# Surgical Treatment Selecting Method For Obstructive Cancer Of Rectosyhmoid Colon

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#### Abstract

This article is investigating colorectal cancer problem as the most common malignant tumor in gastrointestinal tract, often complicated by acute colonic obstruction. The article presents a comparative assessment of the results of the Hartmann operation and loop colostomy in colorectal cancer complicated by acute colonic obstruction. An analysis of the treatment of 156 patients with the corresponding pathology was carried out. The study was designed as a stratified randomized controlled trial with four strata divided according to age and American Society of Anesthesiologists' score. Each of which was divided into two subgroups according to the operation technique: loop colostomy or Hartmann operation. Performing the Hartmann operation is preferable for the elderly. Loop colostomy may be recommended for younger patients without serious comorbidities who can be prepared for urgent radical tumor removal surgery as early as possible, approximately two to three weeks after the first surgery.

**Keywords**: colon cancer, intestinal obstruction, Hartmann's operation, loop colostomy, postoperative complications, postoperative mortality, primary anastomosis.

## I. Introduction

Colorectal carcinoma is the most common gastrointestinal tract malignant tumor, which is often complicated by acute intestinal obstruction (Smith et al., 2022). In turn, acute intestinal obstruction requires early identification and surgical intervention in an emergency surgery (Sopuev et al., 2018; Ali et al., 2021). It is believed that about 70% of mechanical obstruction of colon is caused by colorectal tumors. Despite the significant progress that has been achieved in the field of cancer screening, prevention, and early diagnosis of colon cancer, it is known that 20% of patients with these tumors have signs of intestinal obstruction as an initial symptom (Krstic et al., 2014; Webster et al., 2019). Intestinal obstruction leads to impaired respiratory function due to decreased excursion of the diaphragm, while intraluminal

proliferation of microbes increases the risk of infection. Therefore, emergency surgery of intestinal obstruction is associated with significant complications and mortality, and in these conditions, in most cases, operation ends with a temporary or permanent colostomy (Mulita & Lotfollahzadeh, 2022; Webster et al., 2019).

There is still considerable controversy when it comes to the urgent surgical treatment of the left colon and rectum obstructive cancer. One of these problems is based on the choice of surgical tactics: 1) the formation of a loop colostomy and subsequent resection of the colon in two or three stages; 2) Hartmann's operation determined as colon resection with colostomy formation; 3) colon resection with a primary anastomosis formation (Mulita & Lotfollahzadeh, 2022; Webster et al., 2019). The main attention in this work will be paid to results of loop colostomy formation and Hartmann's operation.

According to the Great Britain and Ireland Coloproctology Association it was established that there are four important predictors of outcome: age, the American Society of Anaestesiologists (ASA) scale, the need for emergency surgery, and the Dukes modified TNM classification (Moran et al., 2017).

In a survey conducted by American Gastrointestinal and Endoscopic Surgeons Society, 67% of surgeons preferred Hartmann's surgery in high-risk patients, and 26% of those surveyed chose loop colostomy. Surgery has been identified as an independent risk factor for death after surgery, according to the French Surgical Association study. Based on these studies (only one of them was randomized), there is a recommendation from the Consensus Conference of the World Association for Emergency Surgery and the Association of Abdominal Surgery, which favors Hartmann's operation over looped colostomy level II, recommendation II (Krstic et al., 2014).

This study aim was to compare the Hartmann operation results and loop colostomy in colorec tal cancer complicated by acute colonic obstruction. We had evaluate both techniques and show which one is more appropriate in the emergency surgery setting using a stratified randomized trial. Nonsurgical complications and angina pectoris became risk factors for poor outcome, and there were no significant differences in surgical complications for both surgical techniques.

## 2. Research methods and materials

The study was conducted based on 156 patients' treatment results with colorectal cancer complicated by intestinal obstruction who received treatment at the National Surgical Center (NSC) in the Kyrgyz Republic from January 1, 2010 to December 31, 2019. The NSC is the main scientific and medical center in the Kyrgyz Republic and the clinical base of Kyrgyz State Medical Academy. All patients were operated by 7 experienced NSC surgeons. Patients with malignant peritoneal

carcinomatosis, lack of willingness to cooperate or with severe general health conditions were not included in this study. Age, gender, length of hospital stay, surgical and non-surgical complications, intraoperative and postoperative blood transfusions were subject to registration in the study.

