Evaluation of anorectal functions after laparoscopic suture rectopexy with complete division of lateral rectal ligaments

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Context
Dissection of the lateral ligaments during rectopexy has been a source of contention. The purpose of this study was to determine the effect of complete rectal mobilization and lateral ligament division on anorectal functioning after laparoscopic suture rectopexy.
Aims
Evaluation of anorectal functions in patients with complete and internal rectal prolapse after laparoscopic suture rectopexy with complete division of lateral rectal ligaments.
Methods, material, and study design
Twenty-five patients with complete and internal rectal prolapse were enrolled in this prospective cohort study between March 2018 and January 2021, including follow-up period. Comparison between pre- and postoperative course included obstructed defecation score, need for laxatives, anorectal manometry pressures, anorectal sensations, and recurrence. Mean follow-up period was 12 months.
Statistical analysis
Data management and statistical analysis were done using SPSS vs. 25 (IBM, Armonk, NY). Quantitative data were assessed for normality using the Shapiro–Wilk test and direct data visualization methods. Then, quantitative data were summarized as mean and SD or medians and ranges. Categorical data were summarized as numbers and percentages. Longo score and anorectal manometry were compared at different times using repeated-measures analysis of variance. Post hoc analyses were done using the Bonferroni method. Quality of life aspects were compared pre- and postprocedure using paired *t*-test. McNemar test was used to compare laxative use at different times. All statistical tests were two-sided. *P* values less than 0.05 were considered significant.
Results
Preoperatively, 25 patients showed obstructed defecation symptoms. Postoperatively, 23 (92%) patients have significant improvement in Obstructed Defecation Syndrome (ODS) score; however, 40% of them are still depending on laxatives. The remaining two patients (8%) with ODS have no significant improvement in ODS score. Regarding anorectal manometry after surgery, mean squeeze pressure showed significant increase, whereas all rectal sensation showed significant decrease. Patient Assessment of Constipation Quality of Life questionnaire score, total physical discomfort score, total psychosocial discomfort score, and total worries and concerns score were significantly lower postoperatively, whereas the total satisfaction score was significantly higher postoperatively. No recurrences were found.
Conclusions
Complete mobilization of the rectum during laparoscopic suture rectopexy associated with recovery of anorectal sensation and also improvement in ODS with low recurrence rate reaches 0%.

Keywords:
anorectal, manometry, obstructed defecation, rectal sensation, rectopexy

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Key messages: complete mobilization of the rectum with complete division of lateral rectal ligaments during laparoscopic suture rectopexy associated with recovery of anorectal sensation and also improvement in ODS.

Introduction

Rectal prolapse may be complete (CRP) (rectal wall protrusion outside the anus) or hidden (rectoanal intussusception [RI]) (rectal wall infolding that does not result in protrusion from the anal canal) [1].

Patients with CRP complain about rectal bleeding, tenesmus, constipation, and sensation of incomplete evacuation [2].

Laparoscopic suture rectopexy is an ideal procedure for rectal prolapse [3] with recurrence rate Ë,10% [4].

Dissection of the rectum's lateral ligaments for complete rectal mobilization during rectopexy has been a point of conflict [5].

This study aims to see does division of lateral ligaments affect the outcome?

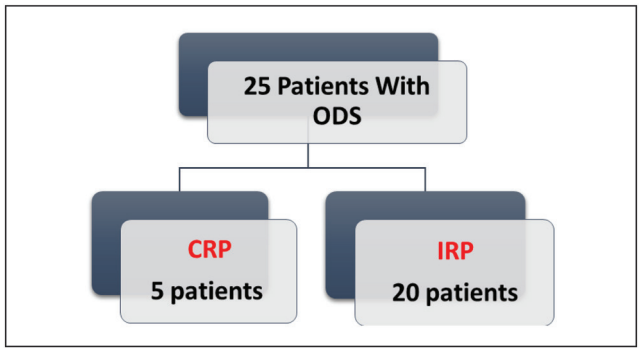
Participants and methods

The current prospective cohort study was conducted at the Colorectal Surgery Unit, Surgery Department, Benha University Hospital, after approval of the local ethical committee and after the patients signed a fully informed written consent form throughout the period from March 2018 to January 2021, including the follow-up period.

The study was done on 25 patients with CRP with obstructed defecation symptoms and symptomatic patients with RI not responding to medical treatment (Fig. 1).

