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Full Length Article

Evaluation of the frequency and pattern of local recurrence following intersphincteric resection for ultra-low rectal cancer

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KEYWORDS

Intersphincteric resection;
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Abstract *Introduction:* Abdomino-perineal resection has been the standard treatment for rectal tumors located ⩽5 cm from the anal verge. Recently, intersphincteric resection became a valid option which preserves the bowel continuity with better functional outcome.
Aim: Is to evaluate the oncological and functional outcome alongside the associated surgical morbidity in patients with T1-3 rectal cancer, who underwent intersphincteric resection (ISR).
Patients & methods: Between the years 2006 and 2011, 55 patients with invasive rectal adenocarcinoma, T1-3 lesions, located 2–5 cm from the anal verge underwent ISR with total mesorectal excision. When inevitable, complete. ISR was performed, otherwise partial ISR was done. All T3 patients underwent total meso-rectal excision (TME) while some had lateral lymph node dissection (LND) with concomitant pelvic autonomic nerve preservation (PANP).
Results: Among the 55 patients, 21 (38.1%) patients were T1-2 and 34 (61.9%) patients were T3. The tumor location range was 0–5 cm from the anal verge (median 2.3 cm). Partial or complete ISR

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was done for 35 (63.6%) and 20 (36.4%), respectively. Patients were followed for a median of 1.5 years (range 1–4.6 years). The 3 year local recurrence and distant metastasis free rates were 85.2% and 85.6%, respectively. All the 3 local recurrences occurred in T3 patients group, and had positive circumferential resection margins. Overall 3-year disease-free survival was 82.6%; while the overall 3-year survival was 88.7%.

Conclusion: Intersphincteric resection with TME does not affect the local recurrence or overall survival rate in early rectal cancer T1-2 & 3, with preservation of bowel continuity and better life quality.

Introduction

The Standard surgical treatment for massively invasive rectal adenocarcinoma located within 5 cm from the anal verge is abdomino-perineal resection (APR) [1]. This is because the length of the anal canal is 3–5 cm [2]. The achieved progress in current technology, chemotherapy and radiotherapy, combined with a better understanding of the microscopic peripheral invasion of the tumor (the limit should not exceeding 10–15 mm), have now led to the planning and application of alternative policies of surgical treatment [3–5].

The intersphincteric resection (ISR), first proposed by Schiessel in 1994 for more distal location, combines rectal removal with excision part or whole of the inner sphincter and restoration by hand sewn colo-anal anastomosis [6]. Generally the maximum limit, under which this method can be applied, must be set in the distance of 3 cm from the dentate line. The superior location of the tumor beyond this limit indicates low anterior resection and stapled anastomosis, while the lower location emerges the choice of intersphincteric resection [6–8]. With this later, which involves dividing the rectum between the internal sphincter and the external sphincter or the levator ani muscles, raised the question of whether a secure circumferential resection margin (CRM) of the tumor can be obtained, with the potential risk of increasing recurrence, especially local recurrence [9–13]. Given the microscopic invasion of 10–15 mm from the macroscopic limit of the tumor, a free resection margin must be preserved, without malignant cell infiltration in this distance. So based on this principle, this method is indicated for tumors located at a distance of 1.5–3 cm from the dentate line, although some set the most extreme limit for lower location even up to 0.5 cm. The infiltration of the outer sphincter or pelvic floor muscles is an absolute contraindication for the method [6–8]. ISR is nowadays being increasingly recognized to achieve a safe distal resection margin, which can be as small as 1–2 cm [14,15].

Aim

The principal aim of this study is to evaluate the oncological and functional outcome as well as the associated mortality in addition to short and long term morbidity in patients with T1-2 & T3 rectal cancer, who underwent intersphincteric resection (ISR).

Patients & methods

Between the years 2006 and 2011, a total of 55 consecutive patients presenting to the outpatient department, fulfilling the inclusion criteria, namely: invasive rectal adenocarcinoma, T1-3 lesions, and located from 2 to 5 cm from the anal verge. Patients were recruited from 2006, for the following 36 months, and then were followed-up thereafter till the end of 2011. Intersphincteric rectal resection (ISR) with total mesorectal excision (TME) was performed for all patients at the National Cancer Institute (NCI), Cairo University.

All patients underwent routine full laboratory blood tests including base line Carcino-Emberyonic Antigen (CEA), digital rectal examination (DRE), diagnostic biopsy under local anesthesia for pathological examination prior to surgery and full Colonoscopy. Additional routine imaging procedures for local, regional and distant staging were performed. These included: Transrectal ultrasonography (TRUS), chest CT, and abdominopelvic thin-section MRI with a phased-array coil. PET-CT was carried out in selected cases with equivocal metastatic results.

