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Translation of the article

SURGICAL MODALITIES FOR SIGMOID COLON CANCER COMPLICATED BY DECOMPENSATED OBSTRUCTION

Svetlana N. Schaeva[1], Ekaterina V. Gordeeva[1], Ekaterina A. Kazantseva[2]

[1] Smolensk State Medical University of the Ministry of Health of Russia (Krupskaya str., 28, Smolensk, 214019, Russia)
[2] Clinical hospital № 1 (Frunze str., 40, Smolensk, 214006, Russia)

AIM: to evaluate the early and long-term results of emergency two-stage surgical procedures in patients with sigmoid colon cancer complicated by decompensated bowel obstruction.
PATIENTS AND METHODS: the cohort study included 112 patients with sigmoid colon cancer complicated by bowel obstruction that underwent emergency two-stage surgical procedures in general surgical and coloproctological units in 2011-2017. The group 1 (n=60) included patients who, at the first stage, underwent Hartmann's procedure, at the second stage – stoma reversal. The group 2 (n=52) included patients with a loop colostomy at the first stage and radical elective surgery as a second stage. The comparative analysis between the groups was carried out according to the following criteria: the type of surgery, the type of intestinal stoma, the rate and type of postoperative complications, postoperative mortality, resection status (R0/R1), the number of removed lymph nodes, the rate of adjuvant polychemotherapy (PChT).
RESULTS: postoperative mortality in the group 1 was 3.33% (n=2) and occurred after the first main stage (Hartmann's procedure), there were no deaths in group 2 (p=0.28). The procedures in group 2 fully met the criteria of oncological radicalism based on the number of lymph nodes examined and resection status (p<0.0001 and p<0.0001, respectively). Three-year overall survival at stage IIB in group 1 was 44.4% vs 75.2% in group 2 (p<0.0001); with IIIB in the 1st group – 60.3% vs 68.2% in group 2 (p=0.034); at IIIC in the 1st group – 35.7% vs 60.7% in the 2nd group (p=0.009). The 3-year disease – free survival at stage IIB in the 1st group was 41.7% vs 68.8% in the 2nd group (p<0.0001); with IIIB in the 1st group – 53.6% vs 64.5% in group 2 (p=0.036); at IIIC in the 1st group – 33.2% vs 60.8% in the 2nd group (p=0.023).
CONCLUSION: for sigmoid colon cancer complicated by decompensated obstruction, in general hospitals the stage treatment with the colostomy at the first stage is preferable.

[Key words: sigmoid colon cancer, decompensated obstruction, multistage surgery]

CONFLICTS OF INTERESTS: The authors declare no conflicts of interest.

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Address for correspondence: Schaeva S.N., Smolensk State Medical University of the Ministry of Health of Russia, Krupskaya str., 28, Smolensk, 214019, Russia; e-mail: shaeva30@mail.ru

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Complicated colorectal cancer is one of the most important problem of emergency abdominal surgery, as up to 60% of patients are admitted to general surgical hospitals in an emergency [1,2].

Despite significant progress made in the field of screening, prevention and early diagnosis of colorectal cancer, it is known that 10-30% of patients with colon cancer first show symptoms of acute bowel obstruction (ABO) [3-5].

Emergency surgery of tumor bowel obstruction is associated with a significant risk of complications and mortality (from 10 to 50%), as well as a high percentage of permanent or temporary colostomy (up to 67%), especially in left-sided tumor site, which is occurred in almost 80% of patients [4,6].

Which surgical procedure is most feasible here continues to be on the agenda of many meetings of coloproctologists, surgeons, and oncologists [1,4,7].

The subject of attention is also the assessment of the severity of the patient's condition, depending on which one or another method may be selected.

Complications caused by ABO threaten the patient's life, so in its treatment active surgical approach is preferable.

To date, there is no standardized surgical technique for the treatment of tumors in different parts of the left colon.

Depending on the tumor site, the patient's general condition and comorbidities, various surgical methods are used: Hartmann's procedure and left-sided hemicolectomy as well as the diversion stoma were the most often.

