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Comparative Study Between Ventral Mesh Rectopexy and Levatorplasty in Management of Rectal prolapse

Mohamed A.B. Alatrash*, Ali A. Shafik, Aya M. Alamrawy, Amr K. Ebrahim, Mohamed Y. Elbarmelgi, Osama R. Mohamed, Mohamed Tamer

Abstract

Rectal prolapse is when the layers of the rectum protrude through the anal canal. It can happen to both men and women of any age, but it is more common in women who have given birth and are in their seventies or eighties. While rectal prolapse doesn't pose a life-threatening risk, it can greatly affect a patient's quality of life. Symptoms can range from loss of bowel control and urgency to constipation and difficulty passing stool. There are numerous surgical techniques available, with no clear consensus on the best approach. Each technique carries a risk of recurring prolapse. The choice of the most suitable surgical repair for a patient depends on various factors, such as overall health, bowel function, bothersome symptoms, and the presence of another pelvic organ prolapse [1].

The female pelvis can be divided into three main sections: the front, middle, and back. The posterior compartment specifically includes the rectovaginal space and rectum. Traditionally, rectal prolapse has been viewed as a problem limited to the posterior compartment, and surgeons focused on repairing only that area. However, there is a growing recommendation for a multidisciplinary approach that considers all compartments of the pelvis. Research has demonstrated that a structural defect in one pelvic compartment often coexists with symptoms or issues in other compartments. For instance, a patient with rectal prolapse might also experience urinary incontinence or vaginal bulging. This concurrent condition, known as pelvic organ prolapse (POP), can involve prolapse of the bladder, uterus, or intestines. The likelihood of this correlation increases with age, higher body mass index (BMI), and prior hysterectomy [1].

Neglecting to acknowledge this association when planning treatment may lead to the worsening of symptoms in another pelvic compartment after isolated repair. This is particularly significant because patients with POP have a higher risk of earlier recurrence after rectopexy alone, as well as a greater number of reoperations for rectal prolapse and repair of other compartments. Taking a multidisciplinary approach can provide a more comprehensive surgical plan and potentially avoid the need for multiple sequential surgeries [1].

Keywords: Rectal Prolapse; Levatorplasty; Ventral mesh rectopexy; Anal incontinence; Recurrence

Affiliation:

General Surgery Department, Faculty of Medicine, Cairo University, 12613, Egypt

***Corresponding author:**

Mohamed Abdelsabour Bassiouny Alatrash, General Surgery Department, Faculty of Medicine, Cairo University, 12613, Egypt

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Patients and Methods

This study is a Randomized prospective clinical trial that included 40 patients between 2/2021 and 7/2023. Patients were followed up for 6 to 12 months.

Inclusion criteria:

Patient with rectal prolapse with wide pelvic hiatus associated with incontinence.

Exclusion criteria:

Patient with neurological disorders.

Methodology in Details

Patient with rectal prolapse presented to our unit. Proper history was taken, and clinical examination was done. Preoperative Pelvic MRI defecography was performed to record the pelvic hiatus, and the Waxener incontinence score pre and post-operative was taken. The patient was randomized by flipping a coin into two groups: rectopexy group(A) and levatorplasty group(B). Informed consent was taken.

Waxner incontinence score:

The Waxener score is a validated scoring system used to assess fecal incontinence severity and social impact. It ranges from 0 (perfect continence) to 20 (complete incontinence) and includes lifestyle alterations and wearing of a pad, in addition to incontinence to solids, liquid, and gas.

Preoperative routine labs were taken: complete blood count, coagulation profile, liver and kidney profile.

Preoperative Antibiotics prophylaxis given according to our local hospital policy and preoperative bowel preparation done with the use of Moviprep.

Preoperative MRI defecoghraphy:

MRI defecography is a non-invasive test that uses magnetic resonance imaging to obtain images at various stages of defecation to evaluate how well the pelvic muscles are working and provide insight into rectal function. It is used to help determine the cause of fecal incontinence, constipation, and other conditions such as pelvic organ prolapse that may interfere with a person's ability to pass stool [2].

