак серед хірургів немає єдиної думки щодо вибору техніки анастомозу. Щоб зробити свій внесок у вирішення цієї проблеми, ми провели клінічне дослідження, в якому взяли участь 576 пацієнтів. Ми порівняли результати накладання анастомозів «кінець у кінець» та «бік у бік», виконаних в екстрених операціях. Як в основній, так і в контрольній групі, анастомози «бік у бік» мали найкращі результати. Це може пояснюватися посттравматичним набряком, що звужує анастомоз, відпрепарування стінок кишечника від їх брижі не менше ніж на 1,5-2 см і взяттям у шов прямих інтрамуральних артерій, розташованих поблизу лінії шва в анастомозах за методом «кінець в кінець».

Ключові слова: кишкові анастомози; анастомози кінець у кінець, анастомози бік у бік, неспроможність кишкових анастомозів, анастомозит.

A number of measures are taken to prevent intra-abdominal complications from developing after emergency bowel resections that are performed against background peritonitis and acute intestinal obstruction. These measures are divided into tactical and technical aspects. One of the tactically important issues is the choice of anastomotic type. End-to-end, end-to-side and side-to-side intestinal anastomotic configurations can be performed in surgical practice. Even though the type of anastomosis may affect post-operative outcomes, it is controversial which anastomotic technique is more appropriate for emergency surgical procedures, there is no widely accepted standard approach for emergency surgeries and the choice of anastomosis is mainly dependent on the surgeons' preference. Some authors recommend end-to-end [6, 9, 12], some side-to-side [2, 3, 5, 10] and others end-to-side intestinal anastomoses [4, 7, 8, 11].

The purpose of the study was to determine and justify the optimal type of anastomosis for emergency bowel resections.

Materials and methods. We analyzed the outcomes of surgical treatment of 576 patients who underwent emergency bowel resection. 332 of them were the main group (MG) patients under our personal observation, and 244 patients' results were studied retrospectively. 118 (48.36 %) out of 244 patients in the comparison group (CG), had tumors of the intestines complicated by acute bowel obstruction and peritonitis, and 126 (51.64 %) underwent surgical intervention with diagnoses of bowel obstruction and peritonitis of non-tumor origin.

71 (60.2 %) out of 118 patients, who were operated on due to tumors of the intestines, underwent radical surgery, and 47 (39.8 %) palliative surgery. 21 (29.6 %) of those who underwent radical surgery had 24 primary anastomoses (2 anastomoses in different parts of bowels was created in 3 patients), and various stomas were created in 50 (70.4 %) patients. In the CG, 30 anastomoses were created in 27 patients, who underwent emergency resection of the intestines with the diagnosis of intestinal tumor complicated by acute bowel obstruction and peritonitis (24 anastomoses were created in 21 patients, and palliative bypass

anastomoses in 6 patients). 3 (10.0 %) of them were anastomoses of small intestine, 16 (53.3 %) ileocolic anastomoses, and 11 (36.7 %) colon anastomoses. 14 of them (46.7 %) were end-to-end, and 16 (53.3 %) side-to-side anastomoses.

126 (51.6 %) out of 244 patients in the CG, underwent emergency surgery due to non-tumor pathologies.

34 of them (27.0 %) were diagnosed with incarcerated hernias; 28 (22.2 %) intestinal strangulation; 4 (3.2 %) thromboembolism of mesenteric arteries; 33 (26.2 %) bowel obstruction caused by adhesions; 6 (4.8 %) intestinal perforation; 9 (7.1 %) blunt abdominal trauma, 5 (4.0 %) stab injuries and 7 (5.6 %) firearm injuries of abdominal organs.

In 80 out of these 126 (63.5 %) patients, the surgeries were completed with the creation of anastomoses, and in 46 (36.5 %) with ileo- and colostomies. In 3 patients, preventive ileostomies were created along with anastomoses in the left colon. Totally, 80 anastomoses and 49 ileo- and colostomies were created in 126 patients.

143 (43.1 %) out of the 332 patients in the MG, had tumors complicated by bowel obstruction and peritonitis, and 189 (56.9 %) underwent surgeries due to bowel obstruction and peritonitis of non-tumor origin. 112 (78.3 %) of the emergency surgeries performed due to tumors, were radical, and 31 (21.7 %) palliative. 73 (65.2 %) of the radical surgeries completed with the creating anastomoses, 39 (34.8 %) of ileostomies and colostomies.

43 (22.8 %) of the patients who underwent emergency surgeries due to non-tumor pathologies, had incarcerated hernias; 6 (3.2 %) entero-enteric (1) and ileo-colic (5) intussusceptions; 49 (25.9 %) intestinal volvulus; 6 (3.2 %) thromboembolism of mesenteric arteries; 34 (18.0 %) bowel obstruction caused by adhesions; 15 (7.9 %) intestinal perforations; 17 (9.0 %) blunt abdominal trauma; 8 (4.2 %) stab injuries and 10 (5.3 %) firearm injuries of abdomen; 1 (0.5 %) patient narrowing of the previous anastomosis. We mainly preferred to use side to side technique for the construction of the anastomoses.

