Intersphincteric resection of low rectal cancer: a retrospective study

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Background
The use of sphincter-saving resection without a permanent stoma in place of abdominoperineal resection (APR) has been one of the greatest advancements in the area of surgical therapy for low rectal cancer.
Aim
To assess the oncological and functional outcomes of inter-sphincteric resection of low rectal cancer in order to achieve radicality and a standard of living.
Patients and methods
At the hospitals affiliated with Menoufia University, a retrospective analysis was done. Forty patients with rectum cancer who were undergoing general surgery at Menoufia University Hospitals were the subject of this investigation. We comprised: older than 18 years old, sexes of both genders, low rectum and anal canal, with internal sphincter or rectal wall restriction on magnetic resonance imaging, differentiated tumour, tumour diameter of 1–5, and good continence.
Results
Mean operative time was 261.8 (±96.6 SD), the mean blood loss was 185.8 (±156.5 SD). Mean postoperative hospital stay was 11.2 (±4.1S D), the mean pain severity 1 h postoperatively was 5.5 (±1.0 SD), the mean 1 day postoperatively was 5.9 (±1.5 SD), the mean 5 day postoperatively was 3.3 (±1.2 SD), there were three with Anastomotic leakage, two with wound infection, two with hemorrhage, one with urinary tract infection, one with ileus. Regarding complications, mean score of micturition problems was 28.2 (±4.1 SD), the mean GIT symptoms was 32.2 (±3.1 SD), the mean weight loss was 5.5 (±1.0 SD), the mean CTX side effects was 13.9 (±1.5 SD), the mean body image was 70.3±6.2.
Conclusion
The intersphincteric resection approach improves the rate of sphincter preservation while maintaining oncological and functional results. Symptom-specific quality of life may be adversely affected by preoperative radiation.

Keywords:
intersphincteric resection, low rectal cancer, quality of life

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Introduction

The use of sphincter-saving resection without a permanent stoma in place of abdominoperineal resection (APR) in recent years has been one of the greatest advancements in the area of surgical therapy for low rectal cancer [1].

Due to the lack of a definition for the low rectum and the lack of surgical standardisation, the use of abdominal-perineal resection ranges from 5 to 55% in the United Kingdom [2] and from 6 to 100% in the United States, depending on the institution or region [3].

Intersphincteric resection (ISR) with colo-anal anastomosis has been adopted as the optimal sphincter-preserving procedure. Schiessel described ISR and he refined his technique in 2005 as an atraumatic surgical technique [4].

ISR is a sphincter-saving technique instead of APR in the middle and lower third of rectum to achieve end points: radical resection, preservation of continence, no permenant colostomy, and accepted quality of life. Modified partial ISR that permitted partial DL preservation, cut slightly above the DL to preserve a partial DL, 2 cm distal to the tumour edge. If there is a distal resection margin, it has been observed that there is no difference in local recurrence rates between individuals who have an APR and a sphincter-preserving surgery [5].

The rate of local recurrence, which is 2–10.6% ISR, is not appreciably different from the rate following low anterior resection (LAR) or APR [6]. In rectal cancer patients who get preoperative neoadjuvent radiation and have a standard complete mesorectal excision, the chance of local recurrence is decreased [7]. Preoperative radiation may affect the anal sphincter, which has a negative impact on anorectal function despite great benefit for decrease local recurrence [8].

In order to achieve radical tumour removal and a standard of living that is accepted, our goal is to research the oncological and functional outcomes of ISR of low rectal cancer.

Patients and methods

At the hospitals affiliated with Menoufia University, a retrospective analysis was done. Forty patients with rectum cancer who were undergoing general surgery at Menoufia University Hospitals were the subject of this investigation.

Menoufia University's Faculty of Medicine granted official clearance. Institutional Research Board IRB approval received from the medical school's ethical review board.

We comprised: older than 18 years old, sexes of both genders, anal canal and a low rectus, restricted by magnetic resonance imaging (MRI) to the internal sphincter or the rectal wall, differentiated tumour, tumour diameter of 1–5, and good continence.

We excluded patients with peritonitis, patient refusal, malignant infilteration of the pelvic floor, tumor diameter greater than or equal to 5 cm, and un-differentiated histopathology.

