



The Treatment of Stercoral Peritonitis Caused By Colorectal Carcinoma

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Methods: Retrospectively we have analyzed two groups of patients. Group A: patients treated in period from 01.01.2001 to 31.12.2006, and group B consisted of patients treated from 01.01. 1995 to 31.12.2001. Surgical approach was different in those groups since we have accepted new strategies in the treatment of colonic perforations caused by CRC from the year 2000.

Results: In group A we have operated 56 patients, median age 62.9, in most of the cases (35.71%) SP was caused by carcinoma of the left colon. In group B, we operated 65 patients, median age 60.5, most of SP also caused by the cancer of the left colon (38.46%).

Keywords : *stercoral peritonitis (SP), colorectal carcinoma (CRC)*

GJMR-B Classification: *NLMC Code: WI 650, WI 600,*



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In both groups, there was similar number of minor complications (wound infection, peristomal abscess, personal irritation of the skin, stomal necrosis) 34 in group A and 39 in group B. This was not the case for major complication were in group A we recorded 30 different major complications (wound dehiscence, anastomotic leakage, intraabdominal abscess, fistula formation, and stomal retraction) opposed to 63 in group B. The higher percentage of complications in group B reflected to higher mortality rate (60%), opposed to mortality rate of 30% in group A.

Conclusion: Following new strategies in the treatment of stercoral peritonitis caused by CRC in recent years, we have managed to reduce rate of postoperative complications and mortality as well as hospital stay among these patients.

Keywords : *stercoral peritonitis (SP), colorectal carcinoma (CRC)*

Rezime - Sterkoralni peritonitis (SP) uzrokovan perforacijom debelog creva zbog kolorektanog karcinoma (CRC) jedan je od najtežih oblika zapaljenja peritoneuma, kompleksne kliničke slike. Cilj ispitivanja je da, retrospektivno-prospektivnom studijom naših bolesnika, utvrdimo učestalost (CRC) kao uzroka SP, način lečenja, postoperativne komplikacije, dužinu hospitalizacije i mortalitet bolesnika. Bolesnici su podeljeni u dve grupe: grupa A (od 01.01.2001-31.12.2006. god) i grupa B (od 01.01.1995 do 31.12.2000 god.). Podela je urađena na osnovu uvođenja i poštovanja novih stavova u lečenju CRC i SP (grupa A). U grupi A, operisano je 56 bolesnika, prosečne starosti 62,9 godina: najviše sa karcinomom levog kolona -20 (35,71%).. U B grupi

operisano 65 bolesnika prosečne starosti 60,5 god., najviše sa karcinomom levog kolona -25 (38,46%)

Hirurški postupci kod ovih bolesnika su se razlikovali što je rezultovalo većom stopom komplikacija i smrtnosti. U A i B grupi lakših komplikacija je bilo oko 60%, dok je težih komplikacija u A grupi bilo oko 53% , a u B grupi oko 96%. Visok procenat težih komplikacija u B grupi odrazio se i na stopu smrtnosti koja je u B grupi iznosila 60%, dok je u A grupi bila duplo niža. Poštovanjem algoritama lečenja CRC i SP skraćuje se dužina hospitalizacije bolesnika, smanjuje nastanak komplikacija i mortalitet.

Ključne reči : *stercoralni peritonitis, kolorektalni karcinom*

I. INTRODUCTION

Stercoral peritonitis (SP) represents inflammation of visceral and parietal peritoneum caused by various bacterial species. This is a secondary peritonitis and it represents severe type of intraabdominal infection and abdominal related sepsis. Due to surgery and effective modalities of medical treatment, extremely high mortality rate of 90% from the beginning of the century has reduced to 15-40%.

The aim of our study is to establish colorectal carcinoma (CRC) as a cause of SP, type of surgery, postoperative complications, hospital stay and mortality during two periods. We'll analyze whether following new strategies in the treatment of stercoral peritonitis caused by CRC in recent years, we have managed to reduce rate of postoperative complications and mortality as well as hospital stay among these patients.

