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"END-TO-END" AND "END-TO-SIDE" COLORECTAL ANASTOMOSIS: DOES THE SELECTION OF SURGICAL TACTICS INFLUENCE INSUFFICIENCY OF THE APPARATUS ANASTOMOSIS?

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Abstract. "End-to-end" and "end-to-side" colorectal anastomosis: does the selection of surgical tactics influence insufficiency of the apparatus anastomosis? Savenkov D.Yu., Bielosludtsev O.D., Siryi S.S. *It is still uncertain whether the choice of "end-to-end" or "end-to-side" anastomosis affects the risk of anastomosis insufficiency, with low anterior resections of the rectum in patients with colorectal cancer. The aim of our work was to determine the influence of choosing the surgical tactics of overlaying colorectal "end-to-end" or "end-to-side" anastomosis on the frequency and severity of the anastomosis leak in patients after rectal resection and postoperative recovery period. A retrospective analysis of the medical documentation of patients after anterior resection of the rectum in relation to rectal cancer was performed. Depending on the type of anastomosis the patients were divided into two groups: group 1 – patients with*

"end-to-end" anastomosis, group 2 – patients with "end-to-side" anastomosis. Surgical complications including the frequency and severity of intestinal anastomosis leak were analyzed. The total number of postoperative complications among patients in group 1 was by 2 times more frequent than in patients in group 2, and analysis of their severity points on advantage of overlaying "end-to-side" anastomosis. Thus, in 3 (20.0%) patients of group 1 there was a partial failure of anastomosis of the class B, in 2 (13.3%) patients – a partial failure of anastomosis of the class C, in 2 (13.3%) patients there was peritonitis; in 1 (6.7%) patient we found lymphorrhea. While in patients of group 2 there were isolated complications (partial failure of anastomosis of class B was in 2 (14.3%) patients, postoperative seroma was in 2 (14.3%) patients. However, partial failure of anastomosis of class C, peritonitis or lymphorrhea were absent. The number of days from surgery to discharge in patients of group 2 was less (9 [7–13] days compared with 13.0 [9–20] days in patients of group 1). In patients with rectal cancer after anterior rectum resection, the choice of surgical tactics of overlaying of colorectal "end-to-end" or "end-to-side" anastomoses influences the frequency of formation of anastomotic leak;"end-to-side" anastomoses overlay reduces the frequency and severity of the colorectal anastomoses leak, which reduces the postoperative recovery period.

Реферат. Колоректальные анастомозы «конец-в-конец» и «конец-в-бок»: влияет ли выбор хирургической тактики на несостоятельность аппаратного анастомоза? Савенков Д.Ю., Белослудцев А.Д., Сирый С.С. *Еще не определено до конца влияние выбора аппаратного анастомоза «конец-в-конец» или «конец-в-бок» на риск возникновения несостоятельности анастомоза, при низких передних резекциях прямой кишки, у пациентов с раком прямой кишки. Цель: определить влияние выбора хирургической тактики наложения аппаратных колоректальных анастомозов «конец-в-конец» и «конец-в-бок» на частоту и тяжесть возникновения несостоятельности анастомозов у больных после передней резекции прямой кишки, а также на длительность послеоперационного восстановительного периода. Проведен ретроспективный анализ историй болезни пациентов, которым выполнена передняя резекция прямой кишки, в связи с раком прямой кишки. В зависимости от типа накладывания анастомоза, больные были разделены на две группы: группа 1 – больные с наложенным анастомозом «конец-в-конец», группа 2 – больные с наложенным анастомозом «конец-в-бок». Были проанализированы хирургические осложнения, в том числе частота и тяжесть несостоятельности кишечного анастомоза. Общее количество послеоперационных осложнений среди больных группы 1 было в 2 раза чаще, чем у больных в группе 2, а анализ их тяжести указывает на безусловное преимущество наложения анастомоза с использованием техники «конец-в-бок». Так, у 3 (20,0%) больных группы 1 возникла частичная несостоятельность анастомоза класса В, у 2 (13,3%) пациентов – частичная несостоятельность анастомоза класса С, у 2 (13,3%) больных – перитонит, у 1 (6,7%) больного – лимфорея. У больных группы 2 встречались единичные осложнения (частичная несостоятельность анастомоза класса В – у 2 (14,3%) больных, серома послеоперационной раны – у 2 (14,3%) больных, тогда как частичной несостоятельности анастомоза класса С, перитонита или лимфореи не наблюдалось. Количество дней от операции до выписки у больных группы 2 было меньшим и составило 9 [7-13] дней по сравнению с 13,0 [9-20] днями у больных группы 1. У больных раком прямой кишки после передней резекции прямой кишки выбор хирургической тактики наложения аппаратных колоректальных анастомозом «конец-в-конец» и «конец-в-бок» влияет на частоту развития несостоятельности анастомозов; наложение анастомозов «конец-в-бок» уменьшает частоту и тяжесть несостоятельности колоректальных анастомозов, что способствует сокращению послеоперационного восстановительного периода.*

