

RESEARCH ARTICLE

Rectal Cancer – Sphincter Saving Techniques

Russu C, Molnar C, Pantiru C, Sărăcuț C, Gherghinescu M, Voidăzan S, Copotoiu C

Surgery Clinic I, County Emergency Clinical Hospital, Tîrgu Mureș, Romania

Background: Rectal cancer management has as its main component the surgical treatment. The purpose of the paper is to point out the advantages and disadvantages of sphincter saving techniques, respecting the oncological principles.

Material and method: A cross-sectional, retrospective study was performed on a group of 69 patients admitted and surgically treated for rectal cancers in the Surgical Clinic I of the County Emergency Clinical Hospital of Tîrgu Mureș, for a period of one year (April 2012 – April 2013) and to whom rectal resections were performed. We followed the immediate postoperative evolutions in these patients, making a comparative analysis between those with the sphincter saving surgery and those in which other operations were performed.

Results: From the total of 69 patients diagnosed with rectal cancer, sphincter saving procedures with restoration of digestive continuity by coloanal anastomosis were performed in 12 patients (17.39%) using the peranal or transanal approach; in 42 patients (60.86%) anterior recto-sigmoidian resections with low and very low colorectal anastomosis („very low” Dixon procedure) were performed. In 15 cases (21.74%) the Miles type of rectal resections, using the abdomino-perineal way, were performed. Out of the 12 cases with peranal or transanal anastomosis, 4 cases had postoperative complications.

Conclusions: Rectal resection procedures, which are restoring the digestive tract continuity using low anastomosis (colorectal, coloanal, peranal or transanal), are representing viable and „physiological” alternatives, if they respect the oncologic principles. In well selected cases, the immediate postoperative evolution is favorable, relieving the patient from the psychological and physical trauma due to the presence of a colostomy.

Keywords: rectal cancer, rectal resection, anastomosis, sphincter saving surgery

Received: 11 June 2013 / Accepted: 12 February 2014

Introduction

Colorectal cancer is the third most common cancer and the fourth leading cause of cancer death in the world [1]. The management of rectal cancer requires a multimodal treatment approach [2]. As a part of this treatment, surgery is the only method to offer cure for rectal cancer [3].

Due to the increased understanding of the spread of the disease and of the improvements that have been achieved in the outcomes of rectal cancer surgery and adjuvant therapy in the last decades, abdominoperineal resection with permanent colostomy — the usual treatment option for distal rectal cancer since Miles reported this technique in the 1920s — is been regarded as unnecessary in most patients who can now be treated with sphincter saving surgery [1,4]. Total mesorectal excision technique is representing now the gold standard management of cancers of the middle and distal thirds of the rectum and the fact that distal mural spread of the disease was shown to be rarely more than 2 cm, has led to an increased incidence of successful sphincter saving procedures [1,4].

The first operation to allow patients with rectal cancer to avoid permanent stoma was anterior resection performed by Dixon in the 1940s in patients with tumors of the upper third of the rectum [5]. Coloanal anastomosis was proposed for patients with low rectal cancers, allowing sphincter preservation with normal anal continence [5]. The final

decision to perform coloanal anastomosis or abdomino-perineal resection was always taken intraoperatively, as assessment of the distance separating the tumor from the sphincter preoperatively is sometimes impossible [5].

The purpose of this paper is to point out the advantages and disadvantages of sphincter saving techniques, respecting the oncological principles, to evaluate the therapeutic options (surgical procedure and preoperative radiochemotherapy) according to the localization of the tumor at the rectal level, and to follow the immediate postoperative evolution (mortality, postoperative complications, need for reinterventions, days of hospitalization).

Methods

We conducted a single center, non-interventional, cross-sectional, retrospective, observational study on a group of 69 patients, hospitalized and surgically treated for rectal cancer at the Surgical Clinic I of the County Emergency Clinical Hospital Tîrgu Mureș within the April 2012 – April 2013 period. We analyzed cases based on physical and laboratory examinations collected from observation sheets and operative protocols. Patients were divided into three groups according to the type of operation they underwent:

- Group I – patients with rectal resection and sphincter preservation technique with coloanal anastomosis using a peranal or transanal approach.
- Group II – patients with anterior recto-sigmoidian resections with low and very low colorectal anasto-

mosis („very low” Dixon procedure).

- Group III – patients to whom the abdominoperineal resection (Miles operation) was performed.

Criteria for inclusion in the study group are:

- Patients admitted and surgically treated for rectal cancer in the Surgical Clinic 1 of the County Emergency Clinical Hospital Țirgu Mureș within the April 2012 – April 2013 period;
- Patients who underwent rectal resection;
- Patients to whom a primary anastomosis was made or an abdominoperineal resection with a permanent terminal colostomy was done.