All patients were subjected to the following: full history taking [age and sex and history of previous operations (type, time, place, complications)].

Examination

General: a thorough general examination is required, with an emphasis on (vital signs, cardiovascular health, and respiratory fitness).

Local: a thorough examination of the abdomen with an emphasis on abdominal wall hernias and surgical scars.

Investigations

Includes laboratory: all patients will have a complete blood count, prothrombin time, partial thromboplastin time, albumin, AST, ALT, liver function tests, kidney function tests, and electrolytes testing for serum urea, serum creatinine, salt, and potassium.

Cardio-vascular testing: all patients underwent an ECG and chest x ray (CXR); some also underwent an ECHO if they were having cardiac issues, a respiratory function test, and an arterial blood gas analysis if they were having respiratory issues.

Radiology: preoperative pelvic-abdominal computed tomography or MR scans were performed on all patients. I am making comments on the pathology of the intra-abdominal and pelvic organs, the degree of the malignancy, its size, location, and spread.

Surgical technique

Based on the concept of total mesorectal excision, the rectum is mobilized to the upper level of the levator ani muscle. Dissection of the intersphincteric space between the internal anal sphincter (IAS) and external anal sphincter started from the posterior side of the rectum by transecting the hiatal (anococcygeal) ligament. Then, circumferential dissection of the intersphincteric space in the anal canal is carried out from the bilateral lateral side to the anterior part. The dissection is advanced to a level lower than the dentate line (DL) in order to facilitate the transanal approach. Circular incision of the anal canal is started at the DL in partial-ISR, between the DL and intersphincteric groove in subtotal-ISR, and at the intersphincteric groove in total-ISR. The IAS is dissected from the external anal sphincter, prostate, vagina, and puborectal muscle, and then the dissection is connected to the transabdominal dissection. After the rectum is completely separated from the anal canal structures, the specimen is taken out of the anus. Thereafter, hand-sewn CAA is done using straight colon, J-pouch. Smooth muscle plasty was devised as a neo-sphincter to improve anal function. Finally, protective diverting ileostomy or colostomy is commonly created.

Postoperative follow-up

Postoperative pain (ache, mild, moderate, severe), postoperative hospital stay, and postoperative complications.

Statistical analysis

SPSS 24.0 for Windows (SPSS Inc., Chicago, IL, USA) was used to gather, tabulate, and statistically analyse all of the data.

Using the Shapiro–Walk test, the distribution of the data was examined for normality. Frequencies and

relative percentages were used to depict qualitative data. The difference between the qualitative variables was calculated using the chi square test [2] and Fisher exact, as shown. For parametric and nonparametric data, respectively, the mean and SD were used to describe quantitative data. For parametric and non-parametric variables, respectively, the independent *T* test and the Mann–Whitney test were employed to quantify the difference between quantitative variables in two groups and failing as 0.50–0.6. The greatest accuracy point served as the ideal cutoff point.

Every statistical comparison used a two-tailed significance test. *P* values below 0.05 indicate a significant difference, those over 0.001 a highly significant difference, and those above 0.05 a nonsignificant difference.

Results

Mean age was 59.12(±3.54 SD), there were 25 male, 15 female, 12 with a history of previous operation. Mean systolic blood pressure was 135.12(±14.54 SD), the mean diastolic blood pressure was 88.12 (±8.60 SD). There were nine with scars of previous operation, four with abdominal hernia.

Regarding laboratory values, mean Hb was 12.9(±2.3 SD), the mean PLT was 179.5 (±15.4 SD), the mean creatinine was 0.9 (±0.2 SD), the mean eGFR was 88.8 (±16.7 SD), the mean potassium was 4.1 (±0.4 SD), the mean APTT was 13.1 (±3.2 SD), the mean Alanine transaminase (ALT) was 23.4 (±4.5 SD), the mean aspartate aminotransferase (AST) was 26.5 (±4.9 SD).

Twenty-two patients diagnosed with mid-rectum neoplasm, 18 with low rectal neopalsm, all patients with tumor size ≤5, 5 with distant metastases.

