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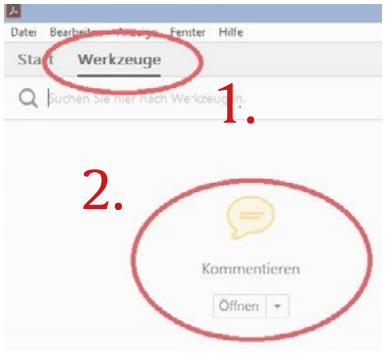

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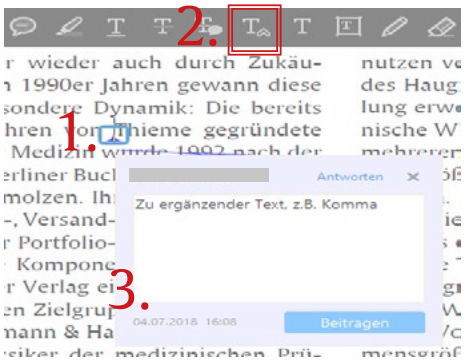

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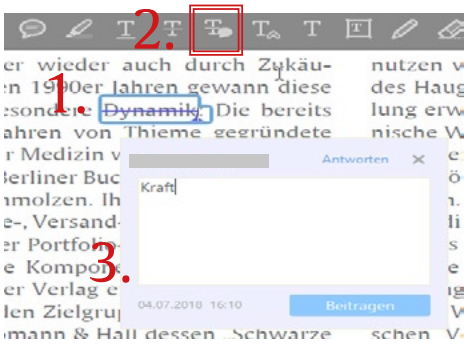

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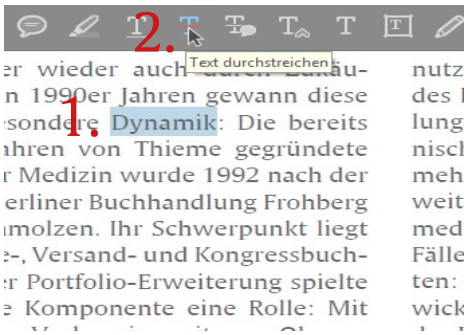

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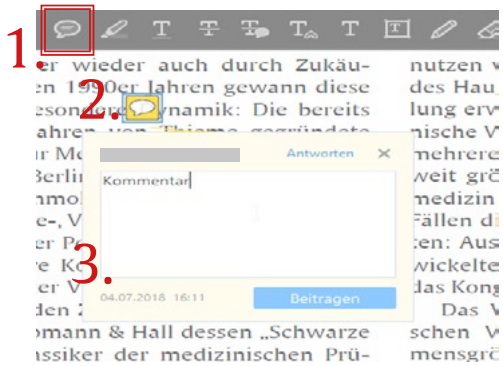

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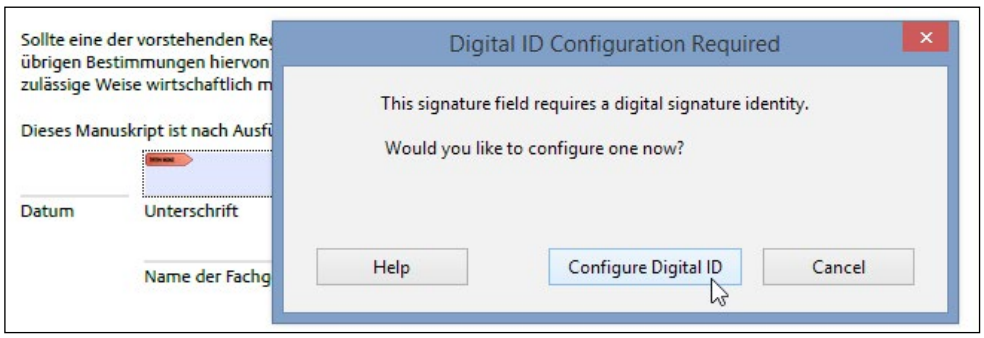