Criteria for exclusion from the study group are:

- Patients admitted for rectal cancer to whom no surgical intervention was made;
- Patients with rectal resection made for benign diseases;
- Patients treated for rectal cancer to whom other surgical procedure was done.

Data were processed in Microsoft Excel, and statistical analysis was performed using the program Medcalc Software (bvba Version 12.3.0, Mariakerke, Belgium). We used Student's t test to evaluate the differences between the means of continuous variables in two groups, and ANOVA to evaluate the differences between the means of continuous variables in three groups (expressed by mean \pm SD). The χ^2 test was used for categorical variables (expressed by nr (%)). The differences between non-parametric variables (expressed by median, range) were compared using the Mann-Whitney U test and the Kruskal Wallis test. A p value smaller than 0.05 was considered to be statistically significant.

Results

From the total of 69 patients diagnosed with rectal cancer, sphincter saving procedures with restoration of digestive continuity by coloanal anastomosis were performed in 12 patients (17.39%), using the peranal or transanal approach (Group I); in 42 patients (60.86%) anterior recto-sigmoidian resections with low and very low colorectal anastomosis

(„very low” Dixon procedure) were performed (Group II). In 15 cases (21.74%) the Miles type of rectal resections, using the abdomino-perineal approach, were performed (Group III) (Table I).

In the studied group the minimal age was 34 years and the maximum 87 years with a mean of 64 years, and the distribution on genders was in favor of males, 43 males (62.31%) and 26 females (37.68%). The distribution of patients was about equal between rural (49.27%) and urban (50.72%) areas.

Regarding the localization of the tumor at the rectal level, sphincter saving procedures with coloanal anastomosis and abdominoperineal resections were made mainly for inferior rectal cancer, as the anterior recto-sigmoidian resections with colorectal anastomosis was done, by choice, for middle and superior localization of the rectal tumor (with statistic significance, $p = 0.0001$) (Table I). Preoperative preparation of the bowel was made for all the patients to whom a primary anastomosis was made.

Preoperative radiotherapy was performed to 73.33% of the patients in group III, to 25% in group I and to 16.66% in group II (the differences are statistically significant, $p = 0.0002$). In some cases, radiotherapy was associated with preoperative chemotherapy (Table I).

Postoperative anastomotic fistulas were present in 4 patients with sphincter preservation and peranal or transanal anastomosis (33.33%), and in 1 patient with anterior recto-sigmoidian resection and colorectal anastomosis (2.38%) ($p = 0.007$) (Table II).

One patient from group I (8.33%) and three from group II (7.14%) had postoperative wound infection, without statistic significance ($p > 0.05$) (Table II).

There were seven reinterventions (10.14%) in the studied group; five (41.66%) in patients with sphincter preservation and peranal or transanal anastomosis (three Maydl lateral colostomy for anastomotic fistula; one terminal colostomy with the resection of the necrotic, pulled through, colic loop and one reintervention for bowel obstruction due to postoperative volvulus); one (2.38%) in the group with Dixon procedure (one case of removing the anasto-

Table I. Comparative analysis between the three studied groups

Variables		GROUP I n = 12	GROUP II n = 42	GROUP III n = 15	P value
Days of hospitalization	Median (range)	18.5 (9–50)	11.5 (8–30)	20 (5–32)	0.0001*
Mortality	(yes/no)	0/12	2/40	1/14	0.68***
Diagnosis	Low rectal cancer	7	5	13	0.0001***
	Middle rectal cancer	4	12	2	
	Upper rectal cancer	0	14	0	
	Recto-sigmoidian cancer	1	11	0	
Chemotherapy	(yes/no)	0/12	2/40	6/9	0.0005***
Radiotherapy	(yes/no)	3/9	7/35	11/4	0.0002***
Preoperative bowel preparation	(yes/no)	12/0	42/0	4/11	0.0001***
Fistula	(yes/no)	4/8	1/41	0/15	0.0006***
Reintervention	(yes/no)	5/7	1/41	1/14	0.0003***
Postoperative wound infection	(yes/no)	1/11	3/39	0/15	0.54***

