

ANNA MAŁOLEPSZA-BAZAN¹, MARTA STRUTYŃSKA-KARPIŃSKA²

Evaluation of Postoperative Complications of Colorectal Surgery

Ocena powikłań po operacji jelita grubego

¹ Outpatient Department “Multi-Medyk”, Wrocław, Poland

² Department of Gastrointestinal and General Surgery, Silesian Piasts University of Medicine in Wrocław, Poland

Abstract

Background. Complications after colorectal surgery remain high. Anastomosis of the intestinal stumps can be performed by three types of closure: manual suture, stapler, or Valtrac-BAR pressure rings. Insufficient anastomosis is the most severe and life-threatening postsurgical complication.

Objectives. The aim of this study was to evaluate these three types of anastomosis in patients requiring resection due to colorectal disease and possibly determine the best type of anastomosis in individual cases.

Material and Methods. Medical records were analyzed of 84 patients, men and women hospitalized in the years 1997–2001 at the Second Department of Surgery, L. Rydygier Specialist Hospital in Wrocław, who underwent resection and anastomosis of the colon in planned or emergency mode using the above types of anastomosis.

Results. Of the 84 subjects who had intestinal anastomoses performed by means of these three methods, 59 (70.24%) had uneventful postoperative course and postsurgical complications were observed in 25 (29.76%). Of these 25 patients, 10 (11.9%) had exclusively cardiopulmonary complications and 15 (17.86%) had complications involving the abdomen, of whom 11 (13.09%) developed suppuration of the wound, 1 (1.19%) eventration, and 3 (3.57%) insufficiency of the anastomosis. Complications occurred after emergency operation in 13 patients (61.9%) and after planned operations in 12 (19.04%). Statistically significant differences were found for the mode of operation, i.e. emergency or planned ($p = 0.001$). Postsurgical mortality in the total analyzed group was 13.09%, while mortality associated directly with colorectal resection and intestinal anastomosis was 1.19% (*Adv Clin Exp Med* 2008, 17, 6, 655–660).

Key words: colorectal surgery, postoperative complications.

Streszczenie

Wprowadzenie. Odsetek powikłań po operacjach jelita grubego pozostaje nadal duży. Do wykonania zespolenia kikutów jelitowych można zastosować jeden z 3 typów szwów – szew ręczny, szew staplerowy lub pierścienie dociskowe Bar-Valtrac. Niewydolność zespolenia jelitowego jest najcięższym, zagrażającym życiu chorego powikłaniem pooperacyjnym.

Cel pracy. Ocena 3 typów zespolenia – szwu ręcznego, staplera i Bar-Valtrac – u chorych wymagających operacji resekcyjnej z powodu schorzenia jelita grubego oraz określenie potencjalnie najlepszego sposobu zespolenia w poszczególnych przypadkach chorobowych.

Materiał i metody. Badania oparto na retrospektywnej analizie dokumentacji lekarskiej z historii chorób pacjentów leczonych w latach 1997–2001 na II Oddziale Chirurgii Specjalistycznego Szpitala im. L. Rydygiera, u których w trybie pilnym lub planowym wykonano częściową resekcję jelita grubego, a do zespolenia kikutów korzystano ze wspomnianych wyżej 3 typów szwów.

Wyniki. Z grupy 84 pacjentów, u których wykonano zespolenia jelitowo-jelitowe za pomocą szwu ręcznego, staplerowego lub krążków dociskowych Bar-Valtrac, w 70,24% przebieg pooperacyjny był niepowikłany. Powikłania wystąpiły u 25 chorych (29,76%). Wśród nich u 10 chorych (11,9%) powikłania dotyczyły wyłącznie układu krążeniowo-oddechowego. U 15 (17,86%) – jamy brzusznej i przedstawiały się następująco: u 11 osób (13,09%) wystąpiło ropienie rany pooperacyjnej, u 1 chorego (1,19%) – ewentracja, a u 3 (3,57%) – niewydolność zespolenia jelitowego. U 13 chorych (61,9%) powikłania odnotowano po operacjach w trybie pilnym, a u 12 (19,04%) – po operacjach planowych. Analiza wykazała istotne statystycznie różnice w zależności od trybu operacji ($p = 0,001$). Śmiertelność pooperacyjna ogółem wyniosła 13,09%, a śmiertelność bezpośrednio związana z wykonanym zespoleniem kształtowała się na poziomie 1,19% (*Adv Clin Exp Med* 2008, 17, 6, 655–660).