Table 1. *Distribution of the patients included in the study by clinical and morphological characteristics*

Factors	Total number of patients	Group 1	Group 2	*p*
Gender				
Females	64 (57.14%)	36 (60.00%)	28 (53.85%)	0.41
Males	48 (42.86%)	24 (40.00%)	24 (46.15%)	
TOTAL	112	60	52	
Age, years				
Average	65	62.4	65.0	0.11
0.95% CI	64.4-65.7	61.1-63.7	62.6-67.4	
Median	65	63	64	
General condition				
Moderate severity (5-8 points as per MODS)	39 (34.82%)	21 (35.00%)	18 (34.62%)	0.32
Severe (9-12 points, as per MODS)	66 (58.93%)	35 (58.33%)	31 (59.62%)	
Extremely severe (over 13 points as per MODS)	7 (6.25%)	4 (6.67%)	3 (5.76%)	
Stage as per the 7th edit TNM classification of malignant tumors				
IIB (pT4aN0M0)	34 (30.36%)	18 (30.00%)	16 (30.77%)	0.96
IIIB pT3N1M0 pT4aN1M0 pT3N2aM0	33 (29.46%) 12 (36.36%) 15 (45.46%) 6 (18.18%)	18 (30.00%) 6 (33.33%) 9 (50.00%) 3 (16.67%)	15 (28.85%) 6 (40.00%) 6 (40.00%) 3 (20.00%)	
IIIC pT4aN2aM0 pT3N2bM0 pT4aN2bM0	45 (40.18%) 18 (40.00%) 19 (42.22%) 8 (17.78%)	24 (40.00%) 10 (41.67%) 11 (45.83%) 3 (12.50%)	21 (40.38%) 8 (38.10%) 8 (38.10%) 5 (23.80%)	
Histological type of tumor				
Adenocarcinoma G1	1 (0.89%)	1 (1.67%)	0	0.115
G2	102 (91.07%)	53 (88.34%)	49 (94.23%)	
G3	4 (3.57%)	2 (3.33%)	2 (3.85%)	
Mucosal adenocarcinoma	2 (1.79%)	2 (3.33%)	0	
Undifferentiated	3 (2.68%)	2 (3.33%)	1 (1.92%)	

AIM

To evaluate early and long-term results of emergency two-stage procedures in patients with sigmoid colon cancer complicated by decompensated bowel obstruction.

PATIENTS AND METHODS

The cohort study included 112 patients with sigmoid colon cancer complicated by decompensated bowel obstruction, who underwent emergency two-stage procedures in general surgical and specialized units in Smolensk in 2011-2017.

In order to compare the early and long-term results, the patients were divided into 2 groups: group 1 (n=60) – patients who had a Hartmann's procedure at the first stage, and a stoma reversal at the second stage.

The group 2 (n=52) consisted of the patients who had a proximal loop stoma formed at the first stage, and at the second stage, after stabilization of the general condition, radical elective resection.

When determining the tumor site in the colon, the Paris anatomical classification was used [8], according to which all the tumors in this study corresponded to the localization in the sigmoid colon.

The severity of bowel obstruction was assessed by the degree of compensation in accordance with the classification of the "Association of Russian Coloproctologists" (2015).

This study included patients with decompensated obstruction only.

At the first stage, all the patients included in the study underwent emergency surgery in a general surgical unit.

The second stage in group 1 was performed in general surgical units, group 2-in specialized one (oncological or coloproctological).

The main characteristics of the patients included in the study are presented in table 1. The study groups were homogeneous by gender, age, general condition, tumor-associated factors (histological type of tumor, TNM stage).

The comparative analysis between the groups was done according to the following criteria:

1. the nature and type of surgery;
2. type of intestinal stoma;
3. rate and nature of postoperative complications;
4. postoperative mortality;
5. the resection status (R0/R1);
6. number of removed lymph nodes;
7. rate of adjuvant polychemotherapy (PCT).

Table 2. *Types of surgeries performed*

Type of operation	Total number of patients	Group 1	Group 2	*p*
TOTAL	112 (100%)	60 (100%)	52 (100%)	
Type of colostomy				
Transversostomia	38 (33.93%)	18 (30.00%)	20 (38.46%)	0.062
Sygmostomia	74 (66.07%)	42 (70.00%)	32 (61.53%)	
Type of resection surgery				
Left hemicolectomy	65 (58.04%)	24 (40.00%)	41 (78.85%)	0.023
Resection of the sigmoid colon	47 (41.96%)	36 (60.00%)	11 (21.15%)	

Table 3. *Parameters of the condition of the patients who underwent emergency surgical treatment*

Factors	Total number of patients	Group 1	Group 2	*p*
Postoperative complications according to Clavien-Dindo				
II	68 (77.27%)	45 (75.00%)	23 (82.14%)	0.01
IIIa	7 (7.96%)	6 (10.00%)	1 (3.57%)	
IIIb-AF1	5 (5.68%)	4 (6.67%)	1 (3.57%)	
IVa	6 (6.82%)	3 (5.00%)	3 (10.72%)	
V	2 (2.27%)	2 (3.33%)	0	
TOTAL	88 (100%)	60 (100.00%)	28 (100.00%)	
Resection status				
R0	101 (90,18%)	49 (81,67%)	52 (100%)	p<0,0001 p<0.0001
R1	11 (9.82%)	11 (18.33%)	0	
TOTAL	112 (100.00%)	60 (100.00%)	52 (100.00%)	
Number of lymphnodes in resected specimens				
0-3	1 (16.97%)	1 (31.67%)	0	p<0.0001
4-7	2 (24.11%)	27 (45.00%)	0	
8-11	5 (4.46%)	5 (8.33%)	0	
12 or more	61 (54.46%)	9 (15.00%)	52 (100%)	
TOTAL	112 (100.00%)	60 (100.00%)	52 (100.00%)	
Adjuvant treatment				
Adjuvant chemotherapy	69 (61.61%)	28 (46.67%)	41 (78.85%)	0.019
TOTAL	112 (100.00%)	60 (100.00%)	52 (100.00%)	