Selection criteria for ISR were sufficient medical fitness; normal sphincter function; distance between the tumor and the anorectal junction (upper edge of the surgical anal canal) of less than 2 cm; no involvement of the external sphincter; and no signs of disseminated disease. Patients having T3, T4, and N positive rectal cancer, received neoadjuvant treatment for down staging and increasing of the possibility of sphincter-saving surgery. Lateral node dissection (LND) with concomitant pelvic autonomic nerve preservation (PANP) was carried out in patients with extra-mesorectal lateral nodes detected by MRI if the node diameter is >5 mm in its longest diameter. Surgery was performed within 6 weeks after neoadjuvant therapy completion. Written informed consent was obtained from all patients. The functional outcome was assessed according to Kirwan scale for continence.

Surgical technique

ISR and colo-anal anastomosis were performed through a combined abdominal and perineal approach (Fig. 1). The abdominal part of the operation was performed using either the open or the laparoscopic technique.

First, the abdominal part began by a high ligation of the inferior mesenteric artery to mobilize the left colon, including taking down the splenic flexure. Total mesorectal excision, with sharp dissection along an embryologic plane between the mesorectal and the pelvic sidewall fasciae, while preserving the hypogastric plexus of nerves, was carried up, following Heald description [16]. Distal dissection exposed the puborectal muscle, surrounding lateral and posterior rectal walls, at the pelvic floor, facilitating the perineal part of the dissection. This latter began by a good exposition of the anal canal via

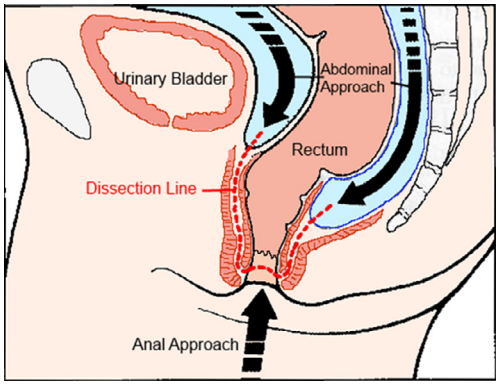

Figure 1 The dissection lines for the combined abdominal and per anal approach of intersphincteric resection.

self-retaining retractor (Lone Star Retractor; Lone Star Medical Products Inc., Houston, TX, USA). Diluted epinephrine (1:20 ml) with saline solution was locally injected, minimizing bleeding and facilitating intersphincteric dissection. The mucosa and internal sphincter were circumferentially incised at least 1 cm distal to the tumor edge. The anal orifice was then closed trans-anally with purse-string sutures to prevent tumor cell dissemination during the procedure.

Three types of ISR were used, namely: total, subtotal, and partial. When inevitable, due to tumor spread beyond the dentate line, total ISR was completed by fully excising the internal sphincter, so that the distal margin of the resection is at the intersphincteric groove. In few cases, where the distal edge of the tumor was more than 2 cm far from dentate line, subtotal ISR was performed, getting the distal resection margin between the dentate line and the intersphincteric groove (Fig. 2). Preferably, when otherwise enough distal surgical margin existed, distal resection was performed, at or above, the dentate line, named partial ISR. The limits of the 3 types of ISR are shown in (Fig. 3). Dissection was continued through intersphincteric plane up to reach the abdomen dissection level.

Lateral lymph node dissection (LND) and pelvic autonomic nerve preservation (PANP) were carried out in persisting T3 patients whom MRI pelvic examination revealed nodal diameter >5 mm with heterogeneous pattern. Following rectum dissection from prostate or vagina, the specimen was removed per anally (Fig. 4). Frozen-section examination was used to confirm the lack of tumor cells in the distal margin. A J-pouch

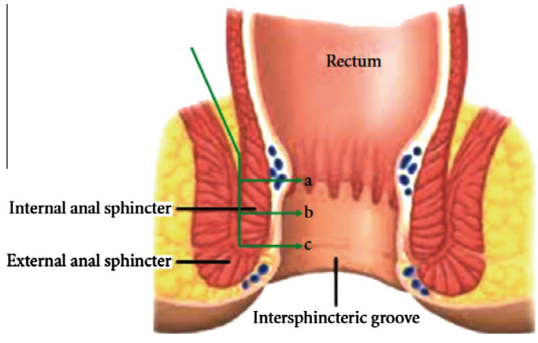

Figure 2 Type of ISR according to amount of excision of the internal anal sphincter. (a) Partial ISR; (b) Subtotal ISR; (c) Total ISR (**Cipe et al. 2012**).