To perform MRI defecography, the patient is positioned in the supine position with the knees elevated (e.g., on a pillow with firm consistency) which facilitates straining and evacuation. No oral or intravenous contrast is necessary. The rectum should be distended with ultrasound gel, especially in order to clearly diagnose an intussusception and to evaluate the efficacy of rectal evacuation [2].

During the procedure, the patient will lie on a table that slides into a tunnel-like machine. The machine takes images at various stages of defecation, while the patient is asked to bear down as if having a bowel movement. The entire procedure takes approximately 30 to 60 minutes [2].

The pelvic hiatus is defined as the space between the levator ani muscles. MRI defecography can be used to evaluate the pelvic floor muscles and provide insight into rectal function, including the assessment of the pelvic hiatus. However, the assessment of the width of the pelvic floor hiatus during MRI defecography is not standardized and may vary depending on the imaging center and the interpreting radiologist [3].

That being said, the literature suggests that the length of the pelvic hiatus (the H line) is a commonly used measurement during MR defecography. The H line is defined as the distance between the puborectal muscle insertion points. A wide pelvic floor hiatus can be identified when the H line is greater than 2.5 cm [3].

Operative techniques: Group (A)Ventral Mesh Rectopexy:

The open Hasson technique is used to establish pneumoperitoneum by placing a 10-mm umbilical port under direct visualization. CO2 insufflation is initiated with a maximum pressure of 12 cmH2O and maximum flow rate of 20 L/min. Two 5-mm working ports are inserted in the right lower quadrant under direct visualization with appropriate

Table 1: Wexner incontinence score (Wexner 2010)

The Wexner`s score					
Frequency					
Type of incontinence	Never	Rarely	Sometimes	Usually	Always
Solid	0	1	2	3	4
Liquid	0	1	2	3	4
Gas	0	1	2	3	4
Wears pads	0	1	2	3	4
Lifestyle alteration	0	1	2	3	4
Never, 0; rarely, <1/month; sometimes, <1/week, 1/month; usually, <1/day, 1/week; always, 1/day. 0, perfect; 20, complete incontinence.					

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triangulation to allow for ergonomic positioning. Prior to the procedure, a laparoscopic assessment of the peritoneal cavity is made to assess for any potential difficulties, such as adhesions, diverticular disease, and bulky fibroid uterus. The upper rectum is retracted cranially, anteriorly, and to the patient's left, exposing the mesorectum. The dissection is purely an anterior dissection and thus avoids potential complications of a posterior rectal dissection. To begin, the sacral promontory is Exposed and then the rectum is mobilized anteriorly, opening the rectovaginal septum all the way to the pelvic floor.