II. MATERIAL AND METHODS

This is retrospective-prospective study of our patients treated for stercoral peritonitis caused by CRC at Surgical Clinic, Clinical Center Nis. We have analyzed two groups of patients. Group A: patients treated in period from 01.01.2001 to 31.12.2006, and group B: patients treated from 01.01.1995 to 31.12.2001. We analyzed type of treatment, hospital stay, postoperative complications and mortality. Surgical approach was different in those groups since we have accepted new strategies in the treatment of colonic perforations caused by CRC from the year 2000.

III. RESULTS

In group A we operated 435 patients for peritonitis, 56 of them had SP (12.87%) caused by CRC. Male gender predominated: 38(67.87%) men opposed

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to 18(32.14%) women, mean age 62.9 years (51-76). In group B we recorded 326 patients with peritonitis, 65(19.23%) of them had SP caused by CRC. There were 37(56.92%) men and 28(43.07%) women, mean age 60.5 years (37-84 years). In both groups most of patients had left-sided CRC: group A 20 pts (35.71%) and in group B 25 (38.46%) (Table 1). With further analysis of our results we established significant difference in type of surgery among those groups (Table 2a, 2b and 2c).

There is difference in rates of postoperative complications among groups. We recorded minor complications as: wound infection, peristomal abscess, stomal necrosis, parastomal skin irritation, and major complications as: wound dehiscence, anastomotic leakage, postoperative abscesses of abdomen, stercoral fistula formation and retraction of stoma (Table 3). Average hospital stay in group A was 16 days (10- 22 days), and in group B 21 day (11-31 day). Mortality in group A and group B according to type of surgery is described in Table 4.

IV. DISCUSSION

Stercoral Peritonitis (SP) is a severe disease with an uncertain prognosis. Due to high concentration of aerobic, endotoxins of Gram-negative and especially egzotoxins of anaerobic bacteria, a quick penetration of these components occurs resolving in diffuse peritonitis, systemic infection and sepsis. Toxins primarily affect heart cells, endothelium, hepatocytes, kidney cells, and cells of immune system. Because of the ischemic, toxic and metabolic damage, cell necrosis occurs leading to septic shock and multiple organ failure in the end. **Acute Physiology Score (APS)** is commonly used to describe the intensity of pathophysiological disorder, while **APACHE II** score helps in describing the incidence, morbidity and mortality rate. Patients with SP are placed in the third group with mortality rate of over 40% according to this score.

Treatment of SP caused by colonic carcinoma considers:

- A. Permanent and successful elimination of septic source (respecting oncology principles)
- B. Evacuation of necrotic and purulent content out of abdominal cavity

Removing the cause of infection is basically the most important step in surgical treatment of SP. CRC is the third most common form of cancer, equally distributed in both gender. Etiology of origin is unknown and risk factors are various (2). Complications aside, this cancer is followed by a high rate of mortality, and 5-year rate of survival correlates to the stage of carcinoma (Dukes A – about 90%; Dukes C – less then 60%) in case of elective surgery.

The very first principles of diagnosis and treatment of SP were noted during Hippocrates's era,

while the first principles of surgical treatment were set by Martin Kirschner in 1926. SP is an acute condition, demanding an urgent surgical treatment. Reanimation and preoperative treatment consider besides the correction of hypovolemic and acidobase balance, a prophylactic use of antibiotics. The presence of CRC is often discovered during operation; therefore the surgeon is forced to decide about the type of operation according to the pathological finding and patient's condition.

The first colostomy used as a procedure to resolve intestine perforation caused by CRC, was created in 18th century. The basic principles of this treatment were set by Mikulicz (Vorlagerungs methods). This way of treatment was preformed for decades, until two stage procedure and the immediate anastomosis were introduced. If the SP is caused by perforation of the right colon affected by carcinoma, right hemicolectomy with Brook's unipolar ileostoma is the common treatment. Immediate anastomosis is acceptable only if protective ileostoma was made. Right hemicolectomy without anastomosis is preformed far more often. Performing immediate anastomosis is related to a high risk of postoperative complications.

Carcinoma of the left colon and rectum resulting in SP is a special problem. It is recommended not to perform coloanoanastomosis during first stage of procedure, but to create a colostomy. Nowadays, reconstructive surgeons support immediate anastomosis of left colon even with presence of diffuse peritonitis and perforation, in strictly selected cases, explaining that this maneuver do not effect mortality and morbidity in patients (5).

