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RESEARCH ARTICLE

Sphincter Saving Techniques in Low Rectal Cancer Surgical Treatment: Results, Perspectives

Russu C[1*], Copotoiu C[1], Bud V[2], Saracut C[2], Gherghinescu M[1], Molnar Varlam C[3], Molnar C[1]

[1] University of Medicine and Pharmacy of Tirgu Mures, Surgical Clinic no. 1, County Clinical Emergency Hospital Targu Mures, Romania
[2] County Clinical Emergency Hospital Targu Mures, Romania
[3] University of Medicine and Pharmacy of Tirgu Mures, Obstetrics and Gynecology Clinic no. 1, County Clinical Emergency Hospital Targu Mures, Romania

Objective: Sphincter saving techniques in low rectal cancer represents a challenge for the surgeons in their attempt to preserve the sphincter function and also to respect the principles of oncological surgery, in order to improve the quality of the patient's life. The paper's aim is to compare different sphincter saving techniques in regards to the early postoperative results.
Methods: An observational, retrospective study was performed on 76 patients (N = 76) operated for low rectal cancer in the Surgical Clinic no.1 of the Targu Mures Emergency Clinical County Hospital, between January 2010 and October 2014, to whom the rectal resection was followed by a primary restorative technique for preservation of the sphincter function. The immediate postoperative results after different types of sphincter saving procedures were analyzed and compared.
Results: From the studied patients, in 41 cases (53.94%) an anterior rectal resection with low colorectal anastomosis was done („very low" Dixon procedure), for 29 patients (38.15%) a sphincter saving technique with a peranal anastomosis was performed and in 6 cases (7.89%) an intersphinteric rectal resection with coloanal anastomosis was made.
Conclusions: Sphincter saving techniques, if oncological principles are respected, represents a viable option in the treatment of low rectal cancer and brings hope for improving the quality of the patients' life.

Keywords: low rectal cancer, tumor resection, anastomosis

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Introduction

Colorectal cancer represents in Europe the second most common cancer in women and the third most common in men. It is also considered to be the fourth leading cause of cancer death in the world. [1] The management of rectal cancer is well known now as a multimodality treatment approach using conventional methods: surgery, radiotherapy and chemotherapy [2].

Despite all progresses made in the adjuvant therapy, radical surgical removal of the tumor is the only chance for a permanent cure of rectal cancer. Beside this, the preservation of fecal continence must represent the second most important goal in order to achieve an acceptable quality of life. [3] Now, surgical treatment for patients with low rectal cancer recognizes sphincter preservation as a priority and as a marker of surgical quality. [4]

A better understanding of the disease in terms of the ways of dissemination, along with technical and technological progress in rectal cancer surgery techniques and in the adjuvant therapy, determined in the last decades an important shift in the treatment of this disease, represented an increase in sphincter preserving surgery and a fall in the rate of abdominoperineal excision, the previous gold standard treatment for rectal cancer [4,5].

Studies proving that the distal intramural spread of the cancer is rarely more than 1 cm beyond the distal margin of the rectal tumor along with the association of preoperative chemoradiation therapy, had increased the rate of successful sphincter saving surgery. The use of total mesorectal excision technique as described by Heald, which represents now the standard of the surgical treatment for middle and low rectal cancer, resulted in a significant decrease of the recurrence rate and a major improvement in survival of patients with rectal cancer. [1]

The purpose of the paper is to analyze and compare the immediate postoperative results after different sphincter saving techniques used in the treatment of low rectal cancer.

Methods

We conducted a single center, non interventional, cross-sectional, retrospective, observational study on a group of 76 patients (n=76) hospitalized and surgically treated for low rectal cancer in Surgical Clinic no. 1 of the County Clinical Emergency Hospital of Targu Mures in a five year period (from January 2010 to October 2014). We analyzed cases based on physical and laboratory examinations collected from observation sheets, operative protocols and pathological results. Patients were divided in two groups according to the type of operation they underwent:

Group I - patients with anterior rectosigmoidian resections and low or very low colorectal anastomosis („very low" Dixon procedure).

* Correspondence to: Cristian Russu
E-mail: cristirussu@yahoo.com

Group II - patients with rectal resection and sphincter preservation technique with coloanal anastomosis performed peranal or transanal.

All patients met all conditions of EU professional ethics, patients' identity remaining secret.

The objectives of the study were:

- to evaluate the therapeutic option (mainly the chosen surgical procedure and the associated neoadjuvant oncological treatment) according to the localization of the rectal tumor;
- to follow immediate postoperative evolution (postoperative complications, the need for reinterventions, mortality, days of hospitalization);
- evaluation of the demographic and biological parameters for the studied cases in relation with the postoperative results.

Criteria for inclusion in the study group are:

- Patients admited and surgically treated for low rectal cancer in Surgical Clinic no. 1 of the Emergency County Hospital Targu Mures within the period of January 2010 - October 2014;
- Patients who underwent a low rectal resection followed by a colorectal or coloanal primary anastomosis;
- Criteria for exclusion from the study group are:
- Patients admitted for low rectal cancer to whom no surgical intervention was performed;
- Patients with low rectal resection made for benign diseases;
- Patients treated for rectal cancer to whom other surgical procedure was performed.