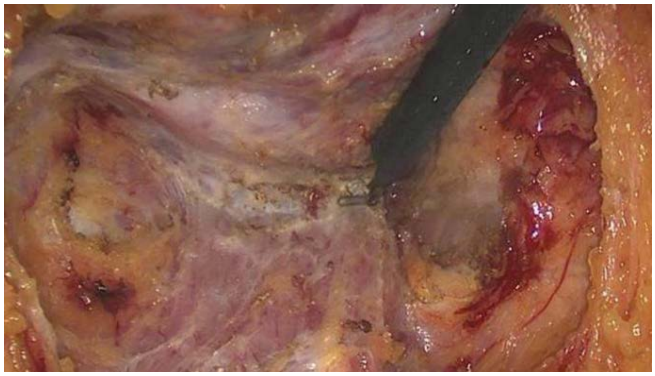

Figure 1: Level of pelvic floor dissection

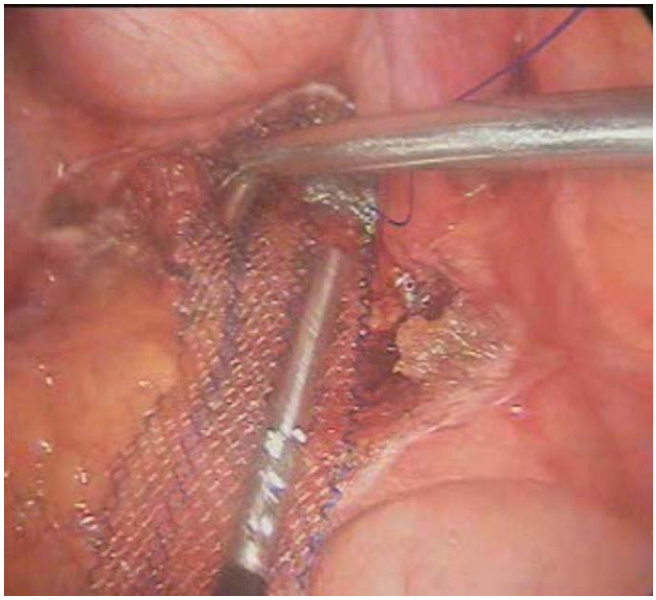

Figure 2: Mesh fixation in ventral mesh rectopexy

The synthetic mesh is trimmed to the correct size and then stitched to the rectum, and occasionally to the pelvic floor as well (Fig.1). Generally, 5-8 stitches are used to secure the mesh to the distal and mid- anterior sections of the rectum. Afterward, the mesh is attached to the anterior longitudinal ligament at the level of the sacral promontory.

Group (B) Posterior Levatorplasty:

The patient is placed in a lithotomy position. A 5 cm perineal incision is made.

The posterior aspect of the levator ani muscle is dissected and mobilized.

The levator ani muscle is plicated by overlapping the edges of the muscle and suturing them together using 2/0 PDS.

Figure 3: Levatorplasty

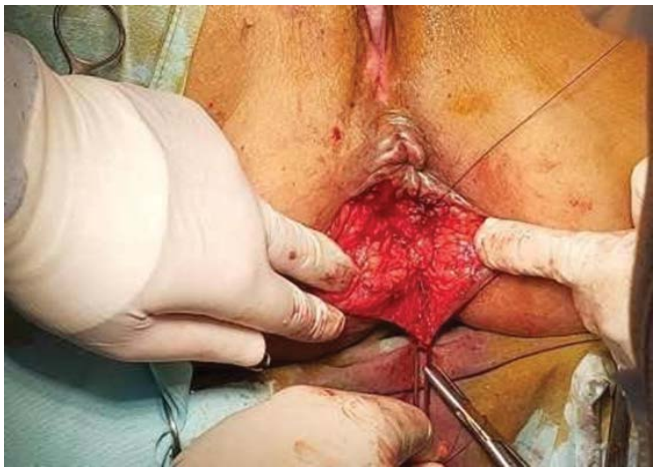

Figure 4: Levatorplasty plication.

The goal of the procedure is to provide support to the anal canal and narrow the levator hiatus. One of the sutures takes a bite in the wall of the anorectal junction.

Mucopexy for the redundant mucosa.

The wound is closed loosely without drainage.

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Postoperative care and advices:

The patients were discharged after full recovery on antibiotics and simple analgesics for pain, and a laxative was prescribed for two weeks to prevent constipation or straining at the toilet. Hot warm sitz- bath was advised three times daily for two weeks.The patient was advised not to ignore the urge to go to the toilet, lift heavy objects, or engage in heavy exercise for six weeks. Sexual intercourse was also restricted for four weeks. The patient were followed up for a year through telephone consultation and Face to face appointments.

The following data was used to compare both operation:

A comparison study was conducted between two surgical procedures to evaluate the efficacy of each procedure in treating rectal prolapse and associated symptoms, including anal incontinence. The study evaluated various parameters, including operative time, post-operative pain, hospital stay, complications of surgery, and recurrence of rectal prolapse six to twelve months postoperatively.

Statistical Methods

Data were coded and entered using the statistical package for the Social Sciences (SPSS) version 28 (IBM Corp., Armonk, NY, USA). Data was summarized using mean, standard deviation, median, minimum and maximum in quantitative data and using frequency (count) and relative frequency (percentage) for categorical data. Comparisons between quantitative variables were done using the non-parametric Mann-Whitney test. For comparing categorical data, Chi square (c2) test was performed. Exact test was used instead when the expected frequency is less than 5. P-values less than 0.05 were considered as statistically significant.