Patients with significant pelvic organs prolapse, history of pelvic radiotherapy, recurrent rectal prolapse, or rectal prolapse with fecal incontinence were excluded from the study.

Figure 1



Flowchart of patients included in the study.

Study endpoints

Evaluation of obstructed defecation score, rectal sensations, anorectal pressures, and recurrence rate after suture rectopexy with complete division of lateral rectal ligament to fully mobilize the rectum was performed.

Methods

Preoperative assessment

(1) Full history and assessment of obstructed defecation by modified Longo score [6], in which a lifestyle change parameter was added to seven symptom-based parameters.
(2) Clinical assessment including examination (general and local).
By inspection, the patient is instructed to bear down during examination so the full thickness rectal wall prolapse and its concentric folds will be visible. By palpation, anal sphincter integrity will be assessed, excluding the presence of masses in anal canal and lower rectum and feeing the internal rectal prolapse while the patients bear down.
(3) Using Solar GI HRAM MMS, full anorectal manometry was done preoperatively and postoperatively at 6 and 12 months with a 24-channel water perfused catheter with latex balloon to evaluate rectal sensations, anal sphincter pressures, and for exclusion of anismus.
(4) Imaging: All patients underwent magnetic resonance defecography to confirm diagnosis and to exclude pelvic organ prolapse.
(5) Colonoscopy: done for all patients to exclude any proximal lesions and for biopsy from the rectal ulcer to exclude malignancy.
(6) Routine preoperative laboratory tests.
(7) Preoperative and 12-month postoperative assessment of constipation and quality of life by the Patient Assessment of Constipation Quality of Life questionnaire (PAC-QOL), a self-reporting questionnaire [7].

Laparoscopic surgical technique

Each patient underwent two rectal enemas in the night before operation and was given 1 and 500 mg ceftriaxone and metronidazole, respectively, with anesthesia induction.

The patient was put in a modified lithotomy posture with both arms close to the body and the thighs spread moderately and bent upwards to provide access to both the abdomen and perineum. The operating positions were as follows: on the right side of the patient was the surgeon, on the left side was the assistant, and alongside the assistant on the left side was the camera man.

Pneumoperitoneum was induced during urinary catheterization using a Veress needle inserted through an umbilical stab incision. Then, 10-mm visiport trocar (camera port) was inserted through umbilical incision and a 30-degree telescope was inserted through this port. Then second port 5 mm (functioned as the right hand) was inserted two finger medial to anterior superior iliac spine. The third port 5 mm (functioned as the left hand) was inserted at the level of umbilicus at right mid clavicular line. The fourth port 5 mm (for the assistant) was inserted below the level of umbilicus at the left mid clavicular line (Fig. 2).

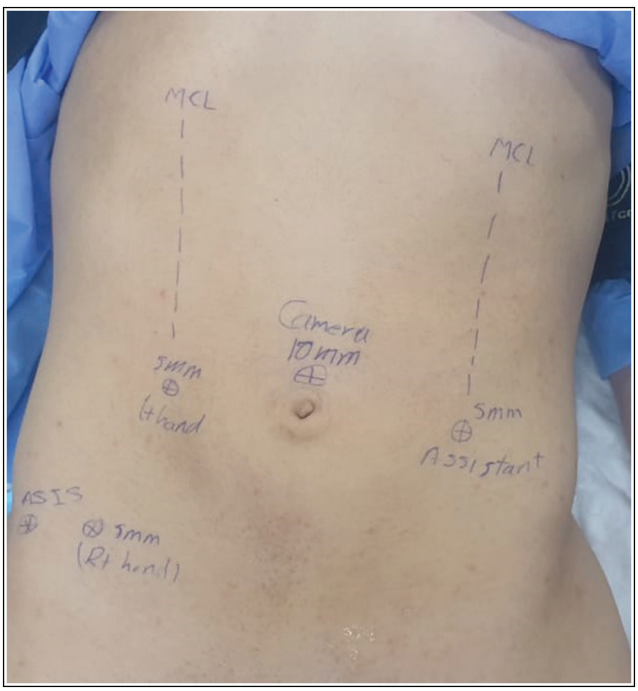
In Trendelenburg position (30 degrees), we started by formal exploration of the abdominal cavity. In females, we retracted the uterus to the abdominal wall by 2/0 prolen sutures with straight needle for better anterior dissection of the rectum. Then, the sigmoid colon was retracted out of the pelvis and to the left side from the left side trocar by the assistant.