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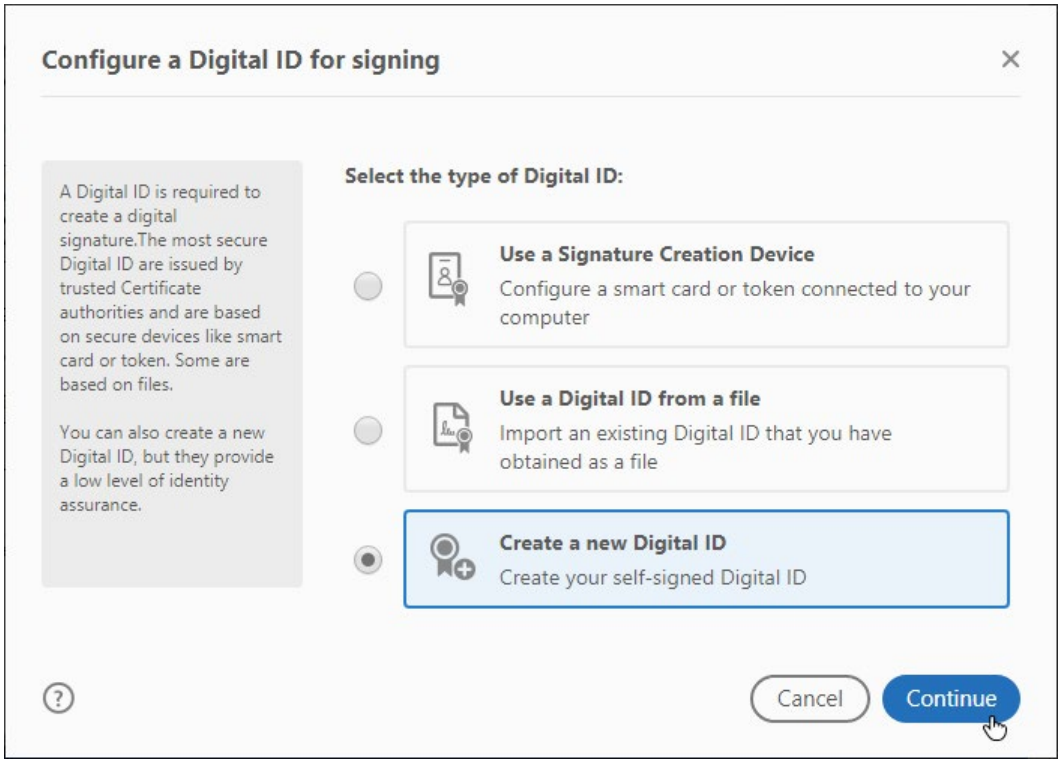