Results

This study was conducted to examine the effects of two different surgical procedures on rectal prolapse. It involved a total of 40 patients who were divided into two groups, with 20 patients in each group. One group underwent ventral mesh rectopexy, while the other group underwent levatorplasty.

Table 2: Demographic data

		Rectopexy group		Levatorplasty group		P value
		Count	%	Count	%	
sex	Male	10	50.00%	10	50.00%	1
	Female	10	50.00%	10	50.00%	

Demographic data

Demographic statistics revealed that both groups had an equal distribution of males and females, with 10 patients in each category. The p-value of 1 indicates that there was no significant difference in gender distribution between the two groups.

Table 3: Age

	Rectopexy group					Levatorplasty group					
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	P- value
Age	44.6	9.95	47	26	59	44.65	10.77	49	26	59	0.904

The age statistics for both the rectopexy and levatorplasty groups showed similar results. The average age was around 44.60 in the rectopexy group and 44.65 in the levatorplasty group. The age range for both groups was from 26 to 59 years. There was no significant difference in age between the two groups, as indicated by the p-value of 0.904.

Table 4: OR time

	Rectopexy group					Levatorplasty group					
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	P- value
OR time	58.15	11.75	55	45	90	34.65	6.33	33	25	45	< 0.001

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Table 5: Pain score

Rectopexy group						Levatorplasty group					
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	P- value
pain score post.	5.4	1.19	5	4	8	4.65	1.04	5	3	6	0.086

The Rectopexy group had a mean operative time of 58.15 minutes (SD 11.75, median 55.00, range 45.00-90.00), while the Levatorplasty group had a mean operative time of 34.65 minutes (SD 6.33, median 33.00, range 25.00-45.00). The difference was statistically significant ($P < 0.001$).

Table 6: Hospital stay

Rectopexy group						Levatorplasty group					
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	P- value
Hospital stay	1.3	0.47	1	1	2	1.05	0.22	1	1	2	0.183

