

Outcome of intersphincteric resection for lower rectal tumors in gastroenterology and hepatology teaching hospital of Baghdad

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ABSTRACT

Background: The treatment of rectal cancer has evolved and Intersphincteric resection (ISR) has become an increasingly popular optional surgical tool for the treatment of very low rectal cancer. In recent years, intersphincteric resection for low rectal cancer has been offered and performed as an alternative to abdominoperineal resection in selected patients. **Objective:** An overview of this procedure, including indications, oncological and functional results and complications are evaluated in this study. **Patients and methods:** 13 patients were selected for intersphincteric resection in gastroenterology and hepatology teaching hospital in medical city Baghdad/Iraq from November 2017 till march 2020, 11 patients have adenocarcinoma of the lower rectum and 1 patients have villous adenoma and 1 patient have gastrointestinal stromal, functional and oncological outcome were assessed. **Results:** All patients received potentially curative R0 resection, 7 out of 13 patients (53.8%) show good continence, 3 patients (23%) have occasional flatus incontinence, 3 patients (23%) have occasional soiling of underwear, most common early complication was wound infection, most common late complication was adhesive bowel obstruction, mortality rate was 0%.

Conclusion: functional and oncological outcomes after open intersphincteric resection seem to be acceptable.

Keywords: ISR, rectal cancer, functional outcome.

Introduction:

colorectal cancer is the third most common cancer and the third leading cause of cancer deaths in both males and females. Adenocarcinomas comprise the vast majority (98%) of colon and rectal cancers, Other rare rectal cancers, including carcinoid (0.4%), lymphoma (1.3%), and GIST (0.3%).⁽¹⁾

About 20% of colorectal cancers in the rectum, and an additional 10% in the rectosigmoid junction.⁽²⁾ The incidence of colorectal malignancy is slightly higher in males than in females. a male-female ratio of 1.30:1.⁽³⁾

Surgical treatment for very low rectal cancer is very difficult because of the higher rate of local recurrence and lower rate of survival, ultra low anterior resection and Abdominoperineal resection reported by Miles has been used for a long time as a standard surgical procedure for lower rectal cancer.⁽⁴⁾ However treatment of rectal cancer has evolved, For early lower rectal cancers (t1n0) with no poor histopathological features (poor differentiation, lymphoneural or perineural invasion) and small <3cm can be treated by transanal excision and follow up.⁽⁵⁾

For more advanced lower rectal tumor, AP resection characterized by a permanent colostomy was the standard procedure and has not been easily accepted

by patients. In 1972, low anterior resection followed by hand-sewn coloanal anastomosis introduced by Parks became widely adopted around the world as an excellent procedure for lower rectal cancer to preserve the anus.⁽⁶⁾

In the latter half of the 1900s, total mesorectal excision, preoperative chemoradiotherapy (CRT), and optimal circumferential resection margin suggested both good control of local recurrence and survival benefit.^(7,8) Also, CRT influenced downstaging of the tumor, and allowed sphincter-saving operation for some patients who may have required AP resection.⁽⁹⁾ In addition to those aspects, shorter distal resection margin proposed by clinicopathological studies has encouraged surgeons to preserve the anus.⁽¹⁰⁾

In 1994, Schiessel et al. introduced ISR followed by hand-sewn coloanal anastomosis (CCA) as an anal preservation procedure for very low rectal cancer closer to the anus.⁽¹¹⁾ The surgical technique changed the concept of anal preservation and, since 2000, has rapidly expanded in the world.⁽¹²⁾ Also, laparoscopic-ISR has come to be aggressively carried out.⁽¹³⁾

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Indications of intersphincteric resection:

ISR is an alternative to AP resection for cancers of the lower third of the rectum. The lower third of the rectum is defined by the "rule of four" as the region from 48 cm from the anus. Since the anal canal measures in many people less than 4 cm, the lower third will be then eventually 26 cm from the anus. Usually such tumours can be reached by the finger and are accessible for a clinical staging.

