

## SURGICAL TREATMENT OF ACUTE INTESTINAL OBSTRUCTION CAUSED BY COLORECTAL CANCER

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Acute intestinal obstruction is a complex pathological condition which is in 90% of the cases caused by colorectal cancer (CRC). Unfortunately, despite the advances in diagnostics, in 20% of patients with this cancer the diagnosis is made on the operating table during the emergency surgery for acute obstruction of the colon. Mortality in emergency operations is 15-20%, while the morbidity is reported in 40-50% of the cases.

The aim of this study was to determine the incidence of acute intestinal obstruction caused by CRC, the localization of obstruction and types of applied surgical procedures.

A prospective clinical study was conducted at the Department of General Surgery, Clinical Center Niš and included patients treated for acute intestinal obstruction caused by colorectal cancer, in the period from 2011 to 2014. Due to acute intestinal obstruction caused by CRC, a total of 129 patients underwent surgery.

The mean age of treated patients was 60.2 years, the youngest patient was 42, and the oldest one was 80 years old. The largest number of patients was in T3 stage. Obstructive cancer was localized in the right colon in 34 (26.35%) patients, in the left colon in 53 (41.08 %) patients, and in the rectum in 42 (32.55%) patients. Total colectomy was performed in 2 (1.55%) patients, subtotal colectomy in 4 (3.1%) patients, right hemicolectomy was performed in 16 (12.40%) patients, left hemicolectomy in 6 (4.65%) patients, Hartmann's procedure in 29 (22.48%) patients, ileotransverse anastomosis in 11 (8.52%) patients, ileo-sigmoid anastomosis in 4 (3.10) patients, Miles' procedure in 3 (2.32%) patients, ileostomy in 2 (1.55%) patients, colostomy in 47 (36.43%) patients, and resection of the sigmoid colon in 5 (3.87%) patients. Out of 129 patients operated for acute intestinal obstruction due to CRC, 25 patients died, representing the morbidity rate of 35.65%, and the mortality rate of 19.37 %.

The final decision on the type of surgical procedure is made on the basis of surgical findings, general condition of patients, and experience of the surgeon. Each of these surgical procedures in the treatment of CRC has its advantages, disadvantages and indication areas. *Acta Medica Medianae 2015;54(4):18-23.*

**Key words:** acute intestinal obstruction, colorectal cancer, surgical treatment

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### Introduction

Acute intestinal obstruction (or ileus from Greek eileós) is a sudden break of intestinal passage. This is a complex pathological condition which is in 90% of the cases caused by colorectal

cancer (CRC). As the most common malignant tumor of the digestive tract, CRC is annually diagnosed in a million people worldwide, of which 600.000 die (1). Volvulus accounts for 5% of the obstructions, whereas diverticulitis is responsible for 3% of adhesions. Endometriosis, carcinoma-tosis, inflammatory disease and benign structures are rare (they are reported in about 1% of the cases). Despite significant advances in technology and surgical techniques, the mortality and morbidity following intestinal obstruction surgery are still high. The morbidity is reported in 40-50% of the cases, whereas mortality in emergency surgery is 15-20% (2, 3).

Acute intestinal obstruction is one of the biggest problems in abdominal surgery, because it is the cause of 20% of emergency admissions with as much as 10% of mortality. Unfortunately, despite the advances in diagnostics, in 20% of patients with this cancer the diagnosis is made on the

operating table during emergency surgery for acute obstruction of the colon (4). The site of an obstruction or cancer is mostly distal to the ileal flexure. Tumors that lead to obstruction are mostly locally advanced stages of neoplasms, with propagation in the form of infiltration of the surrounding structures and frequent distant metastases. Patients are usually in bad general condition due to an acute bowel obstruction as well as the underlying disease, with hydro-electrolyte imbalance and accompanying worsening of chronic diseases. In the course of the colon obstruction, changes are expressed in terms of absorption, secretion and motility. From clinical symptoms, intense pain, nausea, constipation and obstipation dominate, and clinical signs are mostly dominated by distension of the abdomen and palpable abdominal sensitivity, rarely fever and peritonitis.

The surgery is therefore very complicated because of difficult patients, unprepared intestine which is distended, filled with feces and gases, compromised circulation, which makes this surgery an extremely difficult surgical procedure (5). Urgent surgical treatment of the colon obstructive cancers is accompanied by a high percentage of created stoma, out of which in 60% of cases they remain permanent. Patient's age, general condition, localization and size of obstructive lesions, as well as the experience of the surgeon, are the key factors in determining the surgical strategy.