Data were processed in Microsoft Excel, and statistical analysis was performed using the program Graph Pad Prism 5 (Version 5.03). We used statistical methods such as descriptive and analytic-inferential methods. For evaluation of the differences between the means of continuous variables in two groups a t Student test was used, respectively the ANOVA test for evaluation of the differences between the means of continuous variables in three groups (expressed by mean±SD). A $\chi 2$ test was used for categorical variables (expressed by nr (%)). The differenceses between nonparametric variables (expressed by median, range), were compared using the Mann-Whitney U test, respectively the Kruskal Wallis test. All the tests we have performed to materiality p=0.05 and statistical significance was considered for p values less than the threshold value of significance.

Results

From the total of 76 patients (n = 76) surgically treated for low rectal cancer, an anterior rectosigmoidian resections with low or very low colorectal anastomosis („very low" Dixon procedure) was performed in 41 patients (53.94%) (Group I); for 35 patients (46.05%) a sphincter saving procedure with the restoration of digestive continuity by coloanal anastomosis was performed using the peranal or transanal approach (Group II). (*Table I*)

The 35 cases from Group II were represented by: 25 rectal resection with peranal coloanal anastomosis (Maunsell operation), 3 rectal resection with transanal coloanal anastomosis (Parks operation), 6 intersphinteric rectal resection with coloanal anastomosis and one Chiricuta procedure (the abdomino-endoanal technique for rectal resection with coloanal anastomosis without suture).

In the studied group the minimal age was of 39 years and the maximum of 87 years with a mean of 62 years, and the distribution on gender was in favor of male gender, 46 males (60.52%) and 30 females (39.47%).

Regarding the localization of the tumor at the rectal level, sphincter saving procedures with coloanal anastomosis were made mainly for inferior rectal cancer, as the anterior rectosigmoidian resections with colorectal anastomosis was done mostly for middle rectal tumors, with statistical significance (p = 0.0051). (*Table I*)

Preoperative radiotherapy was performed to 29.26% in group I and to 37.14% in group II. The differences have no statistical significance (p = 0.6). For some of the patients preoperative radiotherapy was associated with chemotherapy. (*Table I*)

Preoperative preparation of the bowel was made for all the patients who had not developed an occlusion syndrome.

Postoperative anastomotic fistulas were present in five patients with sphincter preservation and peranal or transa-

Table I Comparative analysis between the studied groups

Variables		GROUP I n=41	GROUP II n=35	P value
Localization of the tumor	Middle rectal cancer	30	14	0.0051**
	Low rectal cancer	11	21	
Radiotherapy	(yes/no)	12/29	13/22	0.6248**
Chemotherapy	(yes/no)	5/36	5/30	1.0000**
Anastomotic fistula	(yes/no)	1/40	5/30	0.0889**
Postoperative wound infection	(yes/no)	3/38	5/30	0.4587**
Reintervention	(yes/no)	1/40	7/28	0.0209**
Days of hospitalization	Median (range)	12.97 (9-22)	16.63 (8-39)	0.0979*
Mortality	(yes/no)	1/40	0/35	

*- Mann Whitney test, **- Fisher's exact test

nal coloanal anastomosis (14.28%) and in one patient with anterior recto-sigmoidian resection and colorectal anastomosis (2.43%). No patient with intersphincterian resection developed a postoperative anastomotic fistula. The statistical analysis showed no significant difference between the two groups (p = 0.007). (*Table I*)

Three patients from group I (7.31%) and five from group II (14.28%) had postoperative wound infection, but the data have no statistical significance (p = 0.45). (Table I)

There were eight reinterventions (10.52%) in the studied group; seven (20%) in patients with sphincter preservation and peranal or transanal anastomosis (five Maydl lateral colostomy for anastomotic fistula and two reintervention for bowel obstruction due to postoperative volvulus); one (2.46%) in the group with Dixon procedure (a Maydl lateral colostomy for anastomotic fistula). (*Table I*)

The number of hospitalization days (expressed by median and range) showed no statistically significant difference (p = 0.097) between the studied groups (*Table I*).

One postoperative death (1.31%) was registered, in the group with anterior rectosigmoidian resections and colorectal anastomosis (2.43%). No postoperative mortality was encountered in the group with rectal resection and sphincter preservation technique with coloanal anastomosis (*Table I*).

We tried to analyze if there is a connection between some biological parameters or preoperative associated conditions and the rate of the most severe postoperative complication represented by anastomotic fistula. The analyzed parameters were: age, gender, preoperative anemia, associated cardiac diseases, metabolic disorders (diabetes), preoperative radiotherapy and chosen type of surgical procedure. We found no statistical significant correlation with any of those studied parameters (*Table II*).