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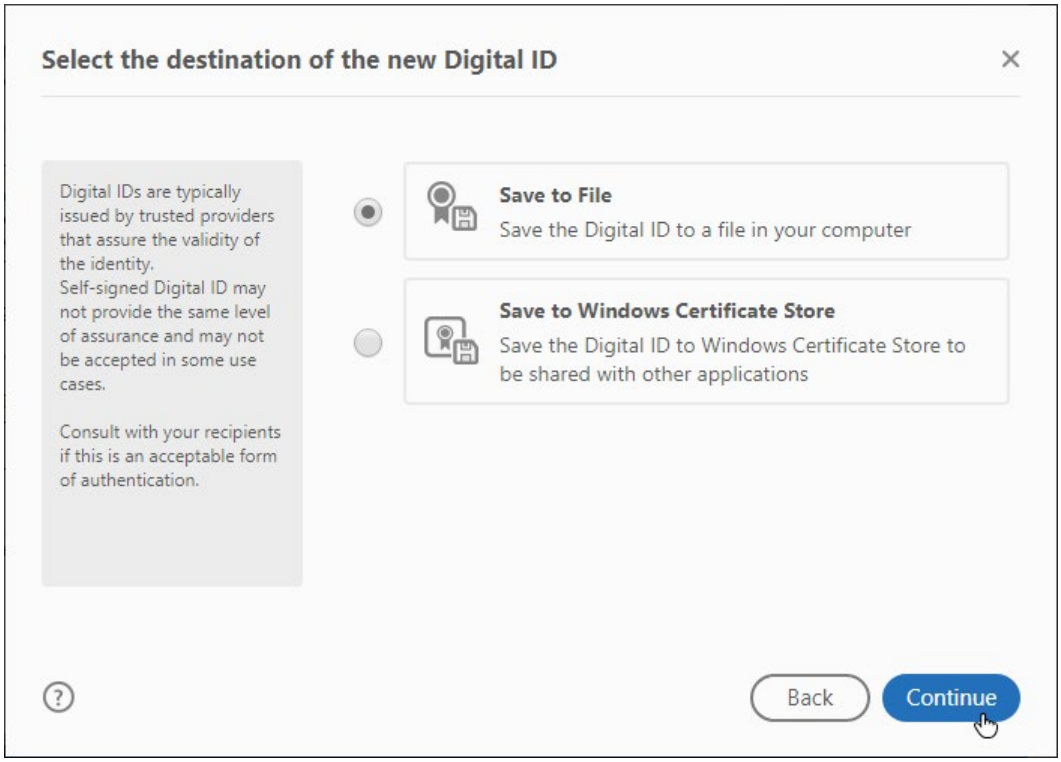

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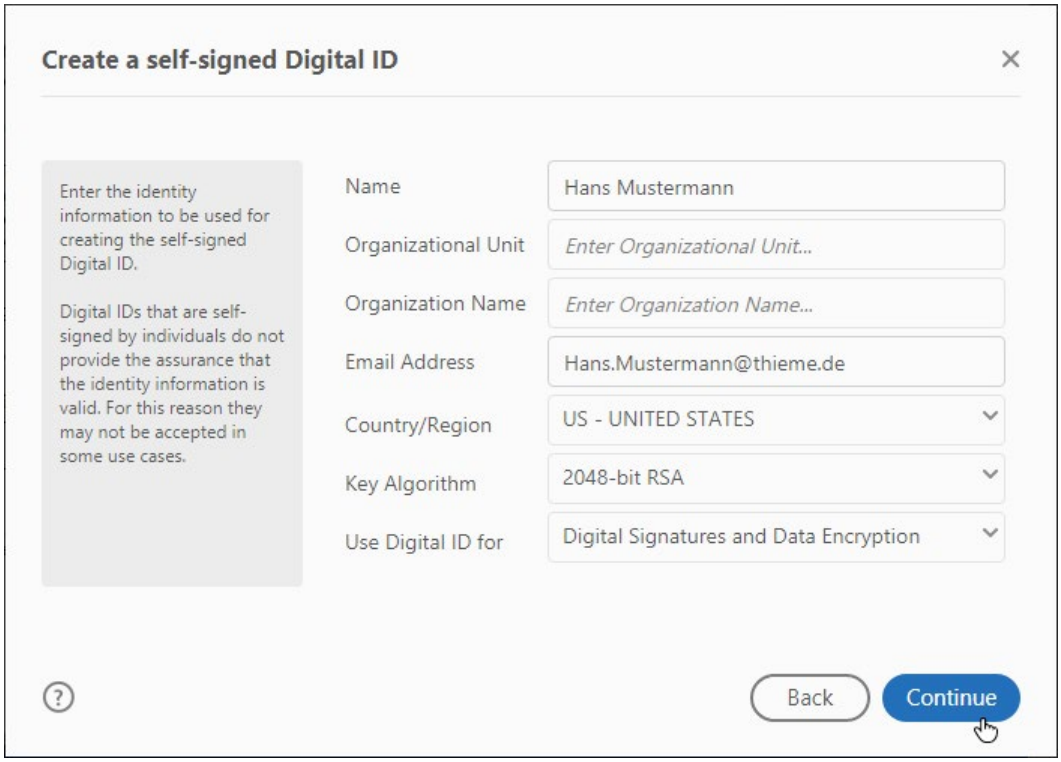