1AL – anastomotic leakage

Statistical analysis was performed using the software STATISTICA 10.

The differences between continuous variables in the two groups were detected using ANOVA single-factor analysis of variance and the Kruskal-Wallis test.

To identify differences in other features (expressed in the nominal scale), the Pierson criterion χ^2 was used.

The statistical hypotheses used for data processing were checked at the significance level $p \leqslant 0.05$.

The beginning of the countdown of time intervals of life in all cases was the date of the first procedure. Overall survival (OS) and disease-free survival (DFS) were assessed over a 3-year period (36 months) and analyzed using the Kaplan-Meyer method.

Statistically significant differences in survival curves were assessed using the χ^2 criterion and the log-rank criterion.

RESULTS

The distribution of the patients by performed surgeries is shown in table 2.

In the group 1, emergency surgery was performed using laparotomy.

In the group 2, a loop colostomy was created using mini-access in 73.1% (38/52), and laparotomy – in 26.9% (14/52). Stoma reversal in group 1 and radical resection in group 2 were performed through open access.

Sigmostomy prevailed as the type of bowel stome in both groups (table 2).

In the group 2 the main radical stage, left hemicolectomy was performed in 78.9% (n=41), more often than sigmoid colon resection – in 21.2% (n=11) in comparison with the group 1, where left hemicolectomy was performed in 40.0% (n=24), and sigmoid resection – in 60.0% (n=36) (p=0.023).

The type of postoperative complications is shown in table 3, which occurred both after the first and the second stages of surgeries. There were significant differences between the groups in severe postoperative complications (p=0.01).

Postoperative mortality within 30 days after surgery in the group 1 was 3.3% (n=2) and was recorded after the first main stage; there was no mortality in group 2 (p=0.28).

According to the data presented in table 3, the surgeries performed in group 2 fully met the criteria for oncological radicalism based on the number of examined lymph nodes and resection status compared to group 1 (p<0.0001 and p<0.0001, respectively).

In the group 1, the timing of the second stage (stoma reversal) depended on the fact of adjuvant treatment. Thus, in this group only 28 (46.67%) patients underwent adjuvant PCT, in whom the second stage of recovery surgery was performed in an average of 6.0±1.5 months. The remaining 32 (53.33%) patients did not receive adjuvant treatment for various reasons: in 14 patients the timing of PCT was violated due to severe postoperative complications, 4 patients were refused PCT because they did not have affected lymph nodes (N-), despite the fact that the negative prognosis factors were not taken into account – surgery in conditions of intestinal obstruction and less than 12 lymph nodes were examined, and 2 patients refused to undergo PCT. For this group, the stoma reversal stage was completed in an average of 2.0±1.5 months.

The time of the second main stage (radical resection) in group 2 averaged 1.0±0.5 months. Adjuvant PCT was performed in 78.9% (n=41) of patients with available indications.

Significant differences between the groups were observed in terms of 3-year survival rates. Three-year OS at stage IIB in group 1 was 44.4%, and in group 2 – 75.2% (p<0.0001); at IIIB in group 1 – 60.3%, in group 2 – 68.2% (p=0.034); at IIIC in group 1 – 35.7%, in group 2 – 60.7% (p=0.009). Significant differences in overall survival are shown in figure 1.

Indicators of 3-year DFS at stage IIB in group 1 were 41.7%, in group 2 – 68.8% (p<0.0001); at IIIB in group 1 – 53.6%, in group 2 – 64.5% (p=0.036); at IIIC in group 1 – 33.2%, in group 2 – 60.8% (p=0.023). Statistically significant differences in disease-free survival are shown in figure 2.

DISCUSSION

In this study, when analyzing the rate of severe postoperative complications, it was found that the latter were more likely in patients of the group 1 who underwent Hartmann's procedure.

Thus, the AL frequency after stoma reversal procedure in this group was 6.7% (n=4), which is significantly higher than in the second group, where the AL frequency after radical surgery was 3.6% (n=1) (p=0.01). In addition, in group 1 the postoperative mortality rate was 3.3%, whereas in group 2 there was no mortality. The presence of severe postoperative complications of IIIb-IVa significantly affected adjuvant treatment in group 1.