Then we began with suture rectopexy by inspection of the ureter of pelvic wall and lateral dissection by incision of peritoneum over sacral promontory and extended to douglas pouch on both sides with full rectum mobilization without preservation of the lower rectum lateral ligaments till reaching pelvic floor (Fig. 3).

Then, through the loose areolar tissue between the mesorectum and the presacral plexus of veins, we started posterior dissection of the rectum. During the dissection, the presacral nerves were discovered and preserved (Fig. 4). Then anterior dissection was performed till the pelvic floor muscles were reached (Fig. 5).

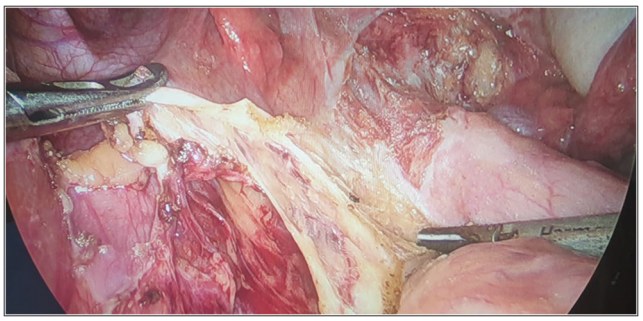
Then rectum retracted cranially to detect suture fixation optimal point. Then examination per rectum was done before taking sutures to ensure there is no prolapse at this point of fixation. The seromuscular layer of posterior rectum wall was then sutured to the presacral fascia on both sides with at least two interrupted prolene 2/0 sutures (Fig. 6).

Figure 2



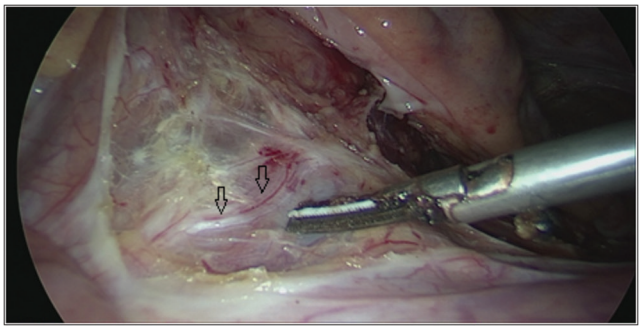
Port site for suture rectopexy.

Figure 3



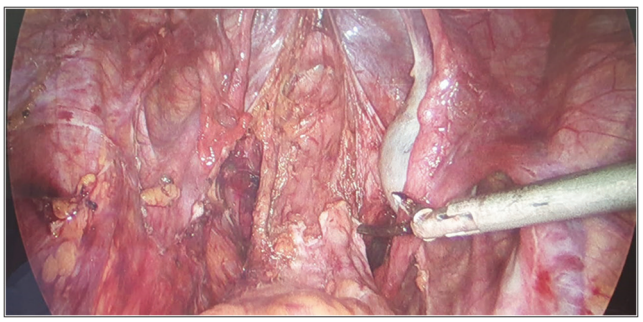
Dissection of lateral ligaments of rectum.

Figure 4



Preservation of presacral nerves (arrows) during posterior dissection.

Figure 5



Anterior dissection till pelvic floor muscles.

Then we suture the lateral peritoneum to the rectum at new higher point for more suspension to the rectum and for prevention of adhesions by continuous sutures using pds 2/0 (Fig. 7).

Postoperative care and instructions

Antibiotics described were ceftriaxone 1 gm once daily for 5 days. Postoperative analgesia was in the form of a patient-controlled analgesia pump. Laxatives were described to avoid postoperative straining.

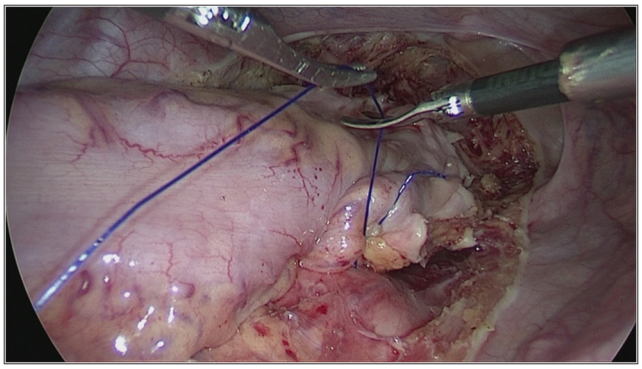
Postoperative pain was evaluated using 0–10 visual analog score. On the evening of operation, patients begin receiving oral fluids, and soft food is introduced on the first postoperative day.