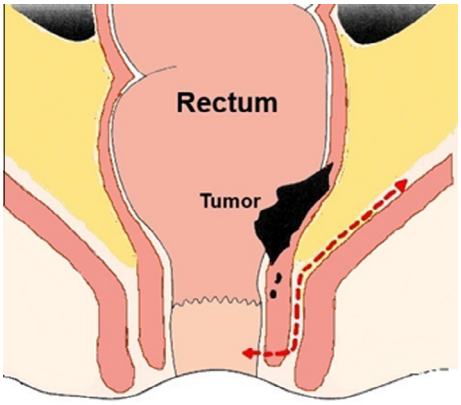

Figure 3 ISR with subtotal excision of the internal sphincter for ultra-low rectal tumor at the ano-rectal junction.

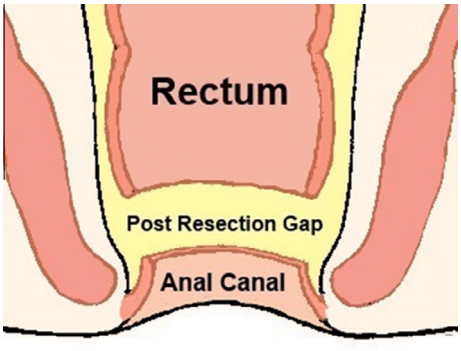

Figure 4 The gap following ISR for ultra-low rectal tumor with proximal colonic end pulled to anal end.

was done in patients with early tumors at a maximum of 6 cm from anal verge, while straight colo-anal hand-sewn anastomosis was done to the other patients (Fig. 5). Pelvic drain was placed, and de-functioning stoma was done for all preoperatively irradiated patients and in those with very low tumors.

Postoperative management

Postoperatively, chemotherapy and/or radiotherapy were offered to all indicated patients. All T3 patients received either neoadjuvant or adjuvant chemoradiation. Patients were

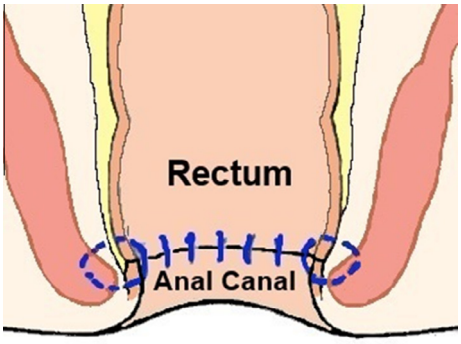

Figure 5 Colo-anal anastomosis for bowel continuity following ISR for ultra-low rectal tumor.

followed up until the end of 2011. For the first 2 years, patients were reviewed every 3 months for clinical examination, CEA. Abdomino-pelvic US and CXR were done every 6 months. CT chest, and abdomino-pelvic MRI with full colonoscopy were carried out on annual basis. PET-CT was done to investigate any suspicious findings during the regular follow-up protocol. The following 3 years, patients were checked every 6 months then annually thereafter.

Statistical methods

Data management and analysis were performed using Statistical Package for Social Sciences (SPSS) vs. 17. Overall survival and Disease Free Survival times were estimated using the methods of Kaplan and Meier. Differences between survival curves were assessed for statistical significance with the log-rank test. All p-values are two-sided. p-values < 0.05 were considered significant.

Results

Among the 55 patients included in the study, 21 (38.1%) patients were T1-2 and 34 (61.9%) patients were T3. The tumor location range was 0–5 cm from the anal verge (median 2.3 cm). Partial ISR was done for 35 (63.6%) patients while complete ISR and external sphincter resection was performed for 20 (36.4%) patients. Lateral node dissection and Pelvic Nerve Preservation (PANP) were carried out in only 8 (14.5%) T3 patients with lateral nodes > 5 mm in diameter, as detected by pelvic MRI. J-pouch was done for 3 (5.4%) patients and covering stoma in 15 (27.3%) patients. Twenty-five patients with T3 received long course of neoadjuvant chemo-radiotherapy (CRT), while 9 others with T3 tumors received adjuvant CRT.