There are studies that also indicate a lower rate of postoperative complications in patients who have undergone colostomy at the first stage [9, 10].

According to other authors [11], there was no statistically significant difference in the rate of postoperative complications in patients who underwent Hartmann's procedure and those who had a proximal colostomy.

In this study, the groups were homogeneous in age and severity of the patients' general condition, but the patients of the group 1 underwent surgery at the first and second stages in a general surgical hospital, and the patients of the group 2 had the second – radical stage performed in specialized units (coloproctological, oncological).

According to a number of studies, the specialty of the surgical unit (colorectal/oncological vs general surgery) significantly affects the rate and severity of postoperative complications, which is confirmed by the results of this study [6,10,11,13].

It is important to note in group 2, all radical resections at the second stage in specialized surgical units completely met the oncological criteria for the volume

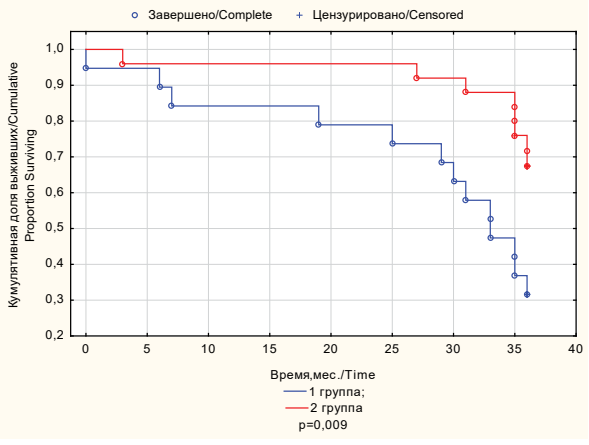

Figure 1. *OS in the groups at the IIIC (T4aN2aM0) stage of the disease*

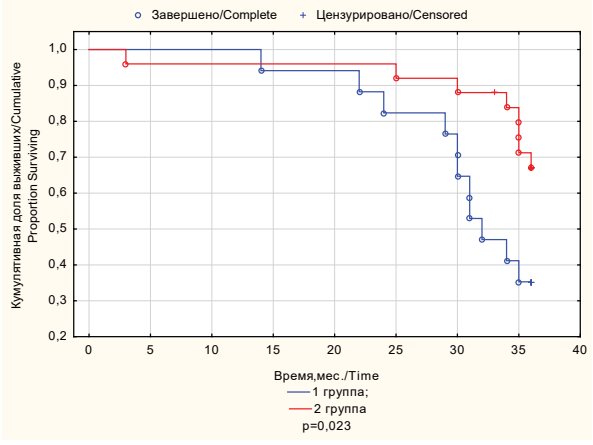

Figure 2. *DFS in the groups at the IIIC (T4aN2aM0) stage of the disease*

of lymph node dissection and resection status, which was not always found in group 1.

These circumstances are due to the fact that during Hartmann's procedure at the height of the obstruction, adequate lymph node dissection is difficult, as well as the fact that these procedures were often performed by surgeons at night time. Difficulties in performing it at the second stage can be explained by a severe adhesion sin the abdomen [9,11].

According to the results of the study, significant differences between the groups were found in 3-year OS and DFS at the IIB, IIIB, and IIIC stages.

They were significantly higher in the patients who had a proximal colostomy at the first stage.

Data from other studies regarding long-term results also show that multistage treatment is more effective when the first stage is performed with minimal volume aimed at eliminating bowel obstruction [1,2,9].

In the compared groups, the difference in 3-year OS and DFS at stages IIB and IIIB is noteworthy; thus, at IIIB, they were higher especially in group 1. This is explained by the fact that the majority of patients with IIIB received adjuvant treatment in contrast to stage IIB patients, who did not receive adjuvant treatment in the absence of metastases in the lymph nodes.

CONCLUSION

An effective method of treatment of tumor decompensated bowel obstruction in sigmoid colon cancer in general surgical unit is stage treatment with the proximal colostomy at the first stage, the second radical stage is preferable to perform in specialized hospitals (coloproctological, oncological).

Multistage treatment allows for continuity between emergency treatment of the developed complication and proper antitumor treatment.

THE PARTICIPATION OF THE AUTHORS:

Concept and design of the study: *Shaeva S.N.*
Collection and processing of the material: *Gordeeva E.V., Kazantseva E.A.*
Statistical processing: *Shaeva S.N.*
Writing of the text: *Shaeva S.N., Gordeeva E.V.*
Editing: *Shaeva S.N.*

AUTHOR INFORMATION:

Schaeva S.N. – https://orcid.org/0000-0002-1832-5255. SPIN: 6126-1894

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