

RESEARCH ARTICLE

Complications Following Surgery for Low Rectal Cancer – Modified Intersphincteric Resections vs Non-Sphincter Saving Technique

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Introduction: In patients with low rectal cancer, a proper surgical technique is aimed to confer a better quality of life following surgery and a longer time of disease-free survival. **Aim:** In this study, we presented the results obtained by a single surgical centre in the treatment of low rectal cancer, using two types of surgery: intersphincteric resections (ISR) and abdominoperineal resections (APR). **Material and methods:** The paper was focused on the rate of complications after surgery for low rectal cancer, which was retrospectively evaluated in 132 consecutive patients who underwent surgery over a period of 5 years. The statistical comparison was done between two groups: group 1 - that underwent ISR (n=60) and group 2 – patients evaluated after APR (n=72). **Results:** The quality of life, evaluated at the regular follow-up, did not show significant difference between the two groups. Clavien-Dindo grade I and above complications were registered in 9 patients (15%) from group 1 respectively 23 patients (38.33%) from the group 2. **Conclusion:** ISR is a good option for surgical removal of a low rectal cancer, with a lower rate of complications, compared with APR technique.

Keywords: intersphincteric resection, rectal cancer, abdominoperineal resection, surgical site infection

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Introduction

Low rectal cancer has long been a difficult diagnosis for both patient and surgeon alike. Recent developments in surgical techniques and the introduction of screening programs have increased survival and patient quality of life (QoL) following surgery. Ever since Ernst Miles introduced rectal surgery with radical intent in 1907, this technique has represented the main weapon in a surgeon’s arsenal against rectal cancer [1].

Multiple surgeons experimented with various approaches along the years taking into account the anatomy of the rectum and various safety margins but all procedures implied the presence of a permanent colostomy bag. It wasn’t until 1976 when Parks proposed low anterior resection with colo-anal anastomosis that the concept of exempting the patient from a permanent colostomy became well known [1]. Better understanding of local anatomy and cancer spread over time lead to the concept of total mesorectal excision (TME) introduced by Heald in 1982 that significantly increased survival [2].

In 1994, Schiessel detailed the intersphincteric resection (ISR) for low rectal cancer and outlined its benefits and pitfalls [3]. Ever since then, numerous surgeons tried to develop a technique that would exempt the patient from the “benefits” of a colostomy bag. ISR is a technique that extends the resection at the level of the intersphincteric groove with partial or total internal sphincter resection [4,5]. From a technical point of view, the intervention con-

sists of an abdominal and a perineal time. The abdominal time can be performed using open, laparoscopic or robotic surgery, each approach having its own pitfalls [6–8]. During this operative step, a crucial aspect is performing TME according to the principles described by Heald [2,9,10]. The perineal step consists of identifying the intersphincteric groove and continuing the dissection to meet the abdominal dissection plane. The surgery is completed with a colo-anal hand sewn anastomosis. In the original technique described by Schiessel, the last part of the surgery was the making of a loop protective colostomy [5].

The present paper sets out to compare the complications following low rectal cancer surgery by comparing two groups consisting of 60 patients that underwent a modified version of ISR and 72 patients that underwent non-sphincter saving surgery, respectively abdominoperineal resections (APR), over a period of 5 years. The modified version of ISR consisted on the abandonment of colostomy / temporary ileostomy, coloplasty or J pouches in favour of a direct hand sewn coloanal anastomosis.

Material and methods

The present study is a retrospective assessment of clinicopathological data and postoperative evolution of 132 consecutive patients that underwent surgery for low rectal cancer, between 2011 – 2015, at Surgical Clinic I of Clinical Emergency County Hospital of Târgu-Mureş, Romania.

Following the approval of the Clinical Emergency County Hospital of Târgu-Mureş, Romania, patient records were retrieved and analysed. The patients were di-

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vided into two groups. Group 1 consisted of 60 patients that underwent a modified version of ISR using a technique previously described by our team [11]. Group 2 consisted of 72 patients that underwent APR as described by Miles [12]. Observation charts were analysed taking into account diagnostic parameters, tumour localization, type of surgery, hospital stay, complications and re-admission in hospital. Complications were organized according to the Clavien-Dindo system and only those occurring under 30 days from the time of surgery were taken into account.