### Aim

The aim of this study was to determine the incidence of acute intestinal obstruction caused by colorectal cancer, the localization of obstruction and types of applied surgical procedures.

### Patients and Methods

A prospective clinical study was conducted at the Department of General Surgery, Clinical Center Niš and included patients treated for acute intestinal obstruction caused by colorectal cancer, in the period from 2011 to 2014.

The total number of treated patients due to intestinal obstruction caused by colorectal cancer was 129. All patients were operated on within 6-12h, and preoperative preparation included the following: correction of electrolyte imbalances, correction of acid-base imbalances, correction of anemia and blood glucose levels, administration of antibiotics (cephalosporins and metronidazole), placement of nasogastric suction, in certain cases the preparation of the distal colon (enema) and adequate treatment of comorbid conditions (cardiac, pulmonary, renal, metabolic). Radiological examination was performed in all patients. The compulsory part of the preoperative examination was digital rectal enema in order to assess the function of the sphincter apparatus in terms of continence and assessment of the presence of a tumor.

Sex, age, tumor location, the level of ob-

struction and surgical procedures were analyzed. Results were described in total numbers and percentage of frequency.

The localization of CRC is divided into:

1. Cancer of the right colon
2. Cancer of the left colon
3. Rectal cancer

The levels of obstruction caused by CRC are divided into:

1. Obstruction of the splenic flexure
2. Obstruction extending from the splenic flexure to the rectum
3. Obstruction at the level of the rectum

### Results

We analyzed all surgical procedures individually.

Because of the acute intestinal obstruction caused by CRC, a total of 129 patients underwent surgery, of which 76 men and 53 women. All patients were operated on within a 6 - 12h, after all necessary preparations.

Data on the distribution of patients by sex, age and stage of the tumor are shown in Table 1.

**Table 1.** Certain characteristics of patients

Patients	N=129	%
Men	76	58.91
Women	53	41.08
Mean age	60.20	
T1	15	11.62
T2	20	15.50
T3	89	68.99
T4	5	3.87
N0	71	55.04
N1	44	34.01
N2	9	6.97
N3	5	3.87
M0	124	96.12
M1	5	3.87

The median age of treated patients was 60.2 years, the youngest patient was 42 and the oldest 80.

The largest number of patients was in T3 stage (TNM classification) (Table 1).

Data from the operative findings related to the localization of obstructive carcinoma are shown in Table 2.

**Table 2.** Data from the operative findings related to the localization of obstructive carcinoma

Localization of the CRC	N	%
Obstruction of the right colon	34	26.35
Obstruction of the left colon	53	41.08
Obstruction in the rectum	42	32.55
Total	129	100.00

Obstructive cancer was localized in the right colon in 34 patients (26.35%), in the left colon in 53 (41.08%) patients and in the rectum in 42 patients (32.55%). Table 2.

**Table 3.** Type of surgical procedure

	N	%
Total colectomy	2	1.55
Subtotal colectomy	4	3.10
Right hemicolectomy	16	12.40
Left hemicolectomy	6	4.65
Hartmann's procedure	29	22.48
Ileotransverse anastomosis	11	8.52
Ileosigmoid anastomosis	4	3.10
Miles' procedure	3	2.32
Ileostomy	2	1.55
Colostomy	47	36.43
Resection of the sigmoid colon	5	3.87
Total	129	100.00

Total colectomy was performed in 2 (1.55%) patients, subtotal colectomy in 4 (3.1%) patients, right hemicolectomy was performed in 16 patients (12.40%), left hemicolectomy in 6 patients (4.65%), Hartmann's procedure was performed in 29 (22.48%) patients, ileotransverse anastomosis in 11 (8.52%) patients, ileosigmoid anastomosis in 4 (3.10) patients, Miles' procedure in 3 (2.32%) patients, ileostomy in 2 patients (1.55%), colostomy in 47 (36.43%) patients, resection of the sigmoid colon in 5 (3.87%) patients. (Table 3).

Out of 129 patients operated for acute intestinal obstruction due to colorectal cancer, 46 patients had complications, representing the postoperative morbidity rate of 35.65%. (Table 4).

Out of 129 patients operated for acute in-

**Table 4.** Type of postoperative complications

Type of complications	N=46	35.65%
Anastomotic leakage	7	5.42
Laparotomy dehiscence	2	1.55
Wound infection	6	4.65
Prolonged intestinal obstruction	5	3.87
Bowel fistula	1	0.77
Stoma complications	4	3.1
Cardiac complications	7	5.42
Respiratory complications	6	4.65
Urinary complications	8	6.2

testinal obstruction due to colorectal cancer, 25 patients died, representing the postoperative mortality rate of 19.37 %.