It is considered that the risk of immediate anastomosis of right and left colon is the same if the patients are hemodynamically stable. Immediate anastomosis should not be considered only in hemodynamically unstable patients, whether obstruction or perforation of colon is involved (6).

Localization of carcinoma do not affect postoperative mortality and 5-year rate of survival (7,8), but patient's general condition, severity of SP, the promptness of preformed procedure, surgeon's skill (9), and whether oncological principles are respected(total lymphadenectomy) (10). Regardless of the procedure extensiveness, a 5-year rate of survival is 20-30%.

According to many colorectal surgeons of GBA (Grate Britain Association) it is possible to determine the risky patients (RIX- risk-stratification index) which would help in survival prognosis (11,12,13). The methods of treatment of SP caused by colorectal origin are still a subject of discussion: one or two stage operation. High rate of mortality in these patients (over 40%) leaves the question:

- A. Primary colostomy in patients in poor general condition. Postoperative occlusions of intestine after Loop ileostomy or Loop transversocolostomy are

quite often. Loop transversocolostomy is recommended only as protective colostomy (14).

- B. Intestine resection (along with tumor removal and lymphadenectomy) with immediate anastomosis and protective ileo or colostomy and finishing anastomosis during second stage. Postoperative mortality in this patients is 86%, while in those treated palliative is 39 % (15).
- C. Subtotal colostomy, if radical operation is needed, in patients in good condition (16,17).

After removing the source of infection the treatment is continued with evacuation of necrotic and purulent content out of abdominal cavity: mechanical cleaning, debridment, intraoperative lavage with ceftriaxon, and drainage of abdominal cavity. Some recent studies show that intraoperative lavage with ceftriaxon or metronidasol completely exclude the possibility of postoperative abscess development. According to some other authors, performing lavage with 20 l of saline solution decreases development of postoperative complications, abscesses and the need for reintervention.

Special attention should be paid to severe forms of **SP** when it is recommendable to proceed with closed postoperative lavage, which actually represents the continuum of intraoperative lavage. Using this method, the risk of developing adhesive ileus is decreasing. The method of choice in treatment of highly severe forms of **SP** is staging lavage with temporary abdomen closure, which avoids the negative effect of increased abdominal pressure and the risk of intestine perforation.

According to many authors, there is no difference in postoperative mortality between planned and relaparotomy on demand (18,19). Second-look operations can be quite useful in case of severe **SP** followed by expressed organ necrosis, and in patients that developed septic shock with consecutive coagulopathy.

Knowing and respecting the principles of medical approach in stercoral peritonitis caused by colonic cancer perforation, patients in group A were treated with following surgical procedures:

- Solving **SP**, which was presented as a late diffuse peritonitis in majority of patients.
- Removal of tumor, which was often perforated (regarding the oncological principles)
- Performing immediate anastomosis only in selected cases. The majority of patients underwent ileo and colostoma creation as well as Hartmann's procedure.

In patients in group A suffering from right colon carcinoma, right hemicolectomy with Brook's unipolar ileostoma was performed in 47.05%, while only 29.41% of patients underwent right hemicolectomy with immediate anastomosis. In patients with left colon carcinoma, the most performed procedure was colon

resection with unipolar colostoma (45%) and left hemicolectomy with bitubular colostoma (25%), while immediate anastomosis were not created. All patients suffering from rectal carcinoma underwent Hartmann's procedure (100%) (Table 2a).

Much more various procedures were performed in patients in group B. In patients with right colon carcinoma, right hemicolectomy with immediate anastomosis was used more often (54,16%), while right hemicolectomy with Brook's ileostoma was performed rarely (8,33). In patients with left colon carcinoma, colostomas were created the most (13,8%), while left hemicolectomy with immediate anastomosis was performed rather often (9,23%). Rectal carcinoma was solved equally by colostoma creation and Hartmann's procedure (43,75%) (Table 2b).