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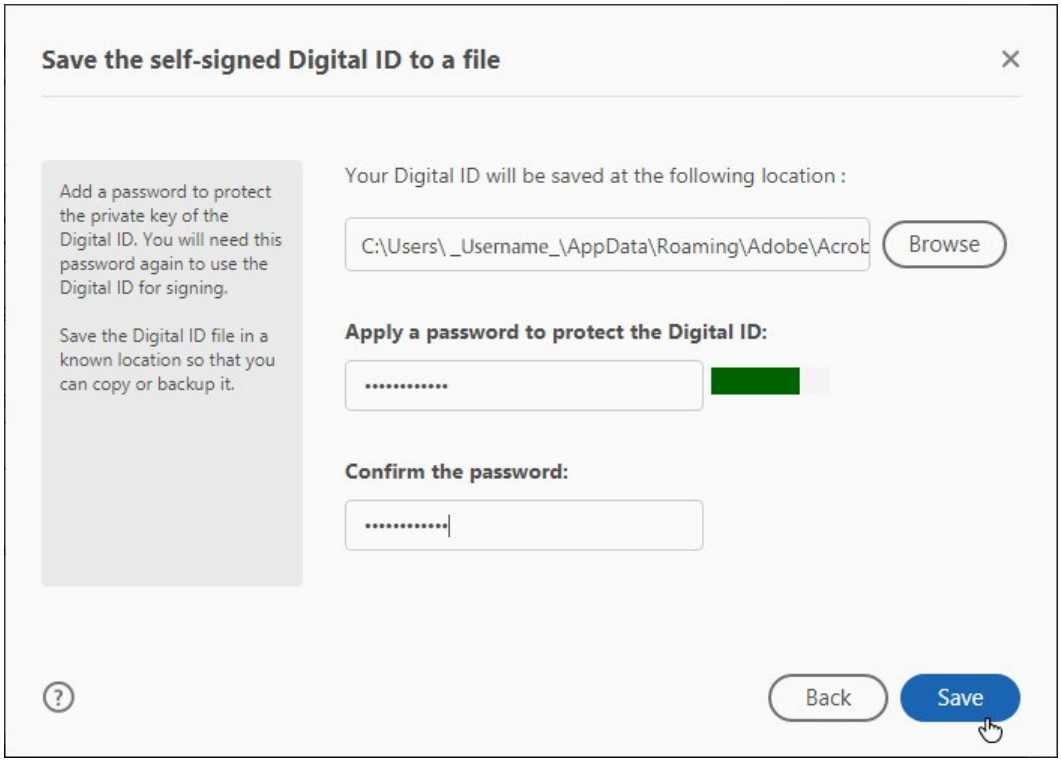

Surgical and Functional Outcome of Laparoscopic Vaginal Suspension Combined with Suture Rectopexy for Management of Pelvic Organ Prolapse

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Abstract

Purpose Laparoscopic techniques to treat pelvic organ prolapse are gaining popularity around the globe due to their low recurrence rates and better functional results compared to perineal techniques. However, the optimum surgical procedures are not yet determined. In the current research, we suggest a novel surgical approach, laparoscopic vaginal suspension with suture rectopexy, to treat multiorgan pelvic prolapse.

Methods This prospective cohort trial was conducted from March 2018 to March 2022 and comprised 35 females with multiorgan pelvic organ prolapse with obstructed defecation symptoms. A residual rectal prolapse was still present despite the manual reduction of uterine prolapse. Patients' conditions before and after the operation were monitored regarding the obstructed defecation score, sexual function, need for laxatives, anorectal manometry pressures, anorectal sensations, and recurrence. The mean follow-up duration was one year.

Results Modified Longo score for obstructed defecation significantly decreased at six and twelve months after surgery. Additionally, a significant reduction was reported in the number of patients who needed laxatives at six and twelve months after surgery. Anorectal manometry pre- and post-surgery showed a significant elevation in the mean squeeze pressure and a decline in all rectal sensations. All parameters of the female sexual function scoring system increased postoperatively. No recurrence was reported during follow-up.