This study was designed as a randomized controlled stratified study with four groups according to age and ASA score (over / under 60 and ASA score > 3). A loop colostomy is mainly performed to create a temporary stoma to move stool away from an area of the intestine that has been blocked by tumor. In this operation, the loop of the colon is removed through an incision in abdominal wall. Outside, hinge is held in place by a plastic bar that slides underneath. An incision is made in the intestine to allow intestinal contents to pass outward through the colostomy loop. Support rod was removed approximately seven to ten days after surgery, when healing occurs, which prevents the colon loop from being drawn into the abdominal cavity.

Hartmann's operation is consisting of the rectosigmoid part resection in the large intestine with the closure of the rectal stump and the final colostomy formation. During this operation, intestine affected area was removed, the intestine adjacent part is closed intraperitoneally, and the adductor intestine was excreted in the form of a colostomy; a high ligation of lymphatic vascular pedicle was performed.

Statistical analysis was performed using the SPSS 18.0 software. In addition to descriptive statistical methods (mean, standard deviation), we used the t-test, the chi-square test (X  $^2$ ) for quantitative comparisons and the Kaplan-Meier method for determining survival analysis. P <0.05 was considered statistically significant.

The study was approved by the Bioethics Committee of the Kyrgyz State Medical Academy named after I.K. Akhunbaev, each patient signed a written informed consent. All patients in this study were hospitalized patients at National Surgical Center in the Kyrgyz Republic Ministry of Health.

## 3. Results and discussions

The study is prospective, randomized, with the inclusion of patients depending on the surgery type of loop colostomy and Hartman's operation. Of the 156 patients in the study, there were 75 men and 81 women, the average age of observed patients was  $65.4 \pm 11.5$  (27 to 99) years. The average hospital stay was  $11.8 \pm 2.3$  days (5 to 35 days). In most cases, no differences between groups of loop colostomy and Hartmann's operation were found in each group (P = 0.319, P = 0.576, P = 0.902, respectively). The only significant statistical difference in the hospital stay length was found in case of reconstructive surgery after a looped colostomy (P = 0.004) in the fourth group (patients under 60 years of age with an ASA score < 3).

The type of surgery did not affect the blood test values at admission and during hospitalization (P = 0.319, P = 0.871, P = 0.712,

P = 0.843, P = 0.521, respectively, for blood parameters). With regard to surgical and nonsurgical complications, it was shown that there was no statistically significant difference between patients who received loop colostomy or Hartmann surgery as shown in Table 1. The amount of blood transfused also had no statistical difference in each of the four groups (P = 0.689, P = 0.848, P = 0.495, P = 0.687,respectively). Intraoperative blood transfusion also did not have a statistically significant difference (P = 0.303, P = 0.055, P = 0.272, P = 0.718, respectively), just as there was no difference in the overall mortality of patients operated on using these two methods (P = 0.451).

Table 1. N	<b>Monitored</b>	characteristics	depending	on the o	peration type.
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Stratific randomi group	ed zed s	> 60 god.,	$ASA \ge 3 > 60 \text{ god.}, A$		., ASA <3	$3 < 60 \text{ god.}, \text{ASA} \ge 3$		< 60 god., ASA < 3		
Surgical treatment	method	Loop colostom y	Hartman's operation	Loop colostom y	Hartman's operation	Loop colostom y	Hartman's operation	Loop colostom y	Hartman's operation	р
Age		63.4±12.1	66.2±10 .1	64.5±13 .6	65.9±12. 1	56.7±9. 8	58.8±8. 6	55.6±9.6	56.6±9. 9	p=0.67 8
lder	М	10(12.3% )	11(13.5 %)	8(9.8%)	12(14.8 %)	8(9.8%)	12 (14.8%)	7(8.6%)	13(16%)	p=0.55
Gen	F	7(9.3%)	13(17.3 %)	8(10.6% )	12(16%)	6(7.4%)	12(16% )	7(9,3%)	11(14.6 %)	1
gical Ipli- ons	Y es	1(25%)	2(40%)	2(50%)	2(40%)	1(25%)	1(20%)	-	-	p=0.57
Surg com cati	N o	14(25%)	28(30.7 %)	16(28.5 %)	26(28.5 %)	14(25% )	24 (26.3%)	12(21.4 %)	13(14.2 %)	9
gical li- ns	Y es	2(33.3%)	8(36.6%	2(33.3%	9(40.9% )	1(16.6% )	3(13.6 %)	1(16.6% )	2(9%)	n-0.34
Nonsur comp catio	N o	18(%)	24(%)	15(%)	20(%)	12(%)	17(%)	9(%)	13(%)	7
Mortali	ty	5(50%)	9(52.9%	3(30%)	5(29.4%	1(10%)	2(11.7 %)	1(10%)	1(5.8%)	p=0.45

Risk factors for lethal outcome did not include such indicators as age, gender, ASA score, type of surgical intervention and its complications due to their inconsistency with the specified parameters are shown in Table 2. In contrast, such indicators as the occurrence of nonsurgical complications and angina pectoris were identified as risk factors for death (P = 0.006, P = 0.001). The relative risk of death was 1.49 for patients with nonsurgical complications and 4 for patients with angina pectoris. Indicators such as blood transfusion, chronic renal failure, and diabetes mellitus did not affect survival (P = 0.427, P = 0.285, and P = 0.812).