During this study, special attention was paid to the number and type of complications after the first stage of procedure. The study showed that patients were in terminal phase of disease, with poor preoperative condition and signs of systemic infection. Very often, surgical procedures had to be performed without adequate colon preparation, after brief and urgent preoperative reanimation. Postoperative complications (such as accretion of laparotomy "per secundam", laparotomy and anastomosis dehiscence, stercoral fistula) were rather the result of poor general condition in patients then inadequate operative technique (stoma complications, postoperative abscess, or other liquid collections in abdominal cavity, etc.).

According to results, about 60% of patients in Group A suffered from minor complications which were treated using conservative procedures, while 50% of patients suffered from serious complications treated both conservatively and operatively. The percentage of patients with minor complications were rather similar in Group B, while harder complications occurred far often – 96,92% of patients, among which 70% underwent reintervention (Table 4).

Cause of death was closely related to general condition of patients (azothemia, cardiovascular, renal or multiple organ dysfunction) and severity of primary disease. **SP** and **CRC** occurring separately are related to a high mortality rate, therefore this rate increases when they need to be treated at the same time. Mortality rate in group A was 32.14%, and 60% in group B. There is a significant difference between mortality rate in relation to the type of performed surgical procedure: in right hemicolectomy with unipolar ileostoma it was 37,5% in patients within group A, and 50% in group B; Hartmann's procedure, as a most frequently used procedure in rectal carcinoma, was related to a mortality rate of 42,1% in group A, towards 71,42% in patients in group B.

Prognosis, frequency of complications and mortality rate depend on various factors: Hinchey classification (Stage II-IV), APACHE II (> 19), SOFA

(score 8), MOF (score 7), Mannheim Peritonitis Index (MPI score 30), age of patients (over 65y.) – 26.9 % (20). According to results from 1994, mortality rate was 19.6 % (21), while in 2002, it was 16.9 %, although that's closely related to the type of procedure. When primary resection with anastomosis had been performed, mortality rate was 11.1%, though it was 22,2% when anastomosis was not included. Not one patient with MPI less than 25 passed away, while in patients with MPI from 26-36, mortality rate was 38.5 % (22). Localization of carcinoma also affects mortality rate. In left colon carcinoma it was 22.4 %, and if it had been associated to a high Peritonitis Severity Score (PSS) it was increased by 15.4 % (23). Mortality rate during the first 30 postoperative days, according to the results from 2001, was 14%, while one year survival was 55% and 5 year – 14%. Intestine perforation located proximal then carcinoma was related to a higher morbidity and mortality rate than perforation located on tumor itself (24). Intrahospital mortality during 30 days was 40.5 % in 2006, while during 2 years it was 64.3% (25). Further studies were performed trying to determine the difference between mortality and survival rate with perforative and non-perforative CRC. Mortality rate as well as metastasing in first 30 days was extremely high, while according to the results from 2008, 2 year survival was 47% in perforative and 54% in non-perforative carcinoma, and 5 year survival was 28% versus 33% (26).

Comparing these results to ours, which imply only for intrahospital mortality, results gained in group A were similar to the ones presented in literature, while results within group B were high above average.

V. CONCLUSION

SP caused by CRC is one of the most severe secondary peritonitis, and still is a great surgical issue. During examination period (group A) it was noticed in 12% of all peritonitis, while during control period (group B) it was rather often - 19%.

Surgical procedures used during treatment of patients in group A considered immediate anastomosis in 8.92%, while creation of unipolar ileostomy and colostomy were present in about 53%. In group B, immediate anastomoses were created in 30% of patients, and unipolar ileostomy and colostomy in nearly 60%. Total amount of minor complications in both groups was around 60%, while serious complications were presented with 53% in group A and 96% in group B. This significant difference between results referring to serious complications in our groups affected mortality rate, which was much higher in group B.

Considering that this were patients dealing with late stage of malignant disease, complicated with severe systemic disorders, shown results represent a fine success in treatment of this patients as well as the

improvement of surgical and reanimation procedures comparing to earlier results.