Mean pperative time was 261.8 (±96.6 SD), the mean blood loss was 185.8 (±156.5 SD). Mean postoperative hospital stay was 11.2 (±4.1 SD), the mean pain severity 1 h postoperatively was 5.5 (±1.0 SD), the mean 1 day postoperatively was 5.9 (±1.5 SD), the mean 5 day postoperatively was 3.3 (±1.2 SD), there were three with anastomotic leakage, two with wound infection, two with hemorrhageone with urinary tract infection, one with ileus.

Regarding complications, mean score of micturition problems was 28.2 (±4.1 SD), the mean gastro intestinal tract (GIT) symptoms was 32.2 (±3.1 SD), the mean weight loss was 5.5 (±1.0 SD), the mean C-Terminal Cross-Linking Telopeptide (CTX) side effects was 13.9 (±1.5 SD), the mean body image was 70.3±6.2.

There were 10 cases with stool frequency 1–3 per 24 h, 23 with frequency 4–6, 7 with frequency more than 7, 10 with nocturnal defecation, 8 with urgency, 8 with stool fragmentation, 4 with pad wearing, 5 with anti-diarrhea medication, the mean Wexner incontinence score was 2.7.

Discussion

Total mesorectal excision, the gold standard for treating patients with mid- and low-grade rectal cancer, has a very low local recurrence rate. The surgical management of these individuals has seen a major change in recent decades [9].

One of the key items in patients who previously underwent an APR is the restoration of bowel continuity, in addition to the goal of cure [10]. The acceptable distal surgical margin for low rectal cancer reduced from 5 to 2 cm and, more recently, to 1 cm, indicating that sphincter preservation may be advantageous in some cases of very low rectal cancer. However, the development of the ISR method allowed for the advancement of sphincter-saving resection in the majority of low rectal tumours [11].

In order to maintain bowel continuity, ISR aims to expand the distal resection margin by partially or completely excising the IAS in extremely low tumours that are less than 1 cm from the anorectal junction [12].

The goal of this study was to assess the ISR in order to confirm that reducing the distal resection margin and maintaining the anal sphincter with ultra-low sphincter preservation did not adversely affect long-term results.

According to this study, there were 25 males, 15 females, and 12 people who had a history of previous operations. The mean age was 59.12 (3.54 SD). According to Denost *et al*. [12], of the 303 ISRs carried out throughout the research period, 29 occurred between 1990 and 1998, 137 occurred between 1999 and 2006, and 137 occurred between 2007 and 2014. A body mass index of 25 (range 17–38) and a median age of 64 (range 22–90) years were found in the 203 men (67%) who made up the sample. Patients' characteristics did not significantly differ across groups.

According to this study, the mean diastolic blood pressure was 8.12 (8.60 SD) and the mean systolic

blood pressure was 135.12 (14.54 SD). In the preoperative examination, Yu *et al.* [13] found that 66 patients (18.4%) in the overall group had a history of hypertension and long-term frequent use of antihypertensive medicines.

This investigation showed that four people had abdominal hernias, and nine people had scars from prior operations. According to Söderbäck *et al.* [14], the cumulative incidence of incisional hernia was 5.3% five years following surgery. According to a multivariate proportional hazard analysis, men had a considerably higher chance of developing an incisional hernia (hazard ratio: 1.40, 95% confidence range).

The results of this study showed that the mean operating duration was 261.8 min (96.6 SD), and the average blood loss was 185.8 (156.5 SD). The average operation took 126 (74.5) minutes to complete, with blood loss of 200.4 (202.7) ml during the procedure and 119.9 (102.9) ml thereafter. The ICU stay was 1.3 (1.9) days, and the hospital stay was 11 (4 days) [15].

This study showed that the average score for urination issues was 28.2 (4.1S D), the average score for gastrointestinal symptoms was 32.2 (3.1S D), the average score for weight loss was 5.5 (1.0 SD), the average score for side effects from CTX was 13.9 (1.5 SD), and the average score for body image was 70.3 (6.2). According to Karlsson *et al.* [16], males were more likely to experience bladder emptying issues than women at 1 year (28% at baseline and 41% at 1 year), even when all problems were taken into account (43% at baseline and 49% at 1 year). At the 1-year follow-up, more men than women required assistance in emptying their bladder. When all issues were taken into account, bladder emptying issues were more common in males (43% at baseline and 49% at 1 year), while women saw a more significant rise at this time (28% at baseline and 41% at 1 year). At the 1-year follow-up, more men than women required assistance in emptying their bladder. Men and women had equal levels of urgency, which grew by around 40% after a year.