Table 2. Risk factors associated with patients' mortality.

Observed risk factors	P value		
Age	P = 0.199		
Gender	P=0.155		
Index ASA	P = 0.764		
Type of operation	P = 0.452		
Surgical complications	P=0.724		
Non-surgical complications	P = 0.006		
Angina pectoris	P = 0.001		

Using the Kaplan-Meier method, it was shown that a statistically significant difference (P = 0.001) occurred only between two study groups in terms of in-hospital mortality. This is a group of patients over 60 years of age with ASA > 3 and a group of patients under 60 years of age with ASA < 3.

Colorectal cancer is the third most common cancer in the world in both men and women. In addition, colorectal cancer is the second leading cause of cancer death. In 53% of all colon cancers, the tumor is in the sigmoid or rectum. In recent decades, the incidence of colorectal cancer has been gradually increasing in patients under 40 years of age (Sawicki et al., 2021).

Colon cancer is diagnosed in two ways: when symptoms appear or as a result of screening programs. Despite significant advances in the optimization and application of screening programs for the detection of colorectal cancer, in about 20% of cases, colorectal cancer is diagnosed during surgery for colorectal obstruction (Siegel et al., 2020).

The presented study analyzes the results of treatment of patients with colonic obstruction caused by rectosigmoid cancer, without any information about the previous development of this disease. The average duration of hospital stay in the total series of the studied patients was

 $11.8 \pm 2.3$  days. The length of hospital stay between the compared groups (loop colostomy or Hartmann's operation) did not differ significantly, excluding stratum 4. The difference in the 4th group is explained by the fact that in this randomized group the age of the patients was below 60 years old, and the ASA index did not exceed 3 units. Patients in this group belonged to a young, healthy and working contingent. They underwent reconstructive operations without being discharged from the hospital after the primary surgical intervention. The short terms of reoperations in these patients are associated with their young working age. In a similar way, the period of initial postoperative rehabilitation was minimized and the return to work was accelerated. The length of hospital stay was shorter in patients undergoing Hartmann's surgery compared to the length of hospital stay after loop colostomy (Öistämö et al., 2016).

In both study groups of patients, no statistically significant differences were found in clinical and laboratory blood parameters during the period of stay in a hospital. From this, it can be concluded that approximately the same blood loss occurred during both surgical procedures, which did not significantly affect the volume of transfused blood. In addition, there was no statistically significant difference between the number of surgical complications and general complications in patients after using both methods of surgery. Consequently, both loop colostomy and Hartmann's operation can equally be attributed to the recommended methods for eliminating intestinal obstruction in cancer of the distal colon.

Mortality between all study groups did not statistically significantly differ, except for elderly patients with an ASA index > 3.

The results of our study are comparable with Krstic et al. (2014) data from a similar randomized scientific study and from the Cochrane Systematic Review (De Salvo et al., 2004).

Indicators such as age, gender, ASA score, type of surgery and its complications were not attributed to risk factors for death due to their inconsistency with the specified parameters. Also, non-surgical complications and angina pectoris are classified as risk factors for an unfavorable outcome of these surgical interventions. As a rule, complications of a nonsurgical nature concerned the cardiovascular system, more often encountered in elderly patients with higher ASA.

The analysis of in-hospital mortality according to the Kaplan-Meier method showed a statistically significant difference in only one case between the 2 study groups: the group of patients over 60 years of age with ASA of more than 3 units compared with the group of patients under 60 years of age and ASA indicators of less than 3 x units. This was the only group where the incidence of nonsurgical complications prevailed and it was confirmed that these complications are predictors of poor outcome. The poor outcome was apparently associated with cardiovascular disease and nonsurgical complications.

The results of this study show no significant difference between the two surgical procedures for treating colon obstruction caused by rectosigmoid carcinoma. Both methods, loop colostomy and Hartmann's operation, had approximately the same mortality and length of hospital stay. None of these surgical interventions have shown significant benefits in the treatment of colonic obstruction caused by cancer of the rectosigmoid colon (mortality and number of complications). The level of blood loss in both surgical procedures was relatively equal in relation to the need for intra- and postoperative blood transfusion.