Conclusion For multiorgan pelvic prolapse, laparoscopic vaginal suspension combined with suture rectopexy has excellent functional outcomes, minimal morbidity, and low cost.

Keywords

- pelvic prolapse
- pelvic organs prolapse suspension (POPS)
- rectopexy

Introduction

Pelvic Organ Prolapse (POP) is a prevalent pelvic dysfunction that negatively impacts women's quality of life. It restricts their psychosocial and physical activities and affects their sexual function.[1] POP is common in old age; it reaches 5% in 60-to 69-year-old women. It can be detected clinically in 50% of patients, with only 3% symptomatic.[2]

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The POP may include the anterior and posterior vaginal walls and the vaginal apex (apical prolapses). The posterior vaginal wall prolapse is the rectal protrusion into the vagina (rectocele).[3] The POP surgery objective is to rectify the prolapse and treat defecation dysfunction with simultaneous rectification of the middle-pelvic-compartment prolapse. For years, abdominal sacrocolpopexy has been preferred by specialists for treating female anterior and apical prolapse over a variety of vaginal techniques.[4] Laparoscopic suture rectopexy may be considered an ideal laparoscopic technique for rectal prolapse, with less than a 10% recurrence rate.[5]

Longo describes pelvic organ prolapse suspension (POPS) surgery as a new technique for multi-compartment female pelvic prolapse. It is simpler than conventional techniques and significantly improves the preoperative symptoms. After POPS surgery, if a residual rectoanal prolapse or an anterior rectocele persists, a stapled transanal rectal resection (STARR) is performed.[6]

The stapled transanal rectal resection (STARR) procedure utilizes a double stapling technique with two circular staplers to remove the circumferential anorectal mucosa and fortify the anterior anorectal junction wall, rectifying the structural defects linked to ODS.[7]

The grey area about the functional outcome of a single laparoscopic technique for pelvic organ prolapse instead of POPS surgery alone has motivated the authors to conduct this study.

Patients and Methods

Study Design and Subjects:

The current prospective study was conducted between March 2018 and March 2022 at the colorectal surgery unit and the surgery department, Benha University Hospital.

It comprised 35 females with multiorgan pelvic prolapse with obstructed defecation symptoms and a residual rectal prolapse despite uterine prolapse reduction. The local ethical committee approved it (Rc5-4-2022), registered on research registry with code number (researchregistry8403) and written consent was taken from all participants.

Patients with previous surgical treatment for total rectal prolapse, history of pelvic radiotherapy, fecal incontinence, or bad general condition were excluded from the study.

Preoperative Assessment

1. Detailed history and Modified Longo score were used for the assessment of ODS
2. Clinical assessment for detection of rectal wall prolapse and its concentric folds and assessment of anal sphincter, rectocele or cystocele
3. Pre and postoperative anorectal manometry was done at 6 and 12 months using Solar GI High-Resolution Anal sphincter Manometry HRAM Medical Measurement Systems (MMS), Laborie, USA, with a 24- channel water perfused catheter with latex balloon to determine rectal sensations and anal pressures and exclude anismus.

Imaging

4. Every patient had defecography.
5. Colonoscopy: Each patient had a colonoscopy performed to rule out proximal lesions and get a biopsy of any rectal ulcer to rule out cancer.
6. FSFI assessed sexual function before and after surgery at 6 and 12 months.
7. Standard preoperative laboratory examinations.

Procedure

Laparoscopic Surgical Technique

The night before the procedure, each patient underwent two rectal enemas and received 500 mg of metronidazole and 1 gm of ceftriaxone along with the induction of anaesthesia. The patient was set up in the modified lithotomy posture, with the thighs spread apart, the hips straight, and the knees flexed. Near the body were both arms.

Manual reduction of uterine prolapse and assessment of rectal prolapse were made. If residual prolapse was still present, we proceeded to our procedure. If no residual prolapse was present, we did vaginal suspension only.