Table II Analysis of biological parameters/associated conditions and the rate of anastomotic fistula

Variables:		Anastomotic fistula (yes/no)	P value
Age	30-49 years	1/7	0.3662*
	50-69 years	2/48	
	70-89 years	3/15	
Gender	Male	3/43	0.6753**
	Female	3/27	
Preoperative anemia	(+)	2/4	0.0681**
	(-)	4/66	
Cardiac diseases	(+)	2/31	0.6920**
	(-)	4/39	
Metabolic disorders (diabetes)	(+)	1/9	0.5844**
	(-)	5/66	
Preoperative radiotherapy	(+)	1/24	0.6571**
	(-)	5/46	
Type of surgical procedure	Group I	1/40	0.0889**
	Group II	5/30	

*- chi square test for trend, **- Fisher's exact test

Discussions

Sphincter saving procedures used for the low rectal cancer treatment represented a field of interest in our surgical service for a long period of time. By practicing this type of oncological surgery, over the years, almost all the surgical techniques from this category of procedures were used. In time, just a few of them gave the best results as short and long term functional and oncological outcome and are now the types of sphincter saving procedures that are used in the treatment of low rectal cancer. In our study the main surgical technique was the very low anterior resection followed by a colorectal anastomosis.

The standard surgery for preserving the anal function in patients with low rectal cancer is considered to be the ultra-low anterior resection requiring a stapled anastomosis [6]. From this point of view, the limitation of the method was represented by the fact that not all the necessary materials (linear and circular staplers) were always available at our disposal.

If local conditions are not allowing the anterior rectal resection, we tried to go even lower with the resection and the following coloanal anastomosis by using a peranal or transanal approach (Maunsell and Parks operations). Always the main concern remained to respect the oncological principles of anorectal surgery.

In well selected cases of very low rectal cancers, an intersphincteric resection was chosen as an alternative to the abdominoperineal resection, but again, when the oncological criteria were met and respecting the well-established contraindications of the procedure: undifferentiated tumors, T4 tumors, and preoperative incontinence [3].

It is well known that the decision-making when choosing a sphincter saving technique is related to the distance between the tumor and the anal sphincter [7]. This explains our results in finding a statistical significant difference between the chosen surgical procedures, depending on the localization of the tumor.

In all cases the oncological principles of rectal surgery were applied. To improve the local recurrence control, total mesorectal excision was practiced and a minimal 2 cm distal margin of resection was obtained, as a standard procedure [8,9]. For all cases free distal margins were confirmed by the pathology laboratory.

Preoperative radiotherapy was used in 32.89% of the cases, mainly for distal rectal cancers in order to do a downsizing and downstaging of the tumor, which increased the possibility of performing a sphincter saving surgery [1]. The association of a chemotherapic agent is used to increase the tumor radiosensitivity, improving the local control, but was reported to have no effect upon survival. [8]

The preoperative bowel preparation represents a debated procedure. Some authors believe that it has no effect in reduction of postoperative complication rates and could be omitted in elective colorectal surgery [10], while other and studies [11] suggest that this procedure should be performed before elective resection for rectal cancer. In our

study, bowel preparation was realized for all patients without an occlusive syndrome.

Postoperative contention function was graded according to the following classification [12]:

- Normal continence defined as no changes in continence after surgery provided normal previous function;
- Mild incontinence indicates minor sporadic incontinence episodes not interfering with normal activity;
- Moderate incontinence indicates frequent incontinence episodes interfering with normal activity;
- Complete incontinence indicates loss of control of the sphincter function.

In almost all of the cases the patients that underwent a sphincter saving procedure had a postoperative normal continence and only a few of them developed mild incontinence.

The high rate of postoperative anastomotic fistulas in patients with sphincter conservatory procedures can be associated, even if with no statistical significance ($p = 0.6576$), with a locally advanced stage of the disease (in 65.78% of cases were T3 tumors), of an altered biological status of the patient with cancerous disease and cannot be attributed to the technique of anastomosis [13]. As a possible option, that may reduce anastomotic leakage rate, can be taken into consideration the protective role of a temporary proximal diverting stoma [14,15].

The postoperative wound infection rate presents no statistical significant differences between our studied groups.

The hospitalization period is slightly reduced in patients who underwent low anterior rectal resection with colorectal anastomosis than in those with rectal resection followed by a peranal or transanal coloanal anastomosis, but with no statistical significance.

The only one registered death, after a Dixon operation, was not accompanied by any postoperative surgical complication and cannot be related to the type of surgical intervention but it was the result of the aggravation of a preexisting cardiac disease.

Conclusion

Among the different sphincter saving techniques analyzed in our study there was no statistical difference in terms of immediate postoperative outcomes and functional results.

The main criteria in choosing one of the procedures that preserves the continence remains the distance of the tumor from the anal sphincter.

Very low and intersphinteric rectal resection procedures, are representing viable and „physiological" alternatives to abdominoperineal resection, in the treatment of low rectal cancer, if thorough oncological principles can be respected.

Preoperative radiotherapy with or without additional chemotherapy should represent standard procedures in the management of low rectal cancers.

A temporary proximal diverting stoma, in cases with high risk of developing an anastomotic fistula, can be considered as a procedure that might reduce the risk of this type of complication.

In well selected cases, the immediate postoperative evolution after a sphincter saving technique offers good results in patients with low rectal cancer. A challenge remains identifying the criteria for selecting the cases.

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