Different approach in the surgical treatment of acute intestinal obstruction due to colorectal cancer is colon resection with a primary anastomosis. When carrying out a radical resection of the colon with the imposition of a primary anastomosis in 743 patients with acute intestinal obstruction caused by cancer of the colorectal colon, the final stage of the operation was different. All surgical interventions were performed in emergency surgery. In 57.9% of cases, colon was resected with a primary anastomosis, in 11.7% of cases is resection with a primary anastomosis and a protective stoma, and in 30.4% of cases, Hartmann's operation. The study group, where the surgical intervention ended with Hartmann's operation, was characterized by the composition of patients with multimorbidity, increased weight and male sex. There were no statistically significant differences between the study groups in terms of complications and nosocomial mortality. In addition, the presence of a protective stoma did not reduce the incidence of anastomotic leakage.

It is also indicated that in patients over 75 years old, Hartmann's operations were performed more often, even with rectal tumors without signs of acute intestinal obstruction (Sopuev et al., 2018).

According to our study results, the Hartmann's operation should be performed mainly in elderly patients with a high probability of a negative outcome of surgery higher ASA scores, with the rectosigmoid colon tumors advanced forms complicated by intestinal obstruction, and in the presence of pronounced stretching in the proximal intestine.

In our study, 68% of patients were  $\geq 60$ years old, most of them had advanced rectosigmoid tumors with distension of the adductor intestine and a threat to its viability. In these patients with numerous concomitant diseases, there were contraindications to the imposition of the primary anastomosis after colon resection; therefore, they underwent Hartmann's operation with additional high ligation of the lympho-vascular pedicle.

In both studied groups of patients, both after Hartmann's operation and after loop colostomy, there was a complication such as wound infection. There were 2 cases in each of the groups. Other complications as dehiscence of sutures or incompetence of the rectal stump, abscess of the abdominal cavity or dehiscence of sutures in the area of the laparotomic wound did not occur in these groups of patients. As already

failure (50%), postoperative pneumonia (33%) and suspense (17%). The occurrence of non-surgical complications is included in the group of risk factors for an unfavorable outcome.

Recent studies have shown that a promising part of the modern diagnostic and treatment algorithm can be the use of a combination of endoscopic and laparoscopic technologies in the management of patients with cancer of the rectosigmoid colon complicated by intestinal obstruction. We are talking about self-expanding metal stents (SMS), which allow you to drain the contents of the intestine before surgery for laparoscopic surgery. subsequent The preoperative installation of SMS did not worsen the indicators of oncological results and patient mortality (Fioriet al., 2021; Tung et al., 2013).

Zhao et al. (2014) analyzed five randomized controlled trials devoted to semi-selective surgery after SMS and emergency surgery. They showed that in obstructive rectosigmoid carcinoma, compared with emergency surgery, the introduction of SMS followed by semiselective surgery has a lower incidence of postoperative complications and wound infection at the surgical site, as well as a higher

## Conclusion

To conclude, the Hartmann operation with additional high ligation of the lympho-vascular pedicle is more preferable for the elderly. The positive aspect of Hartmann's operation is the removal of the tumor in patients who cannot be prepared for the next reconstructive operation in a short time. Younger patients without serious comorbidities may be advised to use a Loop noted, the incidence of surgical complications between these two groups under consideration did not have statistically significant differences. In terms of complications of a non-surgical nature, it was found that they occur more often. again, However, no significant statistical difference was found for nonsurgical complications between the two types of surgery. Most often, among these complications, we observed cardio vascular

incidence of primary anastomosis, thereby reducing the amount of colostomy. In their study, these authors did not reveal a statistically significant difference between the number of anastomotic leakage, between the frequency of the primary anastomosis and between 30-day mortality in the immediate postoperative period.

According to these studies, it can be concluded that there are good prospects behind the method of inserting self-expanding metal stents. The preliminary introduction of SMS reduces the complexity of surgical intervention and increases the results of oncological treatment indicators (Siegel et al., 2020). The authors analyzed sources from the Cochrane Library, Embase and Medline to assess complications and hospital mortality with these treatments and found no significant differences between them. Therefore, the method of preliminary colonic stenting in cancer of the distal colon requires further clinical study.

Colostomy because they can be prepared for an urgent definitive tumor removal surgery as soon as possible. That is, it can happen as early as two or three weeks after the first surgery. In these cases, the surgeon during the second operation has more preferable conditions relief of peritonitis and intestinal atony, improvement of tissue microcirculation, etc., which contributes to a better oncological approach or a high ligation of the lymphatic stem is required, which ultimately, most likely, will improve surgical and oncological results.

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