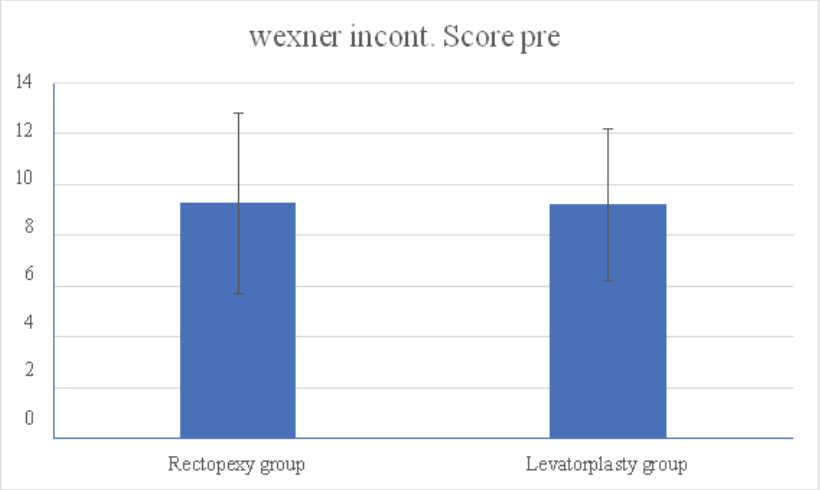

Figure 5: Wexner score preoperative

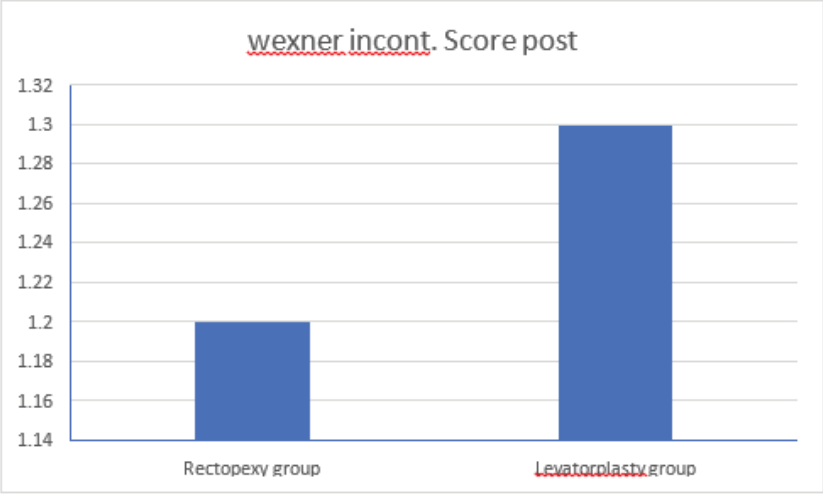

Figure 6: Wexner score postoperative

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Table 7: Wexner score pre and postoperative

Rectopexy group					Levatorplasty group						
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	P value
wexner incont. Score pre											
	9.25	3.55	9	4	18	9.2	3	9.5	4	15	0.862
wexner incont. Score post											
	1.2	1.77	0	0	5	1.3	1.34	0	0	4	0.659

Table 8: Complication details

		Rectopexy group		Levatorplasty group		
		Count	%	Count	%	P value
	yes	5	25.00%	8	40.00%	
Complications	no	15	75.00%	12	60.00%	0.311
	wound infection	0	0.00%	2	10.00%	
	obstructed defecation	1	5.00%	0	0.00%	
	Dysuria	1	5.00%	0	0.00%	
	dyspareunia	1	5.00%	0	0.00%	
Complications details	constipation new onset					
		1	5.00%	2	10.00%	0.023
	chronic pain	1	5.00%	0	0.00%	
	recurrence	4	20.00%	7	35.00%	
Recurrence	no	16	80.00%	13	65.00%	0.288

There was a slight difference in the pain scores between the rectopexy and levatorplasty groups. The rectopexy group had a slightly higher average pain score of 5.40, compared to the levatorplasty group with an average score of 4.65. However, this difference was not statistically significant, as indicated by a p-value of 0.086.

For hospital stay, the Rectopexy group had a mean of 1.3 days (SD 0.47, median 1.00, range 1.00-2.00), while the Levatorplasty group had a mean of 1.05 days (SD 0.22, median 1.00, range 1.00-2.00). The difference was not statistically significant (P = 0.183).

For the Wexner incontinence score, the Rectopexy group had a preoperative mean of 9.25 (SD 3.55, median 9.00, range 4.00-18.00), and the Levatorplasty group had a preoperative mean of 9.2 (SD 3.00, median 9.5, range 4.00-15.00), with no significant difference (P = 0.862). Postoperatively, the Rectopexy group had a mean score of 1.20 (SD 1.77, median 0.00, range 0.00-5.00), and the Levatorplasty group had a mean score of 1.30 (SD 1.34, median 0.00, range 0.00-4.00), also with no significant difference (P = 0.659).

Regarding complications, wound infections occurred in 0% of the Rectopexy group and 10.0% of the Levatorplasty group (P = 0.023). In the Rectopexy group, 5.0% of patients

Table 9: Recurrence rate

		Rectopexy group		Levatorplasty group		P value
		Count	%	Count	%	
Recurrence	Recurrence	4	20.00%	7	35.00%	0.288
	No	16	80.00%	13	65.00%	

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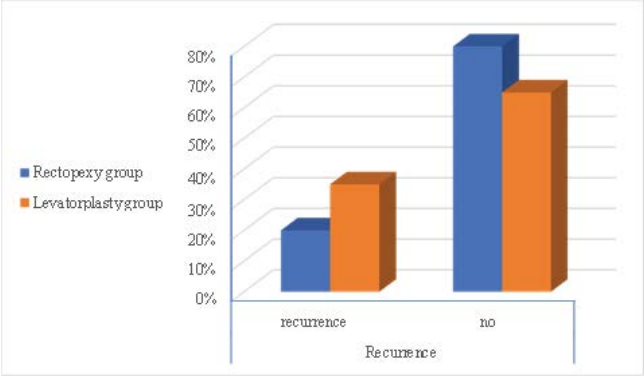

Figure 7: Recurrence rate

experienced obstructed defecation, dysuria, dyspareunia, new onset constipation, and chronic pain. In the Levatorplasty group, 10.0% of patients experienced new onset constipation, with no cases of obstructed defecation, dysuria, dyspareunia, or chronic pain.