Inclusion criteria

In Group 1 we included patients with low rectal cancer who refused the presence of a colostomy or temporary ileostomy [13]. Other anatomic criteria were tumours located 15mm from the dentate line or 10mm from the anorectal ring and tumours located 10-40mm from the anal verge. All patients in this group had an adequate preoperative sphincter function as objectified by the Wexner score Wexner score [14]. In Group 2 were included patients diagnosed in stage \geq III B (AJCC Stage) with inadequate Wexner score prior to surgery and magnetic resonance imaging (MRI) or computed tomography (CT) proved mesorectal fascia involvement. Patients with low or middle rectum, juxta- and intra-anal carcinomas were included. Only patients undergoing elective surgery for rectal cancer were taken into account.

Diagnostic and follow-up

All patients were subjected to a digital rectal exam (DRE) followed by colonoscopy and preoperative staging was done based on CT or MRI investigation. Staging also included the use of abdominal ultrasound and/or chest X-Rays in some cases. Postoperative complications within 30 days were defined as Clavien-Dindo grade III or higher. This includes complications that required surgical, endoscopic or radiological intervention (grade III), and life-threatening complications requiring intensive care management (grade IV) or death (grade V).

Statistical analysis

Descriptive statistic included the report of numerical data that were reported as median value with standard deviation (SD). The statistical associations were considered significant in the cases with a $p > 0.05$ with a 95% confidence interval.

Results

In the Group 1, we included 60 patients (41 males and 19 females) with a median age of 67.32 ± 21.45 years (ranging between 57-81). They were diagnosed with juxta-anal (type II) or intra-anal tumors (type III), in 47 respectively 13 cases. For patients with type II, partial ISR was done whereas total ISR was the used technique in patients with type III tumors. The 72 patients belonging to group 2 (48 males and 24 females) showed a median age of 62.73 ± 10.8 years (ranging between 52 – 83 years). They were diagnosed with tumors of the low rectum ($n=63$) or mid rectum ($n=9$) and APR was done in all of the cases.

Two patients (3.33%) in Group 1 and 6 patients (8.33%) in the Group 2 had distant metastasis at the time of surgery. All of the cases were adenocarcinomas, most of them being moderately differentiated (G2): 47% ($n=28$) in Group 1 and 57% ($n=41$) in Group 2.

They were statistically significant differences found in median time of surgery and intraoperative blood loss between ISR and APR as highlighted in **Table I**. No other significant differences between the two groups regarding the tumor characteristics and surgical intervention approaches were noted.

Complications

Group 1

No intraoperative or postoperative mortality was noted in this group. From the 60 included patients, 9 (15%) developed postoperative complications which mostly consisted on mucosa/submucosa necrosis of the pulled through colonic segment, a Clavien-Dindo type I complication found in 5 cases, at about 11 days postoperatively. The necrotic segment was removed by forceps extraction, without recurrence [15]. Two patients required reintervention with a subsequent APR secondary to transmural colonic necrosis (Clavien-Dindo tip IIIb). The other two patients developed stenosis at the level of the coloanal anastomosis and required successive dilation (Clavien-Dindo tip IIIa). None of the patients developed anastomotic leakage.

Group 2

In this group, 23 out of the 72 patients (38.33%) developed complications. Two patients died shortly following surgery with a mortality rate of 2.77%. From the other 21 cases, 8 patients developed a wound infection, 6 patients presented partial or total wound dehiscence, 4 patients

Table I. Surgical parameters and tumor characteristics in the two groups

	Group I (ISR)	Group II (APR)	p value
Complete mesorectal excision (TME)	54 (90%)	68 (94%)	$p = 0.0364$
Negative CRM	57 (95%)	70 (97%)	$p = 0.5565$
Median time of surgery (min)	160 ± 18 (min:130, max: 210)	200 ± 17 (min:140, max: 310)	$p = 0.0001$
Estimated intraoperative blood loss (ml)	140 ± 55 (min: 100, max: 180)	185 ± 45 (min: 120, max: 250)	$P < 0.0001$
Distance from anal verge	3.15 ± 1.82 (range 1-4)	-	-
Tumour size (mm)	30 ± 14.01 (min: 15, max: 55)	37 ± 12.01 (min: 15, max: 60)	$p = 0.0024$

had early postoperative occlusion and the other 3 patients developed postoperative hemorrhage requiring emergency hemorrhage control surgery.