According to this study, there were 10 cases of 1–3 stools per 24 h, 23, 4–6 stools per 24 h, 7, more than 7, 10 nocturnal faeces, 8 urgent faeces, 8 fragmented faeces, 4 pads worn, and 5 antidiarrhea medications. The mean Wexner incontinence score was 2.7.

Functional results were evaluated on 22 patients at 12 months following surgery, according to Kuo *et al.* [17] (three patients died from metastatic disease and one from perioperative death). The average number of stools per day was 4.7; one patient was completely incontinent and required diapers; eight patients (36.3%) had one to three faeces per day; 12 patients (54.5%) had four to six faeces per day; and one patient

Table 1 Demographic data and examination

Age	
Mean±SD	59.12±3.54
Sex, n (%)	
Male	25 (62.5)
Female	15 (37.5)
History of previous operation, n (%)	12 (30)
SBP	135.12±14.54
DBP	88.12±8.60
Scars of previous operation	9 (22.5)
Abdominal hernia, n (%)	4 (10)

DBP, diastolic blood pressure; SBP, systolic blood pressure.

Table 2 Characters of tumor in studied cases

Location, n (%)	
Mid rectum	22 (55)
Low rectum	18 (45)
Tumor size, cm	
≤5	40 (100)
Distant metastases, n (%)	
Yes	5 (12.5)
No	35 (87.5)

Table 3 Postoperative data of studied cases

Operative time (min)	261.8±96.6
Blood loss (ml)	185.8±156.5
Hospital stay (days)	11.2±4.1
Pain severity (NRS)	
1 h postoperatively	5.5±1.0
1 d postoperatively	5.9±1.5
5 d postoperatively	3.3±1.2
Postoperative 30 day complications, n (%)	10 (25)
Anastomotic leakage	3 (7.5)
Wound infection	2 (5)
Hemorrhage	2 (5)
Urinary tract infection	1 (2.5)
Ileus	1 (2.5)
Others	1 (2.5)

Table 4 CR3CR8 (disease-specific colorectal cancer module) mean quality of life scores of patient groups

Micturition problems	28.2±4.1
GIT symptoms	32.2±3.1
Weight loss	5.5±1.0
CTX side effects	13.9±1.5
Body image	70.3±6.2
FU (future perspective)	62.1±5.9
Sex—active functioning	32.1±2.9
Sex—enjoyment	52.4±4.8
Defecation problems	29.9±2.5

Table 5 Functional outcomes following intersphincteric resection

Stool frequency per 24 h, n (%)	
1–3	10 (25)
4–6	23 (57.5)
>6	7 (17.5)
Nocturnal defecation	10 (25)
Urgency	8 (20)
Stool fragmentation	8 (20)
Pad wearing	4 (10)
Anti-diarrhea medication	5 (12.5)
Wexner incontinence score	2.7