The surgeon stood on the patient's right side, and the assistant and the cameraman stood on the left.

Pneumoperitoneum was produced with a Veress needle and an umbilical stab incision after urine catheterization. A 30-degree telescope was then inserted through a 12 mm trocar (camera port) that had been placed through a supra-umbilical incision. The second port, which was 5 mm in size and used as the RT hand, was implanted two fingers medial to the anterior superior iliac spine. The third port, which was 5 mm in size and used as the left hand, was put at the umbilicus level at the right mid-clavicular line. The fourth port, measuring 5 mm, was placed at the left mid-clavicular line below the umbilicus for the assistant.

The patient was placed in the Trendelenburg position (30 degrees) to begin the abdominal cavity exploration. For improved anterior rectum dissection, the uterus was withdrawn to the abdominal wall using 2/0 polyproline sutures and a straight needle. The helper then pulled the sigmoid colon to the left side and out of the pelvis using the left side trocar.

Suture rectopexy was performed[8] without preserving the lateral rectal ligaments of the lower rectum by inspecting the right ureter at the pelvic wall and performing lateral dissection through a peritoneal incision over the sacral promontory extending to the Douglas pouch.

The loose areolar tissue between the mesorectum and the presacral vein plexus was opened during the posterior rectum dissection while the presacral nerves were kept intact. Up till the pelvic floor muscles, anterior dissection was performed.

Retraction of the rectum was performed cranially to identify the ideal location for suture fixation. Before placing sutures, a rectal examination was performed to make sure there was no prolapse at the fixation point. Then, at least two interrupted polyproline 2/0 sutures were used to attach the seromuscular layer of the rectum posterior wall to the presacral fascia on both sides (►**Fig. 1**).

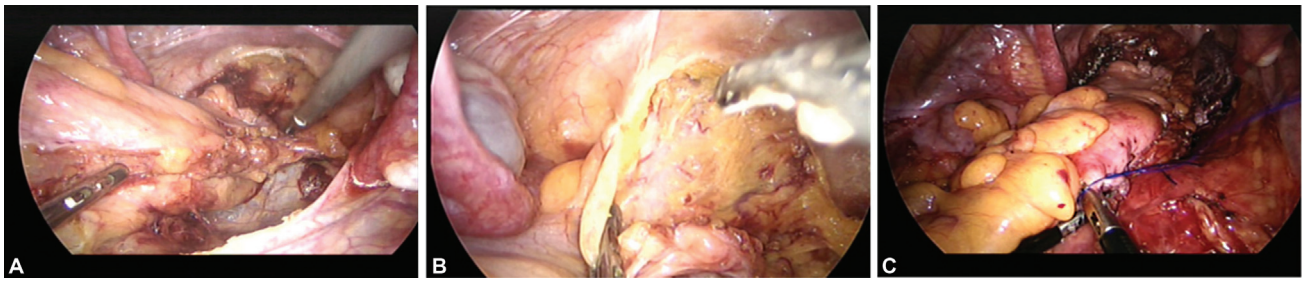

Fig. 1 **(A)** Posterior dissection of the rectum. **(B)** Anterior dissection of the rectum. **(C)** Suturing rectum to presacral fascia.

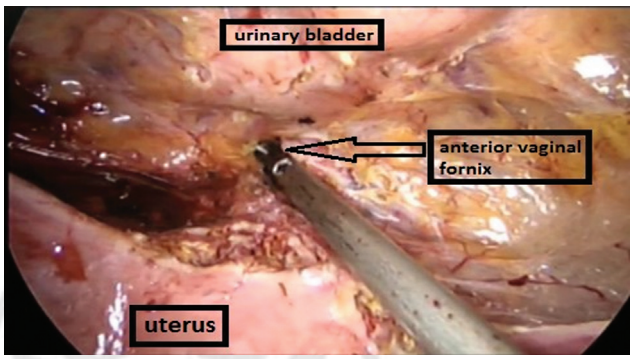

Fig. 2 Dissection done till reaching anterior vaginal fornix.