All patients were hospitalized 1 day before surgery, and the stay duration was measured from the date of admission to discharge.

Follow-up

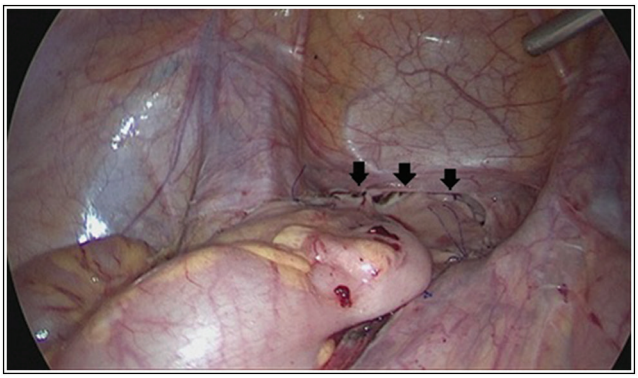
The follow-up was done in outpatient clinic 1 week after operation then every month for 12 months by senior surgeon. Patients reassessed after 6 and after 12 months by anorectal manometry and modified Longo score. The patients were revaluated by PAC-QOL after 12 months. A nurse distributed the questionnaires to patients, who self-administered them at the outpatient clinic. Clinical recurrence was assessed and patients were monitored for 1 year after the completion of the study.

Figure 6



Suturing posterior rectum wall to presacral fascia.

Figure 7



Suturing the lateral peritoneum to the rectum at higher point (arrows).

Results

General characteristics

The studied patients' mean age was 31.88 ± 6.71 years. Regarding sex, more than half of the patients were females (60%). The mean body mass index was 28.36 ± 3.15 kg/m^2. About one-quarter of the patients (28%) had comorbidity (including hypertension and diabetes).

Anorectal manometry finding

Mean resting pressure did not show any significant difference between different measures.

Mean squeezing pressure showed an overall significant difference between different measures (*P* value<0.001). Post hoc analysis showed that it was significantly lower preoperatively (136 mmHg) compared with 6 months (152 mm Hg) and 12 months (156.8 mm Hg) (Table 1 and Fig. 8).

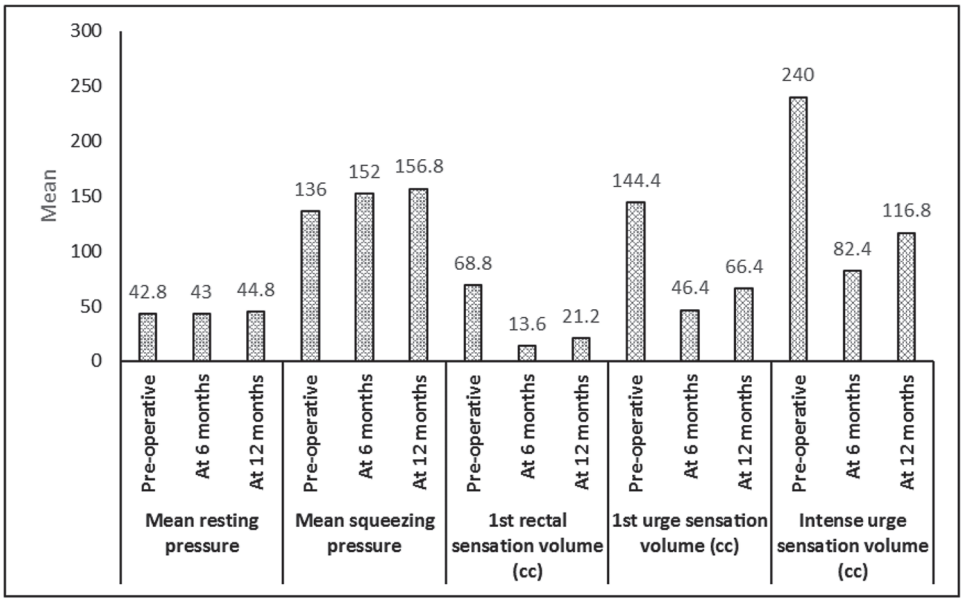
First rectal sensation volume showed an overall significant difference between different measures (*P*<0.001). Post hoc analysis showed that preoperative was delayed at 68.8 cc, denoting hyposensitivity, then