Słowa kluczowe: chirurgia jelita grubego, powikłania pooperacyjne.

Colorectal surgery is associated with various types of resection depending on the primary disease which is the indication for the operation. Anastomosis of the intestinal stumps can be performed by using one of three types of closure: a conventional manual suture, a stapler, or the Valtrac-BAR (Biofragmentable Anastomosis Ring) pressure ring [1–4]. Regardless of the type of closure, the range of postoperative complications remains high [5–8]. Some patients with colorectal disease require an emergency operation, while others are operated in a planned course. Emergency operations are most frequently due to acute alimentary tract obstruction or perforation [9]. The most common group requiring either emergency or planned operations constitutes patients over 60 and 70 years of age with colorectal cancer. Moreover, most of them are burdened with associated diseases, mainly cardiopulmonary insufficiency [10, 11].

A review of the literature indicated that the mode of the operation, i.e. emergency or planned, and the advanced age of the operated patients, usually burdened with concomitant diseases, are the main reasons for postoperative complications and high mortality in colorectal surgery [9, 11, 12]. Beside these risk factors, some authors also draw attention to the type of anastomosis, mechanical or manual, and the side (left or right) of the resected and anastomosed colon [3, 13, 14]. Solutions regarding both the modality of anastomosis and the applied materials are therefore being pursued that would minimize the incidence of postsurgical complications, primarily those involving insufficient tightness of the anastomosis.

The aim of this study was to evaluate the three types of anastomosis, i.e. manual suture, stapler suture, and mechanical suture with the use of Valtrac-BAR pressure rings, in patients requiring resection due to colorectal disease and perhaps determine the best type of anastomosis in individual cases.

Material and Methods

The investigation was based on an analysis of medical records of patients hospitalized in the years 1997–2001 at the Second Department of Surgery, L. Rydygier Specialist Hospital in Wrocław, who underwent resection and anastomosis of the colon with these three types of anastomosis. Evaluation of the applied method was based on an analysis of the parameters 1) age and gender, 2) primary disease as the indication for surgery, 3) modality and kind of the surgery, 4) comorbidities, and 5) postoperative complica-

tions observed in the individual anastomotic method. The patients were divided into two groups depending on the mode of surgery, i.e. emergency or planned. The results were analyzed statistically by means of the chi-squared test. The Yates correction factor was used for four-column tables.

The clinical material consisted of 84 patients, women and men aged 30–86 years (median: 66 years) (Table 1). Twenty-one patients (25%) were operated as emergencies and the remaining 63 patients (75%) as planned operations.

Results

Of the 84 patients, 37 were women (44.4%) and 47 were men (55.6%). Analysis of the age structure revealed that patients aged over 60 and 70 years old prevailed in both the male and female groups regardless of the mode of surgery (emergency or planned) (Table 1). Emergency operations were most commonly due to acute bowel obstruction (81%), of which the condition was caused by neoplastic lesion in 71.4% (Table 2). Among the associated diseases reported by the patients in this group, the most common were chronic cardiovascular diseases. In the group of planned operations, the most common were patients with colon cancer (81%), as in the emergency group, and the most common comorbidities were also chronic cardiovascular diseases (Table 3).

Altogether, 85 bowel anastomoses were performed in the 84 patients. In one case, two anastomoses were performed by means of a conventional manual suture, one involving the right side of the colon and the other the left. Of the 85 anastomoses, 31 were performed by means of a manual suture, 36 by means of a stapler, and 18 using Valtrac-BAR pressure rings.

Of the 84 patients with bowel resection and intestinal anastomoses performed by the three methods, 59 (70.24%) had uneventful postoperative course, while postoperative complications were observed in 25 (29.76%), i.e. 11.9% with exclusively cardiopulmonary complications, 13.09% with development of suppuration of the wound, 1.19% with eventration, and 3.57% with dehiscence of the anastomosis.