Regarding recurrence rates, the Rectopexy group had 4 recurrences (20.0%) while the Levatorplasty group had 7 recurrences (35.0%), with no statistically significant difference (P = 0.288). Non-recurrence rates were 80.0% (16 cases) in the Rectopexy group and 65.0% (13 cases) in the Levatorplasty group.

Discussion

The study compares two methods for managing rectal prolapse. VMR offers several advantages, such as avoiding autonomic nerve damage that can occur with posterior rectal mobilization and lateral stalk division. It also corrects anatomical defects in the middle and anterior pelvic compartments and facilitates multidisciplinary collaboration by keeping the dissection within the rectovaginal septum.

Moreover, VMR and Sacro colpopexy share many steps, including the use of the same port sites and instruments (e.g., mesh and sutures). However, VMR is costly, can be performed robotically or laparoscopically, and carries risks of mesh complications, anesthesia-related issues, and procedure-specific complications. It also has a longer operating time, is technically demanding, and requires a high learning curve.

In contrast, levatorplasty, though typically described as an adjunctive procedure rather than a standalone method for managing rectal prolapse, has a low learning curve, is cost-effective, and can be performed under local anesthesia.

The ideal operation for rectal prolapse would be one with the lowest morbidity, best functional results, and lowest recurrence rate. The single, most ideal surgical repair has not yet been determined. There is no definitive data on using levatorplasty alone for managing rectal prolapse.

The objective of this study was to compare the impact of ventral mesh rectopexy and levatorplasty on rectal prolapse. A total of 40 patients were included in the study and assigned to two different groups, with each group undergoing a distinct surgical procedure. The Rectopexy group had a mean operative time of 58.15 minutes (SD 11.75, median 55.00, range 45.00-90.00), while the Levatorplasty group had a mean operative time of 34.65 minutes (SD 6.33, median 33.00, range 25.00-45.00). The difference was statistically significant (P < 0.001).

In a related study conducted by by P. Boons et al. in 2010 reported a median operating time of 140 minutes for ventral mesh rectopexy [4]. Regarding levatorplasty, a study conducted by El-Sibai and Shafik in 2002 found that the mean operative time was 40.8±5.8 minutes, with a range of 30 to 60 minutes [5].

In our study, the preoperative Wexner incontinence score for the Rectopexy group had a mean of 9.25 (SD 3.55, median 9.00, range 4.00-18.00), while the Levatorplasty group had a mean of 9.2 (SD 3.00, median 9.5, range 4.00-15.00), showing no significant difference (P = 0.862). Postoperatively, the Rectopexy group had a mean score of 1.20 (SD 1.77, median 0.00, range 0.00-5.00), and the Levatorplasty group had a mean score of 1.30 (SD 1.34, median 0.00, range 0.00-4.00), also with no significant difference (P = 0.659).

In Köhler et al. (2001) study, patients with severe anorectal incontinence and complete rectal prolapse underwent operative treatment, with concurrent posterior levatorplasty performed during prolapse removal. The study included 84 patients, and the group that received levatorplasty showed a significant decrease in incontinence score based on the Wexner score (preoperative: 16.4±3.1, postoperative: 9.3±4.5, p<0.05), compared to the group without levatorplasty (preoperative: 15.6±4.2, postoperative: 11.5±5.1). This is consistent with our study, where we also observed a significant decrease in the Wexner score over time (preoperative vs. postoperative) with a p-value <0.001 [6].