Anastomotic leak is one of the most common and severe complications in colorectal surgery (especially in low colorectal or coloanal anastomoses), which not only leads to the need for additional surgery and prolonged hospitalization, but also worsens the disease course and increases hospital mortality [5]. The incidence of colorectal anastomotic leak varies from 6 to 30% of all cases and depends on various risk factors [4, 6].

Thus, in 2013, an international group of researchers conducted a large-scale systematic meta-analysis of surgical failures during anterior resection of rectal cancer, which aimed to identify the frequency of intestinal failure and its severity [3, 7]. Among 24288 patients analyzed, intestinal anastomotic leak occurred in 2085 (8.58%). The incidence of asymptomatic leak (class A according to the classification system of the International Research Group on Rectal Cancer (ISGRC)) was 2.57%, the incidence of leak that required active intervention without relaparotomy (class B) was 2.37%, and the incidence of leak requiring relaparotomy (class C) was 5.40%.

In addition, modern authors are constantly searching for endogenous, intra- and postoperative factors that affect the leak of colorectal anastomoses. For example, a recent analysis made by American scientists and surgeons has shown that cachexia, immunosuppression, non-steroidal anti-inflammatory drugs, diabetes, etc. increases the frequency of this surgical complication [8]. Among intraoperative factors, the technique of intestinal anastomosis remains the most debatable. Despite the growth of surgical techniques in general, it has not yet been fully determined whether the choice of "end-to-end"

or “end-to-side” hardware anastomosis affects the risk of anastomotic leak.

The aim is to determine the influence of the choice of surgical tactics of imposing hardware colorectal "end-to-end" and "end-to-side" anastomoses on the incidence and severity of anastomotic leak in patients after anterior resection of the rectum.

MATERIALS AND METHODS OF RESEARCH

We conducted a retrospective analysis of 29 case histories of patients who underwent anterior resection of the rectum for colorectal cancer in the Dnepropetrovsk Regional Oncology Center during 2017-2018. All patients underwent lymphatic dissection during surgery at the level of D3 (removal of apical lymph nodes with the intersection of the inferior mesenteric artery and venous entry). In all cases, the formation of a protective ileostomy was performed. The same circular suturing devices were used.

Depending on the type of anastomosis, patients were divided into two groups: group 1 – 15 patients (mean age – 64 [55-69] years, including men – 8 (53.3%)) with the imposition of an anastomosis "end-to-end ", group 2 – 14 patients (mean age - 65 [61-67] years, among them men – 8 (57.1%)) with the imposition of an anastomosis" end-to-side" (in the afferent intestine from the side of the antimesenteric edge). Patients in the groups were comparable in number and age. General clinical data and surgical complications, including the frequency and severity of intestinal anastomotic leak were analyzed. The severity of intestinal anastomosis leak was determined according to the classification system of the International Study Group Rectal Cancer (ISGRC) [7].

Statistical processing of the obtained research results was performed using biometric analysis methods implemented in the software packages EXCEL-2007 ® and the module nonparametric statistics STATISTICA 6.1 (StatSoft Inc., serial №AJAR909E415822FA) [1, 2].

RESULTS AND DISCUSSION

All analyzed patients were diagnosed with colorectal cancer. Thus, among patients in group 1, 7 (46.7%) patients were diagnosed with Cr. rectosygma, 6 (40%) – Cr. recti of the upper ampullary department, 1 (6.7%) – Cr. recti of the middle ampullary department, 1 (6.7%) – Cr. recti of the lower ampullary department. Among patients of group 2 the distribution of tumor localization was as follows: in 5 (35.7%) patients Cr. recti of the upper ampullary department was detected, in 3 (21.4%) patients – Cr. rectosygma, in 5 (35.7%) – Cr. recti of the middle-ampullary department, in 1 (7.1%) – Cr. recti of the lower ampullary department.

The distribution of patients according to the formulation of the clinical stage of the disease is presented in Table 1.