Mortality & morbidity

Surgical morbidity occurred in 14/55 patients (25.5%). Early surgical complications occurred in 12/14 patients (85.7%), in the form of intestinal obstruction (4 patients, 33.3%), urinary tract infection (4 patients, 33.3%), respiratory infection (4 patient, 33.3%), anastomotic leakage (4 patients, 33.3%), and pelvic sepsis (1 patient). Eight (66.6%) patients were managed conservatively, among whom 3 patients with anastomotic leakage had diverting colostomy and drainage, while the fourth patient, who underwent delayed drainage, developed massive pelvic sepsis and passed away, to be the study sole mortality. Delayed surgical morbidity occurred in 2/14 (14.3%) patients including one patient with stomal prolapse, and another with anastomotic stenosis; both were managed conservatively.

Oncologic outcome

Patients were followed for a median of 1.5 years (range 1–4.6 years). All the 3 local recurrences occurred in T3 patient group; two occurred at the lateral nodal groups; one at the obturator and the other at the common and internal iliac lymph node groups (Fig. 6) who underwent adjuvant chemo-Radiation, one was a sacral recurrence (Fig. 7), who underwent composite sacral resection (Partial sacrectomy below S3 and APR) while all the 3 patients had positive circumferential resection margins (CRM) at the primary resection.

The distant disease occurred in 7 patients; one in T2 patient and the others in T3 patients. In one patient, liver metastasis was discovered during primary resection, when it underwent complete non-anatomical resection, while in the other 5 patients, liver metastasis appeared during the follow-up period. All the distant recurrences occurred in the T3 patient group, where 2 patients had liver metastasis, 2 patients developed lung metastasis, and only one patient harbored metastatic deposits in both organs. All the patients with distant recurrences received primary chemotherapy followed by resection. One patient with liver metastasis underwent Ablative Radio Frequency (ARF). Thereby, the 3 year local recurrence and distant metastasis free rates were 85.2% and 85.6% respectively. The overall 3-year survival was 88.7% (Fig. 8), while the overall 3-year disease-free survival was 82.6% (Fig. 9).

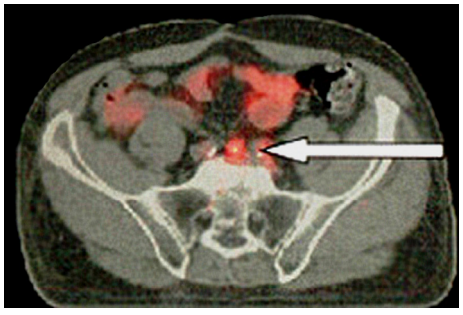

Figure 7 PET-CT showing sacral recurrence (arrow) following ISR.

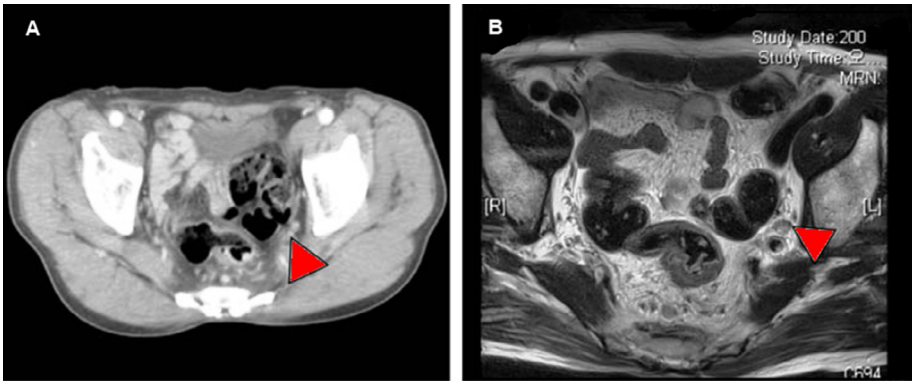

Figure 6 CT (A) and MRI (B) pelvis showing lateral nodal recurrence (arrow) following ISR.

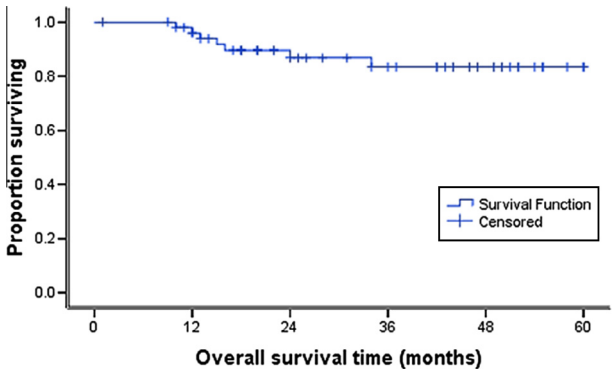

Figure 8 Three-years overall survival time.