Thus, 175 (74.5 %) out of 235 MG patients were used side-to-side and 60 (25.5 %) end-to-end anastomoses. In the CG, in 37 (33.6 %) out of 110 anastomosis patients, were used side-to-side, in 68 (61.8 %) end-to-end, and in 5 (4.6 %) end-to-side techniques (Table 1).

Table 1

The anastomotic types created in the main and control group patients

Anastomoses	Control group			Main group	
	End-to-end	Side-to-side	End-to-side	End-to-end	Side-to-side
Small bowel anastomoses	40 (36.4 %)	19 (17.3 %)	—	26 (11.1 %)	84 (35.8 %)
Ileocolic anastomoses	6 (5.5 %)	13 (11.8 %)	2 (1.9 %)	3 (1.3 %)	28 (11.9 %)
Colon anastomoses	22 (20.0 %)	5 (4.6 %)	3 (2.7 %)	31 (13.2 %)	63 (26.8 %)
Total	68 (61.8 %)	37 (33.6 %)	5 (4.6 %)	60 (25.5 %)	175 (74.5 %)

In order to prevent anastomotic leakage, along with traditional methods of treatment, we used continuous intra-muscular block and lymphotropic treatment, tube decompression, sanitation and enterosorption of the gastrointestinal tract during and after the surgery, and local laser-magnetic treatment of the anastomotic area [1].

Results of the study and their discussion. When analyzing the results obtained, it was found that the main indications for emergency resection of the intestines include acute intestinal obstruction of tumor origin, incarcerated hernias of abdominal wall, strangulated intestines, bowel intussusception, stab and firearm injuries of the intestines, peritonitis due to intestinal perforation, thrombosis and thromboembolism of the mesenteric vessels. In our studies many cases of intra-abdominal complications were observed due to the violation of the biological integrity of intestinal anastomoses created using end-to end and side to side techniques.

In 30 (27.3 %) ($p < 0.001$) patients in the comparison group, and in 15 (6.4) ($p < 0.001$) patients in the main group were observed intra-abdominal complications (Table 2).

Table 2

Frequency of postoperative complications depending on different anastomotic techniques

Postoperative complications	Comparison group		Main group	
	End-to-end anastomoses	Side-to-side anastomoses	End-to-end anastomoses	Side-to-side anastomoses
Anastomotic leakage	12 (17.7 %)	5 (13.5 %)	5 (8.3 %)	3 (1.7 %)
Anastomositis	7 (10.3 %)	1 (2.7 %)	2 (3.3 %)	1 (0.6 %)
Narrowing of anastomosis	2 (2.9 %)	0	1 (1.7 %)	0
Acute bowel obstruction	2 (2.9 %)	1 (2.7 %)	1 (1.7 %)	2 (1.1 %)
Total	23 (33.8 %)	7 (18.9 %)	9 (15.0 %)	6 (3.4 %)

In the main group, 8 (3.4 %) ($p < 0.001$) of 235 primary anastomosis patients had anastomotic leakage; 3 patients had (1.3 %) ($p < 0.05$) anastomositis, 1 (0.4 %) ($p > 0.05$) narrowing of the anastomosis, and in 3 cases (1.3 %) ($p > 0.05$), post-operative acute intestinal obstruction of adhesion origin was observed. Peritonitis was diagnosed in 6, out of 8 patients (2.6 %) who developed anastomotic leakage; intra-abdominal abscess in 1 (0.4 %) and intestinal fistula in 1 (0.4 %). In the comparison group, 17 patients (15.5 %) ($p < 0.001$) had anastomotic leakage, 8 (7.3 %) ($p < 0.05$) anastomositis, 2 (1.8 %) ($p > 0.05$) narrowing of the anastomoses and 3 (2.7 %) ($p > 0.05$) acute bowel obstruction caused by adhesions (Fig. 1).