Table 1 Anorectal manometry finding

	Mean±SD	*P* value
Mean resting pressure		
Preoperative	42.8 ± 14.51	0.174
At 6 months	43 ± 14.22	
At 12 months	44.8 ± 13.5	
Mean squeezing pressure		
Preoperative	136 ± 42.03[a]	<0.001
At 6 months	152 ± 38.51[b]	
At 12 months	156.8 ± 35.91[c]	
1st rectal sensation volume (cc)		
Preoperative	68.8 ± 9.71[a]	<0.001
At 6 months	13.6 ± 6.85[b]	
At 12 months	21.2 ± 11.66[c]	
1st urge sensation volume (cc)		
Preoperative	144.4 ± 27.09[a]	<0.001
At 6 months	46.4 ± 14.96[b]	
At 12 months	66.4 ± 13.5[c]	
Intense urge sensation volume (cc)		
Preoperative	240 ± 33.67[a]	<0.001
At 6 months	82.4 ± 17.63[b]	
At 12 months	116.8 ± 18.64[c]	

Repeated measures analysis of variance was used. Post hoc analysis was done and adjusted using Bonferroni. Different letters indicate significant pairs.

Figure 8



Anorectal manometry finding.

6 months postoperative become 13.6 cc denoting some degree of hypersensitivity that improved at 12 months postoperative reaching 21.2 cc to be close to normal parameters (Table 1 and Fig. 8).

First urge sensation volume showed an overall significant difference between different measures (P<0.001). Post hoc analysis showed that preoperative was delayed reaching 144.4 cc denoting hyposensitivity. Then postoperative improved reaching 46.4 cc at 6 months postoperative and 66.4 cc at 12 months postoperative Table 1 and Fig. 8).

Intense urge sensation volume showed an overall significant difference between different measures (P<0.001). Post hoc analysis showed that it was significantly delayed preoperatively at 240 cc denoting hyposenstivity compared with 6 months (82.4 cc) and 12 months (116.8 cc) (Table 1 and Fig. 8).

Modified Longo score for Obstructed Defecation Syndrome (ODS)

Modified Longo score showed an overall significant difference between different measures (P<0.001). Post hoc analysis showed that it was significantly higher preoperatively (18.08) compared with 6 months (12.48) and 12 months (11.36) (Table 2 and Fig. 9).

Recurrence rate

No cases of recurrence were reported in the follow-up period.

PAC-QOL

Postoperatively, the total physical discomfort score was significantly lower (6) than preoperatively (9.2); P value was <0.001. Total psychosocial discomfort score was also significantly lower postoperatively (12.5) than preoperatively (20) (P<0.001). Total worries and concerns score was significantly lower postoperatively (19.67) than preoperatively (30.08); P value was <0.001. The total satisfaction score was significantly higher postoperatively (11.33) than preoperatively (7.28); P value was <0.001 (Table 3 and Fig. 10).

Table 2 Modified Longo score for ODS

	Mean±SD	*P* value
Longo score		
Preoperative	18.08 ± 1.47[a]	<0.001
At 6 months	12.48 ± 1.45[b]	
At 12 months	11.36 ± 1.89[c]	

ODS, Obstructed Defecation Syndrome. Different letters indicate significant pairs.