The cause of death postoperatively was MODS in 7 patients, anastomotic leakage in 5 patients, septic complications in 5 patients and cardio-pulmonary insufficiency in 8 patients.

**Table 5.** Cause of death

Cause of death	N=25	19.37%
MODS	7	5.43
Anastomotic leakage	5	3.87
Septic complications	5	3.87
Cardiopulmonary insufficiency	8	6.20

## Discussion

In patients with obstructive CRC in whom curative resection is possible, the localization of the lesion determines the extent of resection and the options available for resolving the primary problem. Malignant obstruction can occur in all parts of the colon and rectum. In a study conducted by Biondo and associates, in 82% of cases the acute obstruction was caused by some malignant process; in 40% the localization is proximal to the CRC of the splenic flexure, while in 60% it is distal to the splenic flexure; 18-27% of all patients who die after the CRC surgery are patients who had obstruction (6). In our study, an obstructing carcinoma of the splenic flexure was found in 34 (26.35%) patients, carcinoma extending from splenic flexure to the rectum was found in 53 (41.08%) patients, whereas obstructing carcinoma at the level of rectum was seen in 42 (32.55%) patients. In a series of YM Lee et al. in 2001, 56 % of the obstructions were localized distal to the splenic flexure (7). In modern surgery, there is no controversy regarding the surgical treatment of obstructive carcinoma of the right colon. Malignant occlusion of the right colon occurs in 8% of all CRC occlusions. In cases where surgery is possible, resection or the right hemicolectomy is performed with or without anastomosis. The situation is quite different when it comes to obstructing carcinoma of the left half of the colon, due to the fact that there are several ways of surgical treatment (8). All surgical techniques available in the literature are mainly applied in our study.

Total colectomy was performed in 2 patients, subtotal colectomy in 4 patients, right hemicolectomy was performed in 16 patients, left hemicolectomy in 6 patients, Hartmann's procedure was performed in 29 patients, ileotransverse anastomosis in 11 patients, ileosigmoidostomy in 4 patients, Miles' procedure in 3 patients, ileostomy in 2 patients, colostomy in 47 patients and resection of the sigmoid colon in 5 patients.

The traditional way of treating obstructive carcinoma of the left half of the colon involved

creating decompressive bipolar colostomy (ileostomy) proximal to the obstruction. In the second act the resection of the bowel tumor is done, creating thus anastomosis (9). Kronborg et al. have shown that there is no statistically significant difference in mortality, morbidity, recurrence of the disease and cancer specific survival among the groups, while the length of hospital stay was significantly higher in the group with bipolar colostomy (10). At the consensus conference of the International Association of Emergency Surgery, based on the analysis of papers published up to 2010, it was concluded that Hartmann's procedure is a better solution (the recommendation level is 2B). It is recommended that bipolar colostomy should be performed in patients who have multimodality therapy indicated, in patients with inoperable cases and critically ill patients (11). As far as Hartmann's operation is concerned, only 1/3 is performed as an elective procedure, and in most cases it can be performed in emergency situations (12). The benefit of this procedure is that there is no risk of anastomotic complications, considering that there is no creation of anastomosis (13, 14). In 60% of the cases, reconstruction follows the Hartmann's procedure so that in many patients a permanent colostomy remains. Anastomotic leakage occurred in 15% of cases, and the mortality rate was 10% after the reconstruction (15, 16). Theoretically, primary resection with anastomosis represents the best solution, because bowel resection and reconstruction are performed in one surgical procedure. The advantage of this surgery is that there is no need for creating a colostomy, and on the other hand, the disadvantage is that this operation is technically demanding. Based on the abovementioned, we can perform segmental resection (resection of the intestine with the tumor), subtotal colectomy (removes much of the colon) and total colectomy. A number of non-randomized studies have shown that the average mortality was 9%, and anastomotic leakage was found in 6% of the cases (1). Segmental resection was performed with or without intraoperative lavage. There are no randomized studies that can determine the value of this technique.