Indications for ISR:

- (a) Tumor in the lower third of the rectum.
- (b) Tumor with extension into the anal canal.
- (c) Large villous adenoma.
- (d) Residual tumor after endoscopic mucosectomy for early cancer.
- (e) Residual tumor after radiotherapy.
- (f) gastrointestinal stromal tumor of lower rectum.

Contraindication is the presence of untreatable distant metastasis, poorly differentiated carcinoma, poor anal function, psychiatric disease, and a fixed tumor (T4 lesion) which invades the puborectal muscles and/or external anal sphincter.⁽¹⁷⁾

Diagnostic procedures:**Endoscopy and biopsy:**

Evaluation of the anus and rectum has traditionally been done through external examination, digital rectal examination, anoscopy, flexible or rigid proctosigmoidoscopy, and colonoscopy with biopsy. When we check the report we have to look if there is any information about the distance of the tumor from the anus.^(17,19)

Imaging:

Imaging techniques have included, abdominal ultrasound or CT scan (for metastasis), chest xray, and MRI. With the introduction of endoluminal ultrasonography, a greater degree of objectivity has been implemented in the evaluation of the anorectum.. Accurate preoperative staging guides decision for neoadjuvant therapy, sphincter sparing procedures, and local excision.^(17,18)

Sphincter manometry:

Sphincter saving procedures are based on the hypothesis, that the sphincter to be saved works properly. With a careful history and digital examination we can exclude severe cases of faecal incontinence. Sphincter manometry gives an objective information about sphincter function and will help in difficult decisions.⁽¹⁸⁾

Surgical technique:

Based on the concept of total mesorectalexcision, which include, (1) high ligation of the inferior mesenteric artery, (2) complete mobilization of the splenic flexure, (3) division of the colon at the descending sigmoid junction, (4) sharp dissection in the avascular plane into the pelvis anterior the presacral fascia and outside the fascia propria (5) division of lymphatic and middle hemorrhoidal

vessels anterolaterally, and (6) inclusion of all pelvic fat and lymphatic material at least 2 cm below the level of the distal margin.⁽¹⁶⁾

The procedure consist of two parts :abdominal and perineal, it is recommendable to start with the abdominal part. patient positioned in Lloyd-Davis position The perineal part can be started as soon as the anatomical situation in the abdomen is clear and the rectum is mobilized as much as possible. From this point the operation is carried out as a synchronous AP resection procedure.⁽¹⁷⁾

Abdominal part:

Midline incision from the umbilicus to the symphysis. After complete exploration of the abdomen we mobilize the sigmoid colon and identify the left ureter. Then we mobilize the left colon completely up to the left flexure.

The next step is the incision of the pelvic peritoneum (figure 4), the rectum is mobilized down to the upper level of the levator ani muscle by dissection around the rectum anteriorly, posteriorly and laterally, this is the point where the perineal team can start.

The abdominal team continues with ligating the inferior mesenteric artery. A lymphadenectomy of the stem of the inferior mesenteric artery down to the aorta should then be performed. It is noteworthy that the hypogastric nerves can be damaged in this area. The next step is the decision where to divide the sigmoid colon.

After full mobilization of the sigmoid and descending colon the surgeon get an estimate of the available length for reconstruction. For CAA the colon should reach without tension 5 cm beyond the symphysis. The operation is continued with stepwise approaching the lowest part of the rectum and so coming in close contact to the perineal team.

The final step of the abdominal team is the construction of a protective stoma. Although there is no proof that a stoma is really necessary, we have performed it in all our cases. Depending on the anatomical situation we perform either a transverse colostomy or an ileostomy. A presacral drain is introduced before the abdomen is closed.⁽¹⁷⁾

Perineal part:

There is three types of intersphincteric resection depending removing part or all of IAS, total ISR in which we remove all IAS, subtotal ISR in which we remove most of IAS, and partial ISR in which we remove small part of IAS.