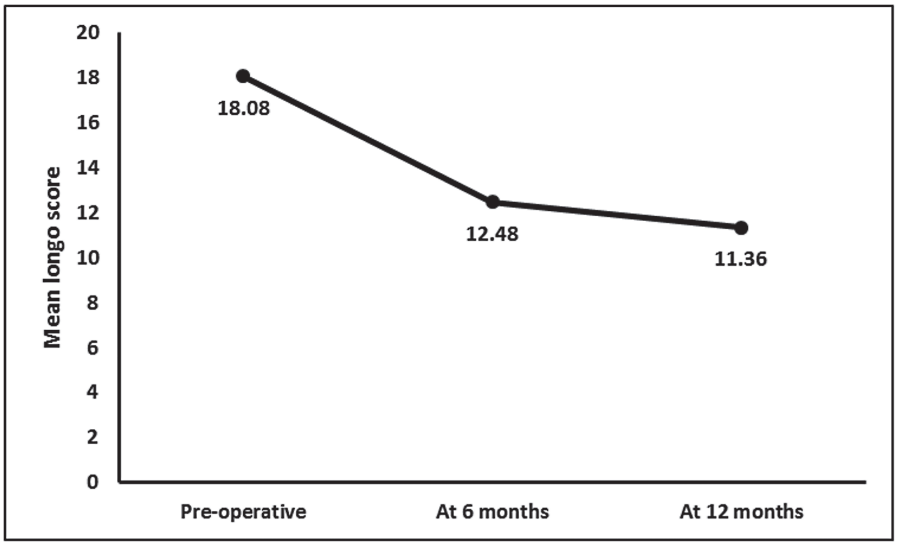
Need for laxatives

Eighteen patients (72%) needed laxatives during the first 6 months postoperatively that decreased to 10 patients (40%) at 12 months that was statistically significantly with P value=0.008.

Statistical methods

SPSS vs 25 was used for data analysis (IBM, Armonk, NY). Quantitative data were evaluated for normality with the Shapiro–Wilk test and direct data visualization methods. Then, quantitative data were expressed as mean and SD or medians and ranges. Categorical data were summarized as numbers and percentages. Using repeated-measures analysis of variance, Longo score and anorectal manometry were compared at different

Figure 9



Modified Longo score for Obstructed Defecation Syndrome.

Table 3 Physical and psychosocial discomfort score

	Mean±SD	*P* value
Physical discomfort		
Pre	9.2±3	<0.001
Post	6±2.24	
Psychosocial discomfort		
Pre	20±3.61	<0.001
Post	12.5±2.72	
Worries and concerns		
Pre	30.08±3.34	<0.001
Post	19.67±4.71	
Satisfaction		
Pre	7.28±2.07	<0.001
Post	11.33±2.01	

Paired *t*-test was used for Patient Assessment of Constipation Quality of Life questionnaire items.

times. Post hoc analyses were done using the Bonferroni method. Using paired *t*-test, quality of life aspects were compared before and after procedure. McNemar test was used to compare laxative use at different times. All statistical tests were two-sided. *P* values less than 0.05 were considered significant.

Discussion

Although various surgical methods have been documented for the correction of rectal prolapse, the ideal surgical therapy remains debatable [8].

Numerous open abdominal surgical methods for treating rectal prolapse of have been documented. Most of them include rectum mobilization followed by suture or mesh fixation of it to the sacrum [9].

Laparoscopic transabdominal rectopexy has been demonstrated to be a safe, reliable operation with minimum morbidity and a low recurrence rate with laparoscopic techniques and equipment advancement [10].

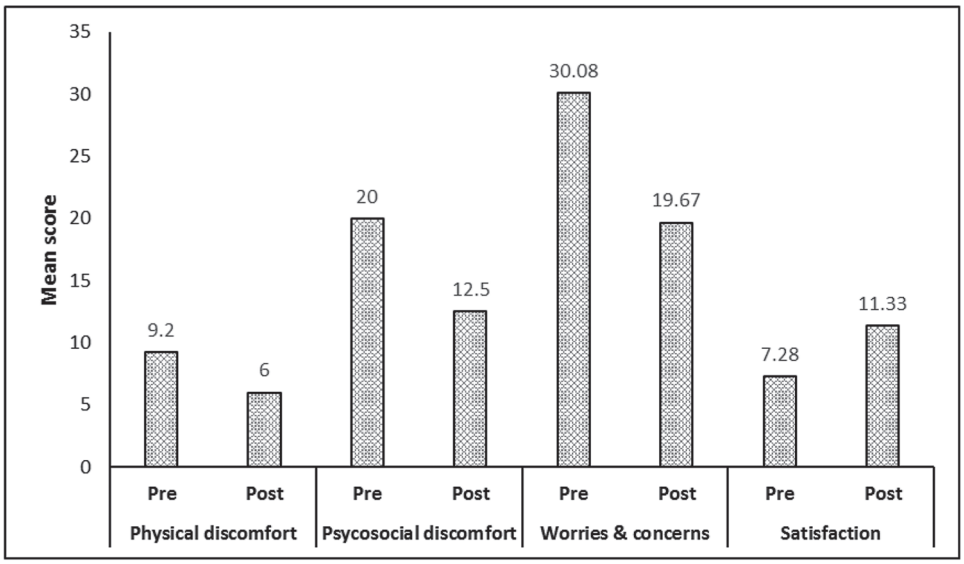
Rectal prolapse surgical management aimed to restore not only normal anatomy of the rectum but also the normal evacuation function of the rectum that may be more vital especially in internal rectal prolapse surgical management.