In the group of 21 patients operated on as emergencies, 6 developed cardiopulmonary insufficiency. This complication occurred after all three types of bowel anastomosis (manual suture: 4, stapler: 1, Valtrac-BAR: 1). Suppuration in the wound was also observed after all three types of intestinal anastomosis (manual suture: 3, stapler: 2, Valtrac-BAR: 1). None of the patients in this group devel-

Table 1. Characteristics of age and gender in analyzed group of patients (n = 84)**Tabela 1.** Charakterystyka wieku i płci w analizowanej grupie chorych (n = 84)

Age – years (Wiek – lata)	30–39	40–49	50–59	60–69	70–79	> 80	Total (Razem)
All patients (Wszyscy)	2.4% n = 2	10.7% n = 9	9.5% n = 8	34.5% n = 29	42.8% n = 36	1.2% n = 1	100% n = 84
Women (Kobiety)	1.2% n = 1	4.8% n = 4	3.6% n = 3	14.6% n = 12	19.0% n = 16	1.2% n = 1	44.4% n = 37
Men (Mężczyźni)	1.2% n = 1	5.8% n = 5	5.8% n = 5	20.2% n = 17	22.6% n = 19	0% n = 0	55.6% n = 47

Table 2. Indications for surgery and location of lesions in the emergency group of patients (n = 21)**Tabela 2.** Wskazania do leczenia operacyjnego oraz umiejscowienie zmian chorobowych w grupie pacjentów operowanych w trybie pilnym (n = 21)

Indications for surgery (Wskazania do leczenia operacyjnego) (n = 21)	Location of lesions and number of patients (Umiejscowienie zmian i liczba chorych)
Acute obstruction due to malignant tumor (Ostra niedrożność na tle guza nowotworowego) n = 15 (71.4%)	cecum (kątnica) n = 6 ascending colon (wstępnica) n = 5 right colon flexure (zgięcie wątrobowe) n = 1 transverse colon (poprzeczna) n = 1 rectosigmoid flexure (zgięcie esiczo- -odbytnicze) n = 2
Acute obstruction due to nonspecific inflammatory tumor (Ostra niedrożność na tle guza zapalnego) n = 3 (14.3%)	cecum (kątnica) n = 1 sigmoid colon (esica) n = 2
Perforation (Przedziurawienie) n = 3 (14.3%)	cecum (kątnica) n = 1 sigmoid colon (esica) n = 1 transverse colon (poprzeczna) n = 1

Table 3. Indications for surgery and location of lesions in the planned group of patients (n = 63)**Tabela 3.** Wskazania do leczenia operacyjnego oraz umiejscowienie zmian chorobowych w grupie pacjentów operowanych w trybie planowym (n = 63)

Indications for surgery (Wskazania do leczenia operacyjnego) (n = 63)	Location of lesions and number of patients (Umiejscowienie zmian i liczba chorych)
Malignant tumor (Guz nowotworowy) n = 51 (81%)	cecum (kątnica) n = 7 ascending colon (wstępnica) n = 2 right colon flexure (zgięcie wątrobowe) n = 4 transverse colon (poprzeczna) n = 2 left colon flexure (zgięcie śledzionowe) n = 2 descending colon (zstępnica) n = 1 sigmoid colon (esica) n = 19 rectosigmoid flexure (przejście esiczo-odbytnicze) n = 1 rectum (odbytnica) n = 13
Nonspecific inflammatory tumor (Nieswoisty guz zapalny jelita grubego) n = 2 (3.2%)	sigmoid colon (esica) n = 2
Restoration of alimentary tract continuity (Odtworzenie ciągłości przewodu pokarmowego)	ascending colon fistula (przetoka na wstępnicy) n = 1 descending colon fistula (przetoka na zstępnicy) n = 6 sigmoid fistula (przetoka na esicy) n = 3

Table 4. Postoperative complications after emergency operations**Tabela 4.** Powikłania po operacjach w trybie pilnym

	Manual suture (Szew ręczny)	Stapler	Valtrac-BAR
Cardiopulmonary insufficiency (Niewydolność krążeniowo-oddechowa)	4	1	1
Suppuration in the wound (Ropienie w ranie)	3	2	2
Total (Suma)	7	3	3
Death (Zgon)	4	1	1

* Complication rate: 61.9%.

** Death rate: 28.57%.

* Wskaźnik powikłań: 61,9%.