For greater suspension and to prevent adhesions, the lateral peritoneum was continuously sutured to the rectum at the new higher location. The sutures used were PDS 2/0.

The vaginal suspension described by Longo[9] was done by cutting the sutures used to retract the uterus to the abdominal wall. A peritoneal incision (3 cm) between the uterus and urinary bladder was done. Then, the dissection was started at the anterior vaginal fornix apex (►**Fig. 2**).

A V-shaped mesh (25 cm long, 2 cm wide) was prepared and introduced through a 10 mm trocar into the abdominal cavity. The mesh apex was fixed using a PDS 2/0 by three sutures on the anterior vaginal vault.

A subperitoneal tunnel was done on both sides by the Endo Clinch to reach the anterior vaginal fornix. The subperitoneal tunnel was used to extract each end of the V-mesh, and symmetrical traction was applied to both mesh strips. (►**Fig. 3**) When the vaginal vault was suspended at the ideal level to eliminate the vaginal prolapse while preventing excessive tension on the vaginal walls, the second assistant informed the surgeon. The correction happened following CO2 exsufflation. Each mesh strip was fixed to the external oblique aponeurosis by prolene 0 stitches.

After reinsufflaton, the peritoneum was closed by continuous sutures using vicryl 2/0.

For all included patients crucial monitoring intraoperative and post operative for

- Intraoperative data, including blood loss, operative time, and complications.
- Postoperative data, including pain score, hospital stay, complications, and the time needed for mesh incorporation.
- Follow-up was extended for 12 months for the incidence of recurrence of ODS and
- Obstructed defecation symptoms by the modified Longo score.[10]
- Anorectal manometry and rectal sensations.
- The need for laxatives postoperatively.
- Sexual function by the Female Sexual Function Index (FSFI), which is a 19-item It comprises six domains: desire [two items], lubrication [four items], arousal [four items], pain, orgasm, and satisfaction [three items each].[11]
- The FSFI total score is the sum of the six domain/subscale ratings, and the maximum score is 36. Higher scores imply greater functioning, and a total score of 26 is the diagnostic threshold for female sexual dysfunction.

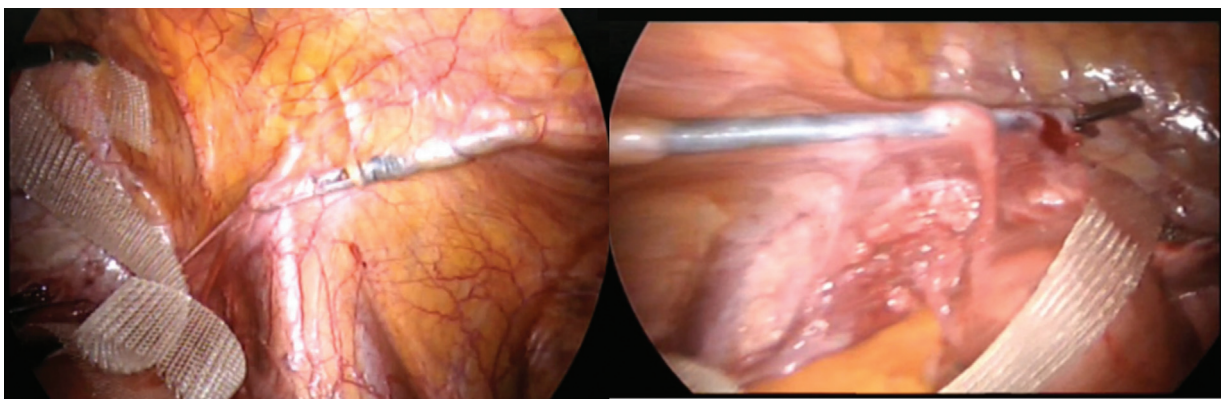

Fig. 3 Creation of right and left subperitoneal tunnel and pulling the right limb of mesh.