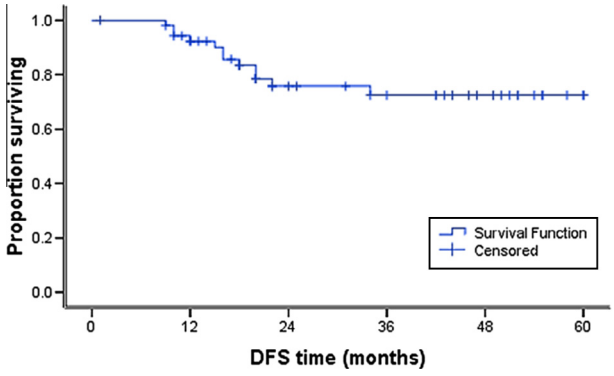

Figure 9 Three-years Disease Free Survival (DFS) time.

Functional outcome

As per continence, it was subjectively assessed according to kirwan scale, forty seven patients (85%) were classified as Kirwan scale I, and five patients (10%) were scale II, while the remaining three patients (5%) were scale III requiring temporary pads.

Discussion

In this study, overall postoperative complication rate was 25.5% conformal to the reported in the different series from 5.6% to 64% [17–19]. Common complications included leakage, anastomotic stricture, fistula, pelvic sepsis, and prolapse. Anastomotic leakage is the most serious complication since it has been found to lead to severe sepsis followed by death or postoperative anastomotic stricture [20] and poor postoperative anorectal function [21]. In this study we reported 33.3% leakage, much higher when compared to the literature anastomotic leakage rates of 0.9–24% [22–24], which varied depending on whether asymptomatic leaks were radiologically detected. This high percentage might be explained by the adverse effect of neo-adjuvant chemo-radiation and the early phase of the learning curve.

Also, different studies reported an anastomotic stricture rate ranging from 5.8% to 12% [7,13,17,19,20,25]; comparatively we reported a similar rate of 8.5% in the current series. Postoperative intestinal obstruction, reported to be 33% in this study, presented between 0% and 16% [15,26] according to other various studies, and usually patients, as in our case, responded to conservative treatment.

We reported a single postoperative mortality from a delayed drainage of a resultant pelvic sepsis following intestinal leakage, compared to most publications who reported a mortality between 0% and 6% for this procedure [7,13,19,20,26]. Thereby, early drainage of pelvis sepsis should always be done to save the patient life.

From an oncological point of view, local control of the disease remains the most important objective in rectal cancer surgery. This study showed that invasion through the muscularis propria (T3) and positive microscopic circumferential resection margin (CRM) were significantly associated with 5.4% local recurrence rate after ISR, which confers with other authors results who reported a local recurrence rate of 0–13.3% for positive CRM [8,13,19,27–33].

For patients with T1-2 lesions, no recurrences have been diagnosed, though these patients did not receive radiotherapy, neither before nor after surgery. This matches with other authors findings [6,19,34]. Although long-term preoperative radiotherapy is known to reduce tumor volume and change protruding tumors into ulcerative scars, facilitating operations and decreasing tumor spillage, radiotherapy, in both short and long courses, has the potential to cause damage to both anorectal and sexual functions. Therefore, identification of a subset of patients for whom radiotherapy is not necessary is valuable [19].

It is controversial whether lateral pelvic lymph node metastasis has a significant role in the control of local recurrence. In our study, two out of three local failures appeared to be caused by lateral node metastasis. The incidence of lateral node metastasis was 3.5% in this study, while it was estimated to be between 6.5% and 9.4% in a large series with 1,977 rectal cancer patients [35], as well as in other studies [13,36], suggesting a certain influence on local failure. So, due to our relatively small number of patients, the real incidence of lateral node metastasis and its role in determining prognosis cannot be commented upon in this study.

We report a relatively overall high rate of continence satisfaction of 95%, relatively higher than the reported in other series of 90.8% [8], this can be explained by the fact that most of our patients had partial ISR.

The authors report in this study, a 3-year survival and disease-free survival of 88.7% and 82.6%, respectively, matching the other studies that reported 82–83% and 75–82%, respectively [8,19].

Conclusion

Intersphincteric resection with Total Mesorectal Resection does not affect the local recurrence or overall survival rate. In early rectal cancer T1-2, there is no need for radiation therapy when meticulous dissection and stump irrigation are applied. This technique provides bowel continuity, rendering patients with no stoma with better quality of life.

Conflict of interest

None.

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