* Kruskal Wallis test, ** Anova test, *** chi square test

Table II. Comparative analysis between group I and group II

Variables		GROUP I n = 12	GROUP II n = 42	P value
Days of hospitalization	Median (range)	18.5 (9–50)	11.5 (8–30)	0.0008*
Mortality	(yes/no)	0/12	2/40	0.92***
Diagnosis	Low rectal cancer	7	5	0.002***
	Middle rectal cancer	4	12	
	Upper rectal cancer	0	14	
	Recto-sigmoidian cancer	1	11	
Chemotherapy	(yes/no)	0/12	2/40	0.92***
Radiotherapy	(yes/no)	3/9	7/35	0.81***
Preoperative bowel preparation	(yes/no)	12/0	42/0	0.0001***
Fistula	(yes/no)	4/8	1/41	0.007***
Reintervention	(yes/no)	5/7	1/41	0.001***
Postoperative wound infection	(yes/no)	1/11	3/39	0.62***

* Mann Whitney test, ** t Student test, *** chi square test

mosis and doing a terminal colostomy for anastomotic fistula) and one case of bowel obstruction due to postoperative volvulus in the group with abdominoperineal resection (6.66%) (Table I).

The number of hospitalization days (expressed by median and range) showed a statistically significant difference ($p = 0.0001$) between groups, especially between groups II and III, and groups I and II, but also between groups I + II and group III (Tables I, II and III).

Three postoperative deaths were registered (4.34%), one in the group with abdominoperineal resection (6.66%) and two from the group with anterior recto-sigmoidian resections with colorectal anastomosis (4.76%). No postoperative mortality was encountered in the group with rectal resection and sphincter preservation technique with coloanal anastomosis (Table I).

Discussion

Sphincter preservation procedures with coloanal anastomosis carried out through peranal or transanal approach are in small number and do not allow to draw statistically significant conclusions, but their frequency has been increasing lately. This may be due to a lack of materials (staplers) in order to carry out an ultra-low anterior resection,

which requires a stapled anastomosis and is considered to be the standard surgery for preserving the anal function in patients with lower rectal cancer [6].

Total mesorectal excision was practiced in all cases and a minimal 2 cm distal margin of resection was obtained, as a standard procedure, in order to achieve a better local recurrence control [7,8,9].

Preoperative radiotherapy was performed in 30.43% of the cases, especially in low rectal cancer, knowing that it provides downsizing and downstaging, which increase the possibility of sphincter saving surgery in those patients [1]. Association with chemotherapeutic agents, to increase tumor radiosensitivity, has been shown to be beneficial in improving local control, but was reported to have no effect upon survival [3].

Sphincteric function was graded according to the following classification [5]:

- Normal continence was defined as no changes in continence after surgery provided normal previous function;
- Mild incontinence indicated minor sporadic incontinence episodes not interfering with normal activity;
- Moderate incontinence indicated frequent incontinence episodes interfering with normal activity;

Table III. Comparative analysis between group I+II and group III

Variables		GROUP I+II n = 54	GROUP III n = 15	P value
Days of hospitalization	Median (range)	18.5 (9–50)	20 (5–32)	0.0001*
Mortality	(yes/no)	2/52	1/14	0.82***
Diagnosis	Low rectal cancer	12	13	0.0001***
	Middle rectal cancer	16	2	
	Upper rectal cancer	14	0	
	Recto-sigmoidian cancer	12	0	
Chemotherapy	(yes/no)	2/52	6/9	0.0006***
Radiotherapy	(yes/no)	10/44	11/14	0.0002***
Preoperative bowel preparation	(yes/no)	54/0	4/11	0.0001***
Fistula	(yes/no)	5/49	0/15	0.5**
Reintervention	(yes/no)	6/48	1/14	0.9***
Postoperative wound infection	(yes/no)	4/50	0/15	0.6***

* Mann Whitney test, ** t Student test, *** chi square test

- Complete incontinence indicated loss of control of sphincteric function.

The majority of patients who underwent a sphincter saving procedure had normal continence in the postoperative period and only a few developed mild incontinence.

Bowel preparation was performed before the operation in all patients to whom a primary restoration of the digestive tract could be anticipated and did not have occlusive symptoms. This preoperative preparation represents a controversial procedure, there are studies suggesting that it does not lower the rate of complications and that it can be omitted before elective colonic resection [10]. Other studies suggest to continue to perform mechanical bowel preparation.

The high rate of anastomotic fistulas in the patients with sphincter preservation procedures can be interpreted as a consequence of a locally advanced stage of the disease (most of the cases were T3 tumors and just two of them were T2), of an altered biological status of the patient (hypoproteinaemia, anemia) that accompanies the cancer syndrome and not due to a defect in the technique of anastomosis [12]. Regarding this matter, there is a possible protective role of a temporary proximal diverting stoma that may reduce anastomotic leakage [13,14].

The postoperative wound infection rate did not present statistically significant differences between the studied groups.