** Wskaźnik zgonów: 28,57%.

oped insufficiency of the intestinal anastomosis (Table 4).

Among the 63 subjects operated on as planned, 4 developed cardiopulmonary insufficiency, with 3 after manual suture anastomosis and 1 after use of a stapler. Suppuration of the wound was observed in 4 cases (manual suture: 1, stapler: 3) and eventration in 1 case (manual suture). Insufficiency of the bowel anastomosis occurred in 3 patients, all of them with stapler anastomosis. Among the patients operated with the use of the manual suture and Valtrac techniques, no such postoperative complication was observed (Table 5).

Of the 84 patients, 11 (13.09%) died due to severe postoperative complications. In 10 patients (11.9%) death was caused by cardiopulmonary failure and one patient (1.19%) died of insufficiency of the intestinal anastomosis complicated by severe fecal peritonitis and multi-organ dysfunction syndrome.

Regardless of the type of suture, no statistically significant differences were found in the number and kind of complications after intestinal anastomosis. However, statistically significant differences were found for the mode of operation ($p = 0.001$); complications occurred in 61.9% of the patients after emergency and in 19.04% after planned operations. Postoperative mortality in the total group of patients was 13.09%, while mortality associated directly with colorectal resection and intestinal anastomosis was 1.19%.

Table 5. Postoperative complications after planned operations**Tabela 5.** Powikłania po operacjach planowych

	Manual suture (Szew ręczny)	Stapler	Valtrac-BAR
Cardiopulmonary insufficiency (Niewydolność krążeniowo-oddechowa)	3	1	0
Anastomosis insufficiency (Niewydolność zespolenia)	0	3	0
Eventration (Ewentracja)	1	0	0
Suppuration in the wound (Ropienie w ranie)	1	3	0
Total (Suma)	5	7	0
Death (Zgon)	3	2	0

* Complication rate: 19.04%.

** Death rate: 7.93%.

* Wskaźnik powikłań: 19,04%.

** Wskaźnik zgonów: 7,93%.

Discussion

Colorectal surgery to a large extent involves patients of advanced age, men and women alike, and the most common indication for surgery is colorectal cancer [5, 8–15]. In this study the most common group (81%) among both emergency and planned operations constituted patients with colorectal cancer, while benign diseases were indications for surgery in only 19% of the cases. As reported in the literature, most patients with colorectal diseases are operated on a planned basis [6, 11]. In the analyzed group, one third of the patients were operated on an emergency basis and the remaining two thirds had a planned operation. The median age in the whole group of patients was 66 years, and more than 50% of the patients showed comorbidities, mainly cardiopulmonary insufficiency.

The rates of postoperative complications after colorectal surgery presented in the literature range from 0% to 40% [7, 8, 10, 13, 16]. In the present study, 70.24% of the patients had uneventful postoperative courses. Complications directly involving the abdomen were observed in 17.86%, of which insufficiency or dehiscence of the anastomosis occurred in 3.57% and the remaining were con-

nected with suppuration of the postsurgical wound. Regardless of the type of anastomosis, no significant differences were found in the number or kinds of complications. Cardiopulmonary postoperative complications in the patients were as much as 11.9%, which could be explained by the fact that about 63% of the patients suffered effects of chronic cardiopulmonary insufficiency. In the patients of the present study, mortality due to cardiopulmonary failure was 11.9%, while mortality associated directly with colorectal resection and intestinal anastomosis was 1.19%. Nearly the same results were presented by other authors [7, 10–12, 17].

The authors concluded that in both emergency and planned operations, the most common patients are those of advanced age with colorectal cancer. Operations performed on an emergency basis have a statistically significantly increased rate of postoperative complications ($p = 0.001$). Regardless of the type of closure (manual suture, stapler, Valtrac-BAR), no statistically significant differences were found in the number and kinds of postoperative complications. More than 50% of the patients operated for colorectal diseases revealed comorbidities, mainly cardiopulmonary insufficiency, and this increased the rate of postoperative mortality.

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Address for correspondence:

Marta Strutyńska-Karpińska
Department of Gastrointestinal and General Surgery
Silesian Piasts University of Medicine
Marii Skłodowskiej-Curie 66
50-369 Wrocław
Poland
E-mail: mstrutynska@wp.pl

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