A total of 17 (23.61%) of the patients showing postoperative complications developed complications related to the ostomy, such as prolapsed stoma (n=10) or stoma stenosis/stricture (n=2) that caused readmissions < 2 years from the initial surgery. This complication was not taken into account as it is not considered a postoperative complication.

Group 1 vs Group 2

Hospital stay in the ISR group was 10.96 (± 5.08 , range 6-27) as compared to 17.43 (± 9.07 , range: 7-38) in the APR group resulting in a significance difference between the two groups ($p: 0.0001$).

The rate of complication was higher in Group 2, compared with Group 1 but not statistically significant. A higher incidence in grade I ($p = 0.6086$) and grade IIIB Clavien-Dindo ($p = 0.036$) complications was noted in the APR group as compared to the ISR group (Table II). Higher grade Clavien-Dindo complications were associated with APR as opposed to ISR.

Discussions

In the present article, it was emphasized that, in patients with low rectal cancer, the APR seems to associate a higher rate of postoperative complications, compared with ISR. Although the groups are of small size the results are comparable to other studies [16]. The originality of the paper consists in validation of the modified ISR technique used by our team for over 5 years.

In previous studies, the authors examined rather overall complications and overall survival rate, without being focused on the postoperative complications. Our focus was primarily on postoperative surgical complications [17].

Complications following APR are well known to be more frequent as it implies the presence of an ostomy, although some authors claim ostomy complications represent a failure in the transversalis fascia that might technically be avoidable [18] respectively. Paracolostomy hernia was the most common complication (36.7 percent at 10 years). Regardless of the technique we used, over two quarter of patients in the APR group developed ostomy complications but we did not analyze this aspect.

Table II. Complications following surgery in Groups I and II according to Clavien-Dindo system [35]

Clavien-Dindo grade	Group I (ISR)	Group II (APR)	p value
Grade I	5 (8.33%)	8 (11%)	0.6086
Grade II	-	-	
Grade IIIa	2 (3.33%)	-	
Grade IIIb	2 (3.33%)	10 (13.88%)	0.0364
Grade IVa	-	3 (4.16%)	
Grade IVb	-	-	
Grade V	-	2 (2.77%)	

The ISR proved to associate a low complications rate and a good qualitative survival in other studies and our findings are similar [3,19–21]. One possible reason of a higher rate of complications, in the APR group, is the possible presence of septic time during the procedure itself [22–25]. Complications following APR tend to have a higher impact on hospital stay and QoL, as opposed to complications following ISR, and often require more surgical interventions to be resolved [17,26–28].

Surgical site infection (SSI) is one of the most frequent complications in rectal surgery with the male sex, stage IV cancer and APR being significantly associated with SSI following rectal cancer surgery. This aspect was noted in by other authors in several studies and is consistent with some of our findings [29–31].

In a matched-pair analysis published by Konanz in 2013 [32] on 131 patients to determine the QoL following ISR, low anterior resection (LAR) and APR, the complications after APR were also significantly higher than the ones following ISR. Another find of the previously mentioned study is that QoL is not different between patients receiving ISR or APR. This is not one of our study's goals but the authors beg to differ as our results in this matter are slightly different [15].

In our study, we found a correlation between tumor size and the type of surgery the patients received. Patients with larger tumors were generally subjected to APR rather than ISR. This is a finding consistent with those of other authors [33,34] but it is not the only criteria when choosing the type of surgery for low rectal cancer.

The main limitations of our study were threefold: first, the retrospective study design and limitations to a single center, second, the lack of the means to better quantify postoperative complications and the omission of medical complications and patient associated disease, third: the small group size. Further development is required to better define systems to account for complications and apply these systems in hospitals in Romania.

Conclusions

Complications following ISR seem to occur less frequent as compared to APR. Wound site infection are associated more frequently with APR and not with ISR. Further research is required for a better understanding of the mechanisms associated with complications following rectal cancer surgery.

Authors' contribution

BVO - Data collection, conceptualization, writing original draft

MA - Data collection, Writing and Editing

BIT - Data collection, Writing and Editing

RPC - Writing and Editing, Conceptualization

BM - Data collection, Writing and Editing

MC - Editing, Supervision

GS - Editing, Supervision

Conflict of interest

None to declare.

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