When the anal region is well exposed, stay sutures or the Lone-Star retractor is inserted.

The next step is a subcutaneous infiltration of the anal skin with an epinephrine solution of 1:200.000 in order to have a dry operative field during the dissection.

Circular incision of the anal canal is started at the dentate line in partial-ISR, between the dentate line and intersphincteric groove in subtotal-ISR, and at the intersphincteric groove in total-ISR. ⁽¹⁹⁾ We lift the muscle fibres with a forceps so that we can enter the intersphincteric plane. With gentle dissection the EAS, which has a reddish appearance, can be separated. As soon as a good dissecting plane is achieved the IAS is mobilized in the entire circumference (Figure 6). Following the intersphincteric plane we approach the lower pelvis and get in touch with the abdominal team.

After peranal harvest of the specimen and its inspection a washout of the pelvis with saline solution is performed. This is followed by thorough inspection of the pelvis from above and from below for residual bleeding.

The final step is the reconstruction of the bowel continuity. The decision has to be made as to whether a pouch is performed or not.

Thereafter continuity is restored with a CAA. It is important to restore the anal canal and to avoid a mucosal prolapse. This can be achieved by putting the stitches first through the anal skin, then through the external sphincter and then through the full thickness of the colon. Before tightening the knots an exact adaptation of the mucosa to the skin is important. A release of the hooks of the Lone-Star retractor is helpful to get some skin into the new anal canal. When the anastomosis is finished, the retractor is removed. Contraction of the sphincter is usually observed after removal of the retractor. ⁽¹⁷⁾