Garely *et al.* [11] reported that division of lateral ligaments during suture rectopexy reduces recurrence rate but associated with constipation. In our study, we made rectum full mobilization without preservation of lateral ligaments to avoid recurrence that associated with its preservation and evaluated anorectal sensations, anal sphincter pressures, and need for laxatives and compared them with the results obtained after both open and laparoscopic rectopexy with and without preservation of lateral ligaments.

In our study, varying degree of obstructed defecation symptoms was observed in all patients that was assessed preoperatively by modified Longo score. In the postoperative period, 23 patients (92%) have significant improvement in ODS score postoperative. Improvement in ODS degree in the current study can be linked to the surgical technique used, when suturing the lateral peritoneum to the rectum at new higher point for more suspension to the rectum.

Despite improvement in ODS, 40% of patients are still depending on laxatives despite decreasing symptoms of ODS and this may be because these patients have slow colonic transit time. The remaining two patients

Figure 10



Physical and psychosocial discomfort score.

(8%) have no significant improvement in modified Longo score postoperatively; in those we noticed that redundant sigmoid colon was found intraoperatively with kinking at rectosigmoid junction after full mobilization of the rectum. Rectopexy has a superior functional result in these individuals despite the modest but evident risk related to colonic anastomosis [12].

Sayfan *et al.* [13] in their study, in which sutured posterior abdominal rectopexy with sigmoidectomy was compared with mesh rectopexy, suggested that there is a link between constipation postoperative and denervating the rectum.

In a similar research, Yasukawa *et al.* [14] reported that constipation decreased in 26.7% of patients who underwent laparoscopic suture rectopexy for full rectal prolapse in which the lateral ligaments were separated.

Regarding postoperative anorectal manometry, mean squeeze pressure showed a significant increase, and this may be due to avoiding muscle fatigue related to straining. Most studies reported an increase in anal sphincter pressures after open rectopexy without preservation of lateral ligaments [15–17] and also observed by Hyun *et al.* [18] in a study published in 2018 in which laparoscopic posterolateral rectopexy was done with preservation of lateral ligaments. However, another studies reported that postoperative sphincter function was unaffected by the surgical operation [19,20].

Regarding anorectal sensation, our study showed improvement in all rectal sensations. This may be due to decreased rectal capacity after rectopexy leading to improvement of rectal sensation postoperatively and similar to a study by Speakman *et al.* [21] in which functional outcome after division of lateral ligaments was compared with its preservation, whereas another study done by Metcalf *et al.* [22] showed a reduced maximally tolerable volume only in patients after rectopexy. However, other study by Scaglia *et al.* [23] demonstrated a higher incidence of rectal hyposensitivity when lateral ligaments are divided.

One of the key parameters to ass rectal prolapse surgery success is the recurrence incidence. In our study, no cases of recurrence were found in the postoperative period, a zero recurrence rate related to full mobilization of rectum till pelvic floor, bilateral suturing of rectum to sacral promontory, and suturing the lateral peritoneum to the rectum at new higher point. In a similar study done by Yasukawa *et al.* [14], in 15 patients who underwent a laparoscopic suture rectopexy with division of lateral ligaments, recurrence rate reached 6.7%.

In contrast, with preservation of lateral ligaments of rectum, the recurrence rate was high (20%) in a study done by Foppa *et al.* [24] with longer follow-up.

However, the present study has limitations due to its small sample size, single-center design, and limited follow-up duration. In the future, a bigger trial may be conducted for better evaluation of anorectal function after division of lateral ligaments.

Conclusion

Constipation and evacuation difficulties after rectopexy remain unknown. Division of the lateral ligaments of

the rectum was not the sole problem, because their preservation resulted in constipation and patients being reliant on laxatives. Dividing the lateral ligaments was related to a lower recurrence rate, which reached 0% in our research, recovery of anorectal feeling, and improvement in the obstructed defecation score. Constipation after surgery is unlikely to be solely due to separating lateral ligaments, although other causes may be implicated.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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