The advantage of the total colectomy compared to other methods of CRC treatment is that there is only one surgical procedure; creating anastomosis and intraoperative preparation of the

colon is not required. The small intestine, which is used for anastomosis, is of the same quality as in elective surgery. Likewise, the distal sigmoid colon or rectum below the obstruction is of the same quality as in elective surgery. The disadvantage of this operation is poor postoperative functional results (17). Given these shortcomings, a subtotal colectomy, as an alternative solution, is proposed. Its advantage is reflected in the fact that it saves the healthy right colon, thus functional results were better. The necessity of intraoperative preparation of the colon is a drawback here, as well as the failures in terms of oversight of synchronous tumors. In the only controlled randomized study that compared the results of subtotal and total colectomy and segment resection in patient with obstructing carcinoma of the left half of the colon it was shown that there was no statistically significant difference in terms of morbidity, mortality and complications (18). In our study after the surgery of acute intestinal obstruction caused by CRC, the mortality rate was 19.37 % and morbidity rate was 35.65%, which is consistent with the data available in the literature. In the study of Janjić et al., the mortality rate was 22.4%, and morbidity rate was 44% after surgery of intestinal obstruction caused by CRC in the group of 250 patients (19). In a study conducted by Biondo S., death occurred in 44 (18.8%) patients (6). Local aggressiveness of colon cancer, delay in diagnosis and urgent surgical exploration have an impact on the increase in morbidity and mortality (20).

## Conclusion

To conclude, despite many years of experience in the treatment of obstructive colorectal cancer, despite the large number of studies, there is still no clear stand on the choice of operative technique. Today, the priority is given to surgery in one act, because of the evidence that this approach does not put patients at higher risk of complications and death. However, the final decision to render on the type of surgical procedure is made on the basis of the surgical findings, general condition of the patients, experience of the surgeon and hospital where the surgery is performed. Each of these surgical procedures in the treatment of colorectal cancer has its advantages, disadvantages and indication areas.

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Originalni rad

UDK: 616.345-006.6:616.34-007.272-089  
doi:10.5633/amm.2015.0403

## HIRURŠKO LEČENJE AKUTNE INTESTINALNE OPSTRUKCIJE UZROKOVANE KOLOREKTALNIM KARCINOMOM

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Akutna intestinalna opstrukcija je kompleksno patološko stanje koje je u 90% slučajeva izazvano kolorektalnim karcinomom. Nazalost, i pored napretka u dijagnostici, kod 20% bolesnika sa ovim karcinomom dijagnoza se postavlja na operacionom stolu, u toku hitne operacije zbog akutne opstrukcije debelog creva. Mortalitet kod hitnih operacija je 15-20%, dok je morbiditet 40-50%.

Cilj ovog rada bio je da se utvrde: incidencija akutne intestinalne opstrukcije izazvane kolorektalnim karcinomom, lokalizacija opstrukcije i vrste primenjenih hirurških procedura.

Prospektivna klinička studija sprovedena je na Klinici za opštu hirurgiju Kliničkog centra u Nišu. Ukupan broj operisanih bolesnika zbog akutne intestinalne opstrukcije uzrokovane kolorektalnim karcinomom bio je 129, u periodu od 2011. do 2014. godine. Prosečna starost bolesnika iznosila je 60,2 godine, najmlađi bolesnik imao je 42, a najstariji 80 godina.

Opstruktivni karcinom bio je lokalizovan kod 34 bolesnika (26,35%) na desnom kolonu, kod 53 (41,08%) na levom kolonu i kod 42 bolesnika (32,55%) na rektumu. Totalna kolektomija je urađena kod dva (1,55%) bolesnika, subtotalna kolektomija kod četiri (3,1%), desna hemikolektomija je urađena kod 16 (12,40%), leva hemikolektomija kod 6 (4,65%), Hartmanova procedura kod 29 (22,48%), ileo-transverzo-anastomoza kod 11 (8,52%), ileo-sigmo-anastomoza kod četiri (3,10%), Milesova procedura kod tri (2,32%), ileostoma kod dva (1,55%), a kolostoma kod 47 (36,43%) i resekcija sigmoidnog kolona kod 5 (3,87%) bolesnika. Od 129 bolesnika operisanih zbog akutne intestinalne opstrukcije izazvane kolorektalnim karcinomom, umrlo je 25 bolesnika, što predstavlja stopu mortaliteta od 19,37%, a stopa morbiditeta bila je 35,65%.

Konačna odluka o vrsti hirurške procedure donosi se na osnovu operativnog nalaza, stanja bolesnika i iskustva hirurga. Svaka od navedenih hirurških procedura ima svoje prednosti, nedostatke i indikaciono područje. *Acta Medica Medianae 2015;54(4):18-23.*

**Ključne reči:** akutna intestinalna opstrukcija, kolorektalni karcinom, hirurško lečenje