Different types of ISR are illustrated in the following figure

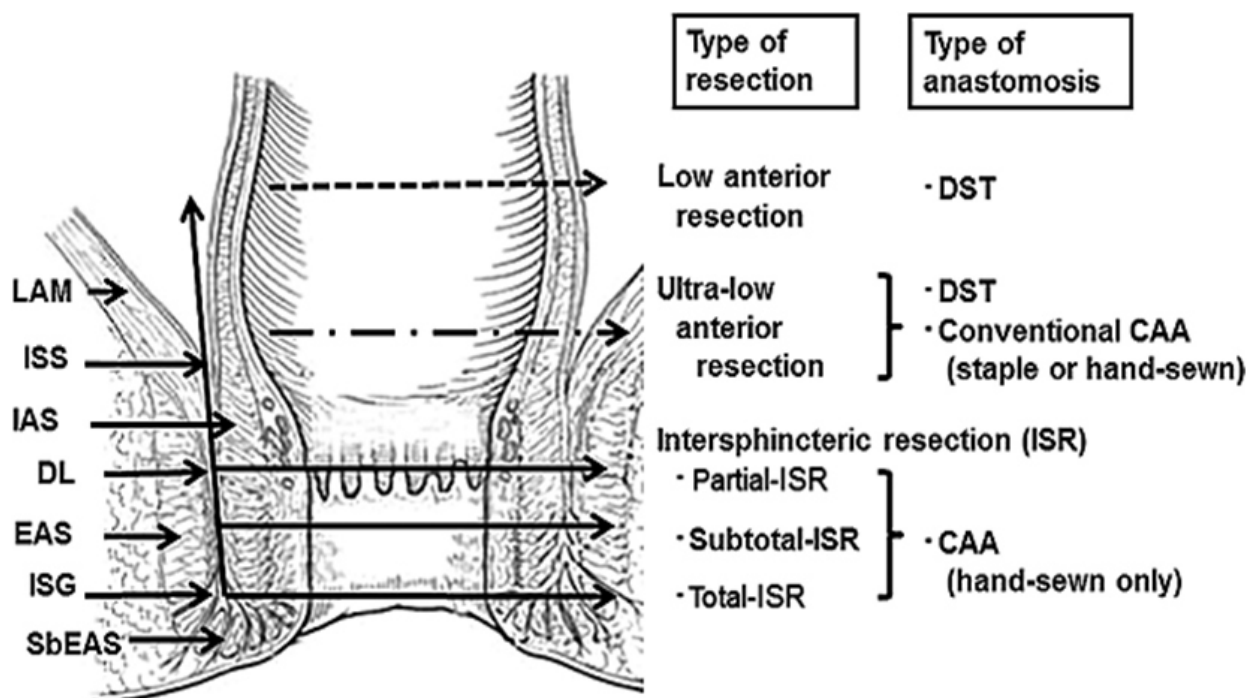


FIGURE: Definition of intersphincteric resection. The resection line of the rectum or anal canal varies depending on the location of the tumor from the anal verge. Total intersphincteric resection (total-ISR) is defined as an internal sphincter resection at the intersphincteric groove (ISG), subtotal-ISR is between the dentate line (DL) and ISG, and partial-ISR is at the DL. CAA, coloanal anastomosis; DST, double stapling technique; EAS, external anal sphincter; IAS, internal anal sphincter; ISS, intersphincteric space; LAM, levatorani muscle; SbEAS, subcutaneous part of external anal sphincter.

Aim of the study:

The main objective of this study is to evaluate the functional and oncological outcome and complications following intersphincteric resection with coloanal anastomosis for lower rectal tumors, a procedure aiming to preserve the anus and avoiding abdominoperineal resection.

Patients and methods:

Patients: We did retrospective study, 13 patients were selected for intersphincteric resection in gastroenterology and hepatology teaching hospital from November 2017 till March 2020, 6 females (46%) and 7 males (54%), mean age 56 years. Selection criteria were patients with low rectal cancer with well or moderately differentiation located less than 5 cm from the anal verge to inferior margin of the tumor, lower rectal villous adenoma and lower rectal GIST. Exclusion criteria for ISR were patients with poorly differentiated adenocarcinoma of lower rectum diagnosed by biopsy, suspected tumor invasion of levatorani, impaired fecal continence preoperatively or presence of distant metastasis.

All patients did preoperative routine investigations including CBC, renal and liver function test, ECG, Blood group, ECHO study and pulmonary function test was done to some patients with comorbidities.

All patients did CT scan of the chest, abdomen and pelvis, MRI of the pelvis.

PET scan was done in selected patients with suspected metastasis.

All patients with malignancy were sent to oncology hospital and received neoadjuvant chemotherapy before surgery.

We did not do endoscopy of the rectum because it is not available.

Blood was prepared for surgery and bowel preparation was done for all the patients.

All patients received prophylactic antibiotics (ceftriaxone and flagyl parentally) half hour before surgery and took deep venous thrombosis prophylaxis (enoxaparin 4000 IU subcutaneously).

Stoma place was marked for all the patients before surgery and discussion with the patient was done about stoma care and complications.

All patients were connected before surgery.

Surgical technique:

Based on the concept of total mesorectal excision the rectum is mobilized down to the upper level of the levator ani muscle. In abdominal part of the procedure. In perineal part circular incision of the anal canal is started at the dentate line in partial-ISR, between the dentate line and intersphincteric groove in subtotal-ISR, and at the intersphincteric groove in total-ISR.

The internal anal sphincter 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, and protective loop ileostomy in the right iliac fossa was done for all the patients.

Oncologic assessment and selection of the operative procedure:

Routine preoperative oncologic assessment included digital examination, rigid proctoscopy, colonoscopy, computed tomography (CT) and magnetic resonance imaging (MRI). By digital examination we judge the tumor location, and then the extent of invasion into the sphincters was confirmed using CT and/or MRI. When a tumor was freely mobile under digital examination and there was no invasion into the external sphincters based on CT and/or MRI, no metastasis, then ISR was done.

Finally, the appropriate treatment was selected after digital examination

under general anesthesia or by transabdominal palpation during the operation.