The hospitalization period was significantly reduced in patients who underwent rectal resection with sphincter preservation than in those with abdominoperineal resection, and this may be due to the open treatment of the perineal postoperative wound. The shortest hospitalization time was encountered in the group of patients with anterior recto-sigmoidian resections and colorectal anastomosis.

The three registered deaths were not related to the type of surgical intervention, being the result of the patients' altered general condition, and aggravation of a preexisting cardiac or pulmonary disease.

Conclusion

Rectal resection procedures, which are restoring the digestive tract's continuity using low anastomosis (colorectal, coloanal), are representing viable and „physiological” alternatives in the treatment of low rectal cancer, respecting oncological principles.

Preoperative radiotherapy associated or not with chemotherapy should represent standard procedures.

A temporary proximal diverting colostomy for protection of the anastomosis can be considered, as a procedure that might reduce the risk of fistulas.

In well-selected cases, the immediate postoperative evolution is favorable, relieving the patient from the psychological and physical trauma due to the presence of a colostomy. The problem remains the criteria of selecting the cases.

References

1. Cipe G, Muslumanoglu M, Yardimci E, Memmi N, Aysan E. Intersphincteric Resection and Coloanal Anastomosis in Treatment of Distal Rectal Cancer. *Int J Surg Oncol.* 2012. doi: 10.1155/2012/581258
2. Musio D, De Felice F, Bulzonetti N, et al. Neoadjuvant-intensified treatment for rectal cancer: Time to change? *World J Gastroenterol.* 2013;19(20):3052-3061. doi: 10.3748/wjg.v19.i20.3052
3. Lindsetmo RO, Joh YG, Delaney CP. Surgical treatment for rectal cancer: An international perspective on what the medical gastroenterologist needs to know. *World J Gastroenterol.* 2008;14(21):3281-3289. doi: 10.3748/wjg.14.3281
4. Law WL, Chu KW. Anterior Resection for Rectal Cancer With Mesorectal Excision A Prospective Evaluation of 622 Patients. *Ann Surg.* 2004;240(2):260-268. doi: 10.1097/01.sla.0000133185.23514.32
5. Mohamed AA, Abdel-Fatah AS, Mahran KM, Mohie-EIDin AM. External Coloanal Anastomosis Without Covering Stoma in Low-Lying Rectal Cancer. *Indian J Surg.* 2011;73(2):96-100. doi: 10.1007/s12262-010-0179-0
6. Saito N, Ito M, Kobayashi A, Nishizawa Y, Sugito M. Sphincter-saving resection for low rectal cancer. *Nihon Geka Gakkai Zasshi.* 2011;112(5):318-24.
7. Rullier E, Laurent C, Bretagnol F, et al. Sphincter-saving resection for all rectal carcinomas: the end of the 2-cm distal rule. *Ann Surg.* 2005;241(3):465-9.
8. Park IJ, Kim JC. Adequate length of the distal resection margin in rectal cancer: from the oncological point of view. *J Gastrointest Surg.* 2010;14(8):1331-7. doi: 10.1007/s11605-010-1165-3.
9. Yeatman TJ, Bland KI. Sphincter-saving procedures for distal carcinoma of the rectum. *Ann Surg.* 1989;209(1):1-18.
10. Jung B, Pålman L, Nyström PO, Nilsson E. Mechanical Bowel Preparation Study Group, Multicentre randomized clinical trial of mechanical bowel preparation in elective colonic resection. *Br J Surg.* 2007;94(6):689-95.
11. Bretagnol F, Panis Y, Rullier E, et al. Rectal cancer surgery with or without bowel preparation: The French GRECCAR III multicenter single-blinded randomized trial. *Ann Surg.* 2010;252(5):863-8. doi: 10.1097/SLA.0b013e3181fd8ea9.
12. Warschkow R, Steffen T, Thierbach J, et al. Risk factors for anastomotic leakage after rectal cancer resection and reconstruction with colorectostomy. A retrospective study with bootstrap analysis. *Ann Surg Oncol.* 2011;18(10):2772-82. doi: 10.1245/s10434-011-1696-1.
13. Deo SVS, Kapali AS, Gupta M, Shukla NK. A Review of Controversies in the Management of Colorectal Cancers. *Indian J Surg.* 2012;74(3):221-227. doi: 10.1007/s12262-012-0586-5.
14. den Dulk M, Marijnen CA, Collette L, et al. Multicentre analysis of oncological and survival outcomes following anastomotic leakage after rectal cancer surgery. *Br J Surg.* 2009;96(9):1066-75. doi: 10.1002/bjs.6694.