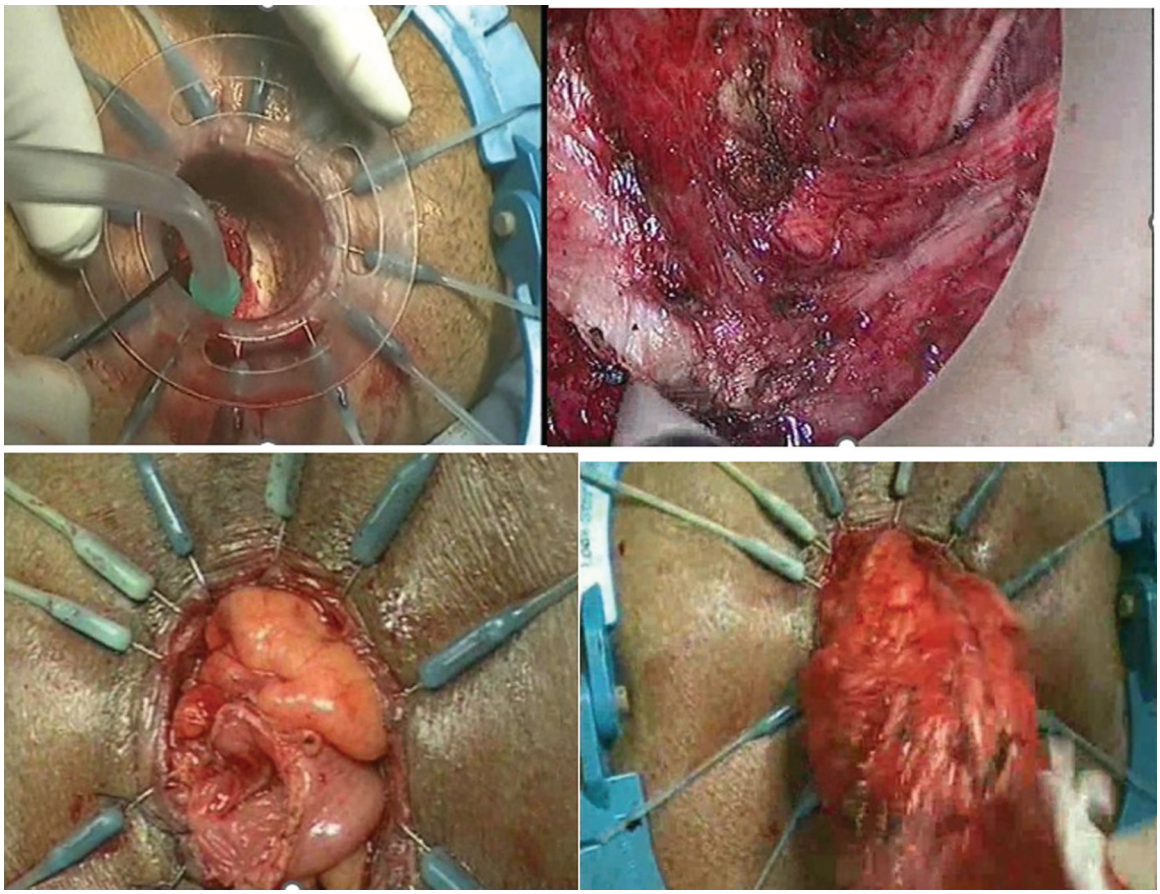
was unable to have a colostomy closure due to a previous coloanal anastomotic site stricture (Tables 1–5 and Fig. 1).

Functional questionnaires received an average response rate of 80%. Patients who participated in the functional evaluation had a median follow-up of 4.6 years, with a range of 1.0–15.6, and it was greater in patients who underwent surgery in periods 1 and 2 than in period 3 (8.2 *vs.* 6.2 *vs.* 4.0 years). According to Konanz and colleagues, there was an average difference of 3.4 points in the Wexner incontinence summary score between patients who underwent ISR and those who underwent LAR. The item "pad use," which was approximately twice as prevalent among ISR patients compared with LAR patients, showed the greatest differences in continence function [18].

The current study has certain drawbacks. First of all, it is a single institution series with patients receiving care from rectal cancer surgery specialists. Given the great range of social cultures across the world, it is critical to emphasise the influence of social culture when choosing between sphincter-saving resection and abdominoperineal excision for very low rectal cancer. The patient populations from different regions of the world may not be able to use our data. Before making a surgical choice, patients were chosen using high-quality imaging, such as pelvic MRI. The center's expertise in ultra-low sphincter preservation is, hence, to thank for the positive oncological outcomes.

In low traffic centres, we do not advise employing ISR. Second, the functional result only comprised a limited subset of participants. This was because patients who

Figure 1



Steps of intersphincteric resection.

had passed away, experienced a recurrence, or required a colostomy due to complications were not included in the long-term follow-up. In addition, there is a significant variation in the time between initial surgery and functional evaluation, ranging from 1 to 15 years. The results, however, were consistent with other studies including our earlier series, revealing that substantial LARS and some level of faecal incontinence were present in about 40% of patients.

Conclusion

The intersphincteric resection approach improves the rate of sphincter preservation while maintaining oncological and functional results. Symptom-specific quality of life may be adversely affected by preoperative radiation.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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