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Table 1 : Localization of CRC among our patients

	Group A		Group B		p
	n	%	n	%	
	17	30,35	24	36,92	0,57
	20	35,71	25	38,46	0,902
	19	33,92	16	24,61	0,355
	56	100	65	100	0,304

Table 2a : Type of surgery in group A (according to tumor localization)

	Total	Type of surgery	N	%
Right colon	17	RH with anastomosis	5	29,41
		RH with unipolar ileosomy Brook-u	8	47,05
		RH with ileostomy and transversecolostomy	2	11,76
		Cecostomy	2	11,76
Left colon	20	LH with unipolar colostomy	4	20
		LH with bipolar colostomy	5	25
		Cecostomy	2	10
		Resection with unipolar colostomy	9	45
Rectum	19	Hartmann' procedure	19	100
RH-right hemicolectomy; LH-left hemicolectomy				

Table 2b : Type of surgery in group B (according to tumor localisation)

	Total	Type of surgery	N	%
Right colon	24	RH with anastomosis	13	54,16
		RH with unipolar ileosomy sec Brooke	2	8,33
		RH with ileostomy and transversecolostomy	4	16,66
		Colostomy	2	8,33
		Cecostomy	3	12,5
Left colon	25	LH with anastomosis	6	9,23
		Cecostomy	2	8
		Colostomy	9	13,84
		Resection with unipolar colostomy	8	12,3
Rectum	16	Exteorisation of transverse colon	2	12,5
		Colostomy	7	43,75
		Hartmann' procedure	7	43,75
RH-right hemicolectomy; LH-left hemicolectomy				

Table 2c : Comparative analysis

	Type of surgery	Group A	Group B	p
Right colon	RH with anastomosis	5	13	0,147
	RH with unipolar ileosomy Brook-u	8	2	0,043
	RH with ileostomy and transversecolostomy	2	4	0,685
	Colostomy	0	2	0,499
	Cecostomy	2	3	0,999
Left colon	LH with anastomosis	0	6	0,03
	LH with unipolar colostomy	4	0	0,043
	LH with bipolar colostomy	5	0	0,019
	Cecostomy	2	2	0,999
	Resection with unipolar colostomy	9	8	0,74
	Colostomy	0	9	0,004
Rectum	Exteorization of transverse colon	0	2	0,499
	Colostomy	0	7	0,015
	Hartmann' procedure	19	7	0,004
RH-right hemicolectomy; LH-left hemicolectomy				

Table 3 : Postoperative complications

Complication	Group A	Group B	Total group A	Total group B	p
Wound infection	10 (17,85%)	11 (16,92%)	34 (60,71%)	39 (60%)	0,085
Peristomal abscess	3 (5,35%)	3 (4,61%)			
Stomal necrosis	5 (8,92%)	6 (9,23%)			
Parastomal skin irritation	16 (28,57%)	19 (33,92%)			
Wound dehiscence	8 (14,28%)	13 (20%)	30 (53,57%)	63 (96,92%)	0,085
Anastomotic leakage	3 (5,35%)	10 (15,38%)			
Postoperative abscess	8 (14,28%)	14 (21,53%)			
Stercoral fistula	6 (10,71%)	15 (23,07%)			
Retraction of stoma	5 (8,92%)	11 (16,92%)			
Total	64	102			

Table 4 : Mortality in group A and group B according to type of surgery

Type of surgery	Group A 56 patients		Group B 65 patients		p
	n	Mortality	n	Mortality	
RH and LH with anastomosis	5	4 (80%)	19	15 (78,94%)	0,01
RH with unipolar ileostomy	8	3 (37,5%)	2	1 (50%)	0,043
RH with ileostomy and transversocolostomy	2	0	4	3 (75%)	0,685
Cecostomy	4	1 (25%)	5	3 (60%)	0,999
Resection with unipolar colostomy	9	0	8	4 (50%)	0,144
LH with unipolar colostomy	4	1 (25%)	0	0	0,043
LH with bitublar colostomy	5	1 (20%)	0	0	0,019
Colostomy	0	0	18	6 (54,54%)	0,00006
Exterorization of transverse colon	0	0	2	2 (100%)	0,499
Hartmann' procedure	19	8 (42,1%)	7	5 (71,42%)	0,004
Total	56	18 (32,14%)	65	39 (60%)	0,304
RH-right hemicolectomy; LH-left hemicolectomy					





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