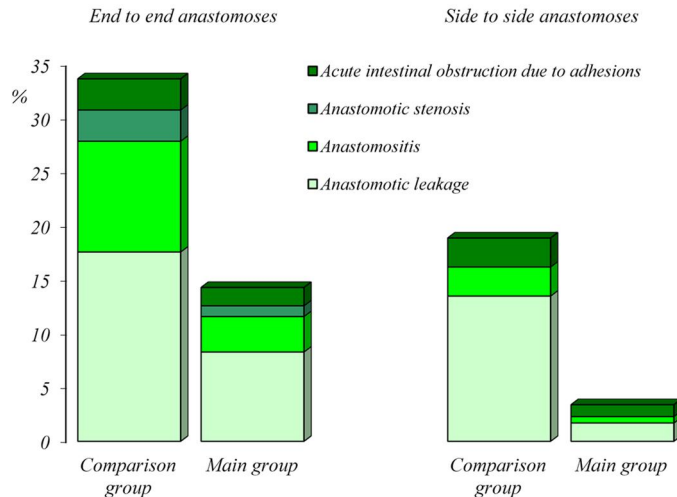


Fig. 1. The frequency of complications depending on type of anastomoses in main and comparison groups.

why complications were observed more in patients with end-to-end anastomoses in both the main and comparison groups.

For the creating the end-to-end anastomoses, it is important to separate (to perform mobilization) the afferent and efferent intestinal loops from their mesentery at least 1.5–2 cm. In such case the anastomotic line is going to be in ischemic area. It should be taken into account that the intramural arterial blood supply of the intestinal wall in the patients who are undergoing emergency surgery, without preoperative preparation is already impaired, in addition this fact deteriorates the ischemia, and the microcirculation of the anastomosis area worsens.

Moreover, since end-to-end anastomotic sutures are placed perpendicularly to the intramural blood vessels, these sutures act as a “ligature” for straight intramural arteries.

As a result, the blood supply of the anastomotic line is completely disturbed, edema increases in the suture line, inflammation and destructive processes intensify, reparative regeneration processes weaken, and these lead to secondary healing of anastomoses, or in many cases, to the large defects along the anastomosis, the anastomotic leakage, and this in turn leads to intestinal fistulas, intra-abdominal abscesses and peritonitis. Contact and intra-luminal pulse-motorographic investigations that we have carried out, confirmed this idea. Thus, in the pulse-motor graphic examinations of the anastomoses from the intestinal lumen and the surface of the serous membrane it was found that blood supply in the suture line in side to side anastomoses is less disturbed, than in end-to end anastomoses [1].

This, can be considered as contradicting the data of authors who prefer end-to-end anastomoses. However, some researchers who prefer end-to-end anastomoses also declare that the technic is more complicated than side to side method and apply special reinforcement means such as bioabsorbable polyglycolic acid sheet (Endo GIA™) when making end-to-end anastomoses [6]. And some authors admit that end-to end anastomoses more acceptable and convenient in elective surgery, such as a colostoma closure [9].

In emergency resections of intestines, the cases of acute bowel obstruction due to adhesions in the early period after end-to-end anastomoses were observed in 2.3 % of patients, while this complication was 1.4 % in patients with side-to-side anastomoses. The main reason for this was the anastomotic leakage due to a delay in healing as a result of impairment of regeneration processes in end to end anastomoses and the adhesion of intestinal loops to this area and the creation of inflammatory mass (aggregation).

The difference in the luminal diameters between the afferent and efferent intestinal loops in patients operated on the background of acute bowel obstruction leads to a serious problem in the creating of primary anastomoses. In this case, the approximating of the identical tissues along the suture line of the end-to-end anastomoses is not obtained normally, and this is one of the important factors that prevent the primary

regeneration of anastomoses. This condition leads to anastomotic stenosis. Anastomotic stenosis occurred only in patients with end to end double layered anastomoses in both main and comparison groups. This type of complication was not observed in anastomoses created by side-to-side technique. The researches of some authors also confirm the conclusion we reached. They create side to side anastomoses using linear stapler and call them the “functional end-to end anastomoses” [5]. But some surgeons consider end to side anastomoses more appropriate to eliminate the disparity in size observed in diameters [4, 7].

Regarding side to side technique, unlike end-to-end anastomoses, there is no need to perform mobilization of intestinal loops, there is no violation of microcirculation along the anastomotic line, the necrosis area of the mucous membrane edge is reduced, and as a result, the regeneration of the anastomosis is not impaired, healing proceeds primarily and takes less time. In side-to-side anastomoses, the direction of the stitches is parallel to the intramural vessels, so fewer vessels are taken into the “ligature” of the suture, which leads to the preservation of the arterial blood supply of the anastomotic area. Regardless of the difference in luminal diameters between the afferent and efferent loops, there is no problem for the appropriate approximating of identical tissues in side-to-side anastomoses. This condition has a significant positive effect on the regeneration of anastomoses. And it is widely accepted that a larger caliber of anastomotic line in side to side anastomoses contributes to the lower rate of overall postoperative complications including anastomotic stenosis and anastomotic leakage, reduces the incidence of reoperation [1, 2, 3].

In the other hand, post-traumatic edema in end-to-end anastomoses causes narrowing of the intestinal lumen, dilation of pre-anastomotic area, and microcirculatory disorders of the intestinal wall. These disadvantages are not encountered in side-to-side anastomoses.