Table 1

Distribution of patients according to clinical stage of cancer

Clinical stage	Groups of patients		p, χ^2
	1 (n=15)	2 (n=14)	
1	2 (13.3%)	1 (7.1%)	0.006
2A	2 (13.3%)	3 (21.4%)	0.006
2B	5 (33.3%)	5 (35.7%)	0.06
3A	1 (6.7%)	0	0.007
3B	2 (13.3%)	2 (14.3%)	0.006
3C	1 (6.7%)	1 (7.1%)	0.002
4	2 (13.3%)	2 (14.3%)	0.006

The analyzed data indicate that according to the clinical stage of cancer, patients between groups did not differ statistically, this testifies that this indicator alone could not affect treatment results.

Before surgery, almost all patients both in group 1 (12 (80%) and group 2 (13 (92.9%) received neoadjuvant therapy: 9 patients (4 patients of group 1 and 5 patients of group 2) underwent neoadjuvant

radiation therapy), 5 patients (2 patients of group 1 and 3 patients of group 2) – one or more courses of neoadjuvant polychemotherapy, 12 patients (7 patients of group 1 and 5 patients of group 2) – neoadjuvant chemoradiation therapy. In addition, 2 patients (1 patient of group 1 and 1 patient of group 2) underwent intestinal stoma before the start of special treatment. The choice of neoadjuvant treatment of patients was chosen by a multidisciplinary commission based on local protocols.

The analysis of anamnestic data revealed that all patients of groups 1 and 13 (92.9%) patients of group 2 had concomitant pathology. The most common is coronary heart disease – 16 cases (10 patients in group 1 and 6 patients in group 2), hypertension – 16 cases (9 patients in group 1 and 7 patients in group 2), chronic gastritis or gastroduodenitis – 10 cases (8 patients of group 1 and 2 patients of group 2), type 2 diabetes mellitus – 3 cases (1 patient of group 1 and 2 patients of group 2). In addition, both among patients of group 1 and patients of group 2 there were isolated cases of moderate anemia, neutropenia, bronchoobstructive diseases, chronic cholecystitis, chronic pancreatitis and the like. Given the statistically insignificant difference between the incidences of various comorbidities among patients of both groups, we can conclude that this indicator did not affect treatment results.

All patients underwent planned treatment of concomitant pathology, standard preoperative preparation and surgical treatment - anterior resection of the rectum.

The analysis of the postoperative period and the development of complications directly related to surgery in patients of both groups are of particular interest (Table 2).

Thus, the total number of postoperative complications among patients of group 1 occurred 2 times more often than in patients of group 2, and the analysis of their severity indicates the unconditional advantage of using "end-to-side"anastomosis technique. Among patients of group 2, there was no case of anastomosis leak of class C which is associated with peritonitis and the need for repeated surgery. In addition, there was a statistically significant difference between the groups in the number of days from surgery to discharge in the patients operated.

According to the histological examination of the material obtained during surgery, in the vast majority of patients there was a moderate type of tumor differentiation (in 14 (93.3%) patients of group 1 and 11 (78.6%) patients of group 2), which could not affect treatment results either.

Table 2

Postoperative complications and duration of postoperative period in cancer patients

Indicator	Groups of patients		p, χ^2
	1 (n=15)	2 (n=14)	
Presence of postoperative complications including:	**8 (53.3%)**	**4 (28.5%)**	**0.00**
-partial anastomosis leak of class B;	**3 (20.0%)**	**2 (14.3%)**	**0.01**
- partial anastomosis leak of class C;	**2 (13.3%)**	**0 (0.0%)**	**0.00**
-peritonitis;	**2 (13.3%)**	**0 (0.0%)**	**0.00**
-seroma of postoperative wound;	**0 (0.0%)**	**2 (14.3%)**	**0.00**
-lymphorrhoe	**1 (6.7%)**	**0 (0.0%)**	**0.00**
Necessity of repeated surgical intervention	**2 (13.3%)**	**0 (0.0%)**	**0.00**
Number of days from surgical intervention to discharge from hospital, Me [25-75%]	**13.0 [9-20]**	**9 [7-13]**	**0.04***

Note: * – p between patients of different groups by Mann-Whitney U-test.

CONCLUSIONS

1. In patients with colorectal cancer after anterior resection of the rectum, the choice of surgical tactics of imposition of hardware colorectal anastomoses "end-to-end" and "end-to-side" affects the incidence of anastomotic leak.

2. Imposition of “end-to-side” colorectal anastomoses reduces the incidence and severity of colorectal anastomotic leak which helps to reduce the postoperative recovery period.

Conflict of interest. The authors declare no conflict of interests.

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