Similarly, in the study by El-Sibai et al. (2002), which included 28 patients with complete rectal prolapse, 14 of whom had fecal incontinence, posterior levatorplasty was performed on 14 adult patients with a wide levator hiatus and incontinence. The results showed a significant improvement in the Wexner score, as all 14 incontinent patients became continent after the operation [5].

Trompetto et al. (2019) conducted a study on 43 female patients with rectal prolapse who underwent the Altemeier procedure, with half of them also undergoing levatorplasty. The study evaluated the fecal incontinence rates using the modified Wexner. The findings revealed that among the patients, 11 showed improvement in fecal incontinence, 10 experienced worsened symptoms, and 13 remained

unchanged. However, there was no significant change observed in the modified Wexner for any of the patients, indicating that the procedure did not have a significant effect on the modified Wexner score, and the addition of levatorplasty did not show any significant impact [7].

Our study found that the recurrence rates were 20.0% in the Rectopexy group with 4 cases, compared to 35.0% in the Levatorplasty group with 7 cases. This difference was not statistically significant (P = 0.288).. However, further research with a larger sample size may be necessary to validate these findings.

In comparison, El-Sibai (2002) reported that 5 out of 28 patients had mucosal rectal prolapse within two to three months post-surgery, with two recurrences at two months and three at three months, managed by mucosal plication. There were no cases of fecal impaction, anal strictures, or fistulas.

Additionally, one patient had a complete rectal prolapse recurrence three months after surgery, notably this case used to defecate in a squatting position [5].

A recent systematic review and meta-analysis conducted by Sahil Sharma in 2024 found that the recurrence rate for full-thickness rectal prolapse after proctosigmoidectomy with levatorplasty is approximately 13.8%. The addition of levatorplasty does not significantly lower recurrence rates.

However, levatorplasty may improve functional outcomes, such as reducing obstructive defecation and fecal incontinence [8].

Our results are comparable to those found by D'Hoore et al. (2004), who reported a 4.7% recurrence rate for ventral mesh rectopexy, and by Liliana Bordeianou et al. (2017), with a 3.4% recurrence rate in their meta-analysis of 728 patients. Likewise, Sameh Emile et al. (2016) reported an average recurrence rate of 5.8% in their meta-analysis of 1301 patients undergoing ventral mesh rectopexy [9- 10-11].

In another study by Bananzadeh et al. in 2021, they found that Altemeier's procedure had a low complication rate and no mortality in their series. While it improved evacuation in constipated patients, it did not improve fecal and urinary continence. The recurrence of prolapse was observed in 40% of cases at four years.The study analyzed a total of 53 patients, consisting of 17 men and 36 women, with a mean age of 55.23 ± 18.24 years. The mean preoperative and postoperative Wexner scores did not differ between the groups with and without posterior levatorplasty (p = 0.911 and 0.965, respectively) [12].

Compared to a recent study done by Shafik et al., 2023 showed that The Levatorplasty group experienced a lower postoperative recurrence rate of 1 (3.3%) compared to the Without Levatorplasty group, which had a recurrence rate of 6 (20%), with this difference being statistically significant (p = 0.044). Additionally, there was a significant reduction in Wexner scores from pre-operative to post operative periods ($p < 0.001$) [13].

Conclusion

Our study compared two surgical procedures for managing rectal prolapse. There is no definitive data on using levatorplasty alone for this condition. Both procedures have advantages, but there is no consensus on the best approach. Treatment should be tailored to each patient based on symptoms, prolapse length, other concurrent prolapses, resource availability, surgical fitness, frailty, and patient preference. Decisions should be made with a multidisciplinary team (MDT) approach. The study aimed to compare the functional outcomes and recurrence rates of the two surgeries. Recurrence rates were 20.0% (4 cases) for Rectopexy and 35.0% (7 cases) for Levatorplasty, with no statistically significant difference (P = 0.288). Postoperative incontinence scores were 1.20 (SD 1.77) for Rectopexy and 1.30 (SD 1.34) for Levatorplasty, also with no significant difference (P = 0.659). Further research with a larger sample size is needed to confirm these findings.

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