Undoubtedly, the cause of anastomotic leakage in the primary anastomoses created in emergency conditions on the background of peritonitis and acute intestinal obstruction is not only the chosen anastomotic technique. There are a number of factors including the age, sex, body mass index, bad habits, comorbidities of patients, intramural arterial blood supply anastomosed intestines, intraluminal pressure, contamination of anastomotic area with virulent microorganisms, the severity of peritonitis, hypovolemia, hypoalbuminemia, cancer intoxication, technical perfection of the surgeon, capacity of postoperative care etc. that effect the anastomotic regeneration [2–12]. However, in our opinion, the choice of the type of anastomosis is also of great importance for the prevention of anastomotic leakage in primary anastomoses created in emergency conditions.

Although young doctors with little experience prefer end-to-end anastomosis, which is technically less complicated than side-to-side and end to side anastomoses, they should take into account the disadvantages of this technique in emergency surgery.

Conclusion

Taking into consideration all the ideas mentioned above, we can note that in emergency bowel resections, side-to-side anastomoses should be preferred. It is very important for the primary healing of anastomoses against the background of general peritonitis and acute bowel obstruction, as well as for the prevention of postoperative complications. Nevertheless, we are aware of the limitations of our study to make satisfying conclusion regarding the best type of anastomosis in emergency bowel surgery. However, our study might be useful on this subject, because so far in the world literature there are few studies comparing different anastomotic techniques in the emergency surgery.

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DISCRIMINATIVE MODELS OF THE POSSIBILITY OF VARIOUS FORMS OF URTICARIA OCCURRENCE AND CHARACTERISTICS OF THE COURSE IN UKRAINIAN MEN DEPENDING ON THE CHARACTERISTICS OF THE STRUCTURE AND BODY SIZE

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In Ukrainian men, on the basis of the characteristics of body structure and size, reliable discriminative models were built, which allow with a high probability to classify the subjects as “typical” for practically healthy or urticaria patients (correspondingly, the correctness of 83.6 % of cases, Wilks' Lambda statistic=0.113). Taking into account the structure and body size indices among men with urticaria, a reliable interpretation of the obtained classification indices is possible only between acute and chronic forms of the disease (correspondingly, the correctness of 60.0 % of cases, Wilks' Lambda statistic=0.620).

Key words: skin diseases, urticaria, anthropometric and somatotypological indices, discriminant models, men.

А.М.А. Аладван, Р.В. Скорук, І.М. Кириченко, С.В. Дмитренко, Д.Г. Смолко **ДИСКРИМІНАНТНІ МОДЕЛІ МОЖЛИВОСТІ ВИНИКНЕННЯ ТА ОСОБЛИВОСТЕЙ** **ПЕРЕБІГУ РІЗНИХ ФОРМ КРОПИВ'ЯНКИ В УКРАЇНСЬКИХ ЧОЛОВІКІВ** **У ЗАЛЕЖНОСТІ ВІД ОСОБЛИВОСТЕЙ БУДОВИ ТА РОЗМІРІВ ТІЛА**

В українських чоловіків на основі особливостей показників будови та розмірів тіла побудовані достовірні дискримінантні моделі, які дозволяють з високою ймовірністю віднести досліджуваних до «типових» для практично здорових або хворих на кропив'янку (відповідно коректність 83,6 % випадків, статистика Wilks' Lambda=0,113). При урахуванні показників будови та розмірів тіла між хворими на кропив'янку чоловіками можлива достовірна інтерпретація отриманих показників класифікації лише між гострою та хронічною формами захворювання (відповідно коректність 60,0 % випадків, статистика Wilks' Lambda=0,620).

Ключові слова: шкірні захворювання, кропив'янка, антропометричні та соматотипологічні показники, дискримінантні моделі, чоловіки.

The study is a fragment of the research project “The latest aspects of diagnosis, course, development and implementation in practice modern methods of chronic dermatoses and STDs complex treatment”, state registration No. 0119U000712.

Hives, or as it is also called urticaria, is an inflammatory disease of human skin and is clinically manifested as smooth or erythematous swelling of the skin with severe itching. The basis of this disease is the degranulation of mast cells, which can be caused by both immunological and non-immunological mechanisms. The trigger can be both mechanical irritation of the skin, and infectious diseases, medication, food intake, systemic concomitant diseases, etc. According to the duration of symptoms, acute urticaria is distinguished when the duration of the disease is less than 6 weeks, and chronic urticaria – when the disease lasts more than 6 weeks [10].

According to various data, in 25–75 % of patients, the duration of this disease is more than 1 year and causes, in addition to obvious problems with physical health, psychological problems as well. More than 30 % of patients have anxiety and depression. In addition, there is a negative impact on the quality of life. The last and no less important is the significant cost of treatment, which ranges from 900 to 2,400 US