Functional assessment:

Assessment of anal function was performed before and at 3 months after the first operation, and then at 3, 6 and 12 months after ileostomy closure. The continence status of each patient was evaluated using the standardized classification proposed by Kirwan et al. ⁽²⁰⁾

Kirwan grade	
I	NORMAL
II	INCONTINENCE OF GAS
III	OCCASIONAL OVERFLOW
IV	UNDERWEAR OFTEN CONTAMINATED
V	STOMA REQUIRED

Follow up:

outpatient follow-up was carried out after 3 months. Clinical symptoms were observed during the follow-up interview and a clinical laboratory test (CBC and CEA) and a radiographic examination (chest radiography) were conducted. In 6 months postoperatively, abdominal CT and colonoscopy were performed. The patients with restored ileostomy were followed using a standard protocol at 3, 6 and 12 months after ileostomy closure. The assessment of defecatory function was evaluated through personal interviews about stool frequency in a 24-h period and incontinence status assessed by Kirwan's classification at 3 months after the first operation, and then at 3, 6 and 12 months after ileostomy closure, To evaluate local recurrence and distant metastasis, abdominal computed tomography (CT) every 6 months, colonoscopy were performed every 1 years. Anorectal manometry was not routinely performed to evaluate postoperative sphincter function.

Results:

13 patients were selected for intersphincteric resection 7 males(54%) 6 females(46%) and,mean age 56years.figure 10.

11 patients have adenocarcinoma of the lower rectum and 1 patients have villous adenoma in the lower rectum and 1 patient have gastrointestinal stromal tumor of the lower rectum.11patients received neoadjuvantchemoradiation for 4-5 weeks. 10 out of 13 patients undergo complete intersphincteric resection, 2 patients undergo incomplete intersphincteric resection and 1 patient undergo partial intersphinctericresection. ileostomy was closed 2-3 months surgery.

Patients and tumor characteristics are shown in Table 1.

Table 1 Patients and tumor characteristics

Patient	Genre	Age (years)	histopathology	Tumor stage
1	♂	60	MD adenocarcinoma	T2N0M0
2	.	55	MD adenocarcinoma	T2N1M0
3	♀	45	MD adenocarcinoma	T3N1M0
4	.	65	MD adenocarcinoma	T2N1M0
5	♀	60	WD adenocarcinoma	T3N1M0
6	♂	45	MD adenocarcinoma	T2N0M0
7	♂	50	MD adenocarcinoma	T2N0M0
8	♀	55	MD adenocarcinoma	T3N1M0
9	♂	65	adenocarcinoma	T3N0M0
10	♂	60	MD adenocarcinoma	T2N0M0
11	♀	70	Villous adenoma	-----
12	♂	40	GIST	LOW RISK
13	♀	60	WD adenocarcinoma	T2N0M0

MD :moderately differentiated,WD :well differentiated,GIST :gastrointestinal stromal tumor

Oncologic results:

All patients received potentially curative R0 resection with mean distal resection free margin of 2.5 cm ,9 patients have 2 cm distal resection free margin and 3 patients have 3 cm distal free margin and 1 patient have 1 cm distal free margin. The lateral resection margin was negative in all cases.

During follow up one patient had local recurrence 1 year after resection treated by abdominoperineal resection, this patient had MD

adenocarcinoma T3N1M0 and had 1 cm distal resection margin.

Functional results:

The assessment of defecatory function was evaluated through personal interviews about stool frequency in a 24-h period and incontinence status assessed by Kirwan's classification at 3 months after the first operation, and then at 3, 6 and 12 months after ileostomy closure.(table 2)

Table 2 functional outcome according to kirwan grading

Kirwan grade	NO.OF PATIENTS
I Normal	7/13(53.8%)
II INCONTINENCE OF GAS	3/13(23%)
III OCCASIONAL OVERFLOW	3/13(23%)
IV UNDERWAER OFTEN CONTAMINATED	0/13(0%)
V Need stoma	0/13(0%)

Regarding genitourinary system:4 patients(males) developed impotence respond to medical treatment ,4 patients have frequency and urgency in urination.. table 3

Table 3 :genitourinary complications

Genitourinary complication	No of patients
Impotence	4 patients (males)(50%)
Frequency,urgency	4(30%)

Morbidity and mortality:

Patients who had undergone operations were found to have early and late complications (table 4) Other complications like colonic ischemia ,pelvic abscess,rectovaginal fistula was not observed.

Mortality rate was 0%.

We observed that most common early complication is wound infection while most common late complication is subacute adhesive bowel obstruction.

Table 4: early and late postoperative complication

Early complications		Late complications	
Wound infection	7/13(53.8%)	Adhesive bowel obstruction	2/13(15%)
Chest infection	1/13(15%)	anastamotic stricture	2/13(15%)
Ileus	2/13((15%)	Incisional hernia	1/13(8%)
Perineal infection	1/13(8%)	Recurrent UTI	1/13(8%)
Urinary retension	3/13(23%)	Recurrence	1/13(8%)
Anastamotic leak	0/13(0%)		

Discussion:

For the curative resection of very low rectal cancer, abdominoperineal resection was the surgical procedure of choice. However, this procedure is inevitably accompanied by a permanent stoma, compromising quality of life due to psychological and social limitations especially in young and middle age patients. In order to avoid these unfavorable results of abdominoperineal resection we used intersphincteric resection for the treatment of very low rectal cancer in highly selected patients who meet specific criteria.. In recent years, ISR with coloanal anastomosis has been proposed to avoid permanent colostomy for very low rectal cancers and was reported in many studies. Although it is technically difficult, intersphincteric resection is associated with good functional and oncological outcome according to our study.

The main objective of the present study is to evaluate functional and oncological outcomes and complications following intersphincteric resection with coloanal anastomosis.

Regarding functional results: using kirwan grading for continence assesment :7 out of 13 patients show good continence ,3 patients have occasional flatus incontinence,3 patients have occasional soiling of underwear, this is comparable to the study done by Chamlou R *et al*, Thirty-four patients (41%) were fully continent, 29 patients (35%) had minor continence problems, and 20 patients (24%) were incontinent. ^(20,21)

In another study study done In Martin's systematic review for intersphincteric resection. Nearly half (51.2%) of patients reported "perfect continence," about a third (29.1%) reported experienced fecal soiling, 23.8% had flatus incontinence, had 18.6% had urgency. ⁽²²⁾

In other study by Rullier E *et al*, Continence was normal in one-half of patients and was altered in the other patients who suffered from occasional minor leaks. This is comparable to the result of this study. ⁽²³⁾ In our centre the coloanal anastomosis is done without colonic pouch.

In study done by by Braun J *et al* on intersphincteric resection with direct coloanal anastomosis without pouch , Eighty-five percent of the patients with reported good functional results regarding anal continence, this is comparable to our study. ⁽²⁴⁾

On the other hand other studies show better outcome when performing colonic pouch like Bretagnol F, *et al*. ^(24,25)

Schiessel *et al*. reported that the effect of the colonic reservoir improved by the pouch lasts for only the first 3 months after surgery and that anastomosis of a pouch down to the level of the dentate line is technically difficult due to the bulk of mesocolic fat and the length of the anal canal. ⁽²⁶⁾ So in our centre we avoid using colonic pouch because it has no long term benefit and to avoid its complications.

Regarding oncological outcome 1 patient developed local recurrence 1 year after surgery the recurrence rate was 7%, compared to 5.7% in study done by Akasu T *et al* on 108 patients. ⁽²⁷⁾

Recurrence rate was 5.3% in study by Schiessel *et al* on 38 patients. ⁽¹¹⁾

Chamlou *et al*. reported a local recurrence rate of 6.6 % in study done on 90 patients. ⁽²¹⁾

This difference in results related to our study may be attributed to smaller no of patient compared to other studies. In our study all patients had negative resection margin and all patients with lower rectal adenocarcinoma received neoadjuvant treatment only 1 patient with adenocarcinoma had recurrence 1 year after surgery, this patient had 1 cm distal resection margin for moderate differentiated adenocarcinoma of the lower rectum , this may have role in developing local recurrence in this patient.

no distant recurrence reported in our study, this may be contributed to proper patient selection and neoadjuvant therapy received by the patients with adenocarcinoma before proceeding to surgery.

Regarding morbidity and mortality and postoperative complications :

Mortality rate was 0% in our study same result with studies done by Martin ST *et al* (0.8%), Kim *et al* (0%). ^(22,12)

This may be related to good patient selection and optimization of patient condition before surgery and good postoperative care.

Complication rate after intersphincteric resection range from 0_30% in our study. Postoperative complications occurred in ranging 18% to 27% in other studies by Schiessel R et al, Hohenberger W et al, Akasu T, et al. ^(11,28,27)

Four out of 7 male patients who underwent intersphincteric resection develop impotence (more than 50%), this is comparable to other studies showing that Sexual dysfunction may reach 1155% like kim et al. ⁽²⁹⁾

The well-known TME technique requires high ligation of the inferior mesenteric artery pedicle and careful sharp dissection in the 'holy plane' down to the pelvic floor with transection of the rectum (with adequate margins) followed by end-to-end anastomosis. Limitations of direct visualization may result from the anatomical constraints of the narrow bony pelvis, especially with a very curved, prominent sacrum together with a narrow true pelvis which is often especially narrow in the android pelvis.

This may be made worse in patients with high body mass index with bulky pelvic sidewall and mesorectal fat. Pelvic adhesions from radiotherapy or tumour inflammation or gross tumour adherence to contiguous organs may also require surgeons to perform extrafascial dissection to achieve good circumferential radial margins or clearance and thereby increase the risk of damage.

Most of our patients in this study had high BMI, and received neoadjuvant chemotherapy.

Other complications develop in our patients: simple wound infection in 7 out of 13 patients, chest infection in 2 patients, post operative paralytic ileus in 2 patients, and perineal infection in 1 patient all treated successfully.

Late postoperative complications include: incisional hernia 1 patient (repair by mesh done), adhesive bowel obstruction 2 patients (treated conservatively), anastomotic stricture 2 patients treated by dilation, 1 patient developed recurrent UTI. These rates are comparable to the results of other studies done for intersphincteric resection by Saito N et al, Chamlou R, et al. ^(30,21)

In present study all surgeries done by open technique because we don't have good facilities for laparoscopic approach, there is studies that show superior results of laparoscopic procedure regarding clear vision of operation, relatively minor trauma, slight physical interference, an early recovery of normal activities after surgery and other advantages, which does not increase local recurrence rate or lower survival rate, like study by Han JG, and colleagues. ⁽³¹⁾

According to our results intersphincteric resection seem to be an acceptable procedure for excision of lower rectal tumors avoiding more extensive procedure (abdominoperineal resection) and avoiding permanent colostomy with acceptable functional and oncological outcomes. Although 23% of patients have occasional gas incontinence and 23% of patients have occasional overflow overall function is acceptable with the advantage of avoiding permanent colostomy and its burden on the patient psychological, financial conditions and daily activities.

Conclusion and Recommendation

Functional and oncological outcomes after open intersphincteric resection seem to be acceptable.

The intersphincteric resection technique seems to be a valid alternative to abdominoperineal resection in properly selected patients with a very low rectal cancer.

however it is necessary to fully discuss the functional outcomes and expected quality of life after the procedure with the patient.

We recommend to do study on intersphincteric resection on larger number of patients and with longer duration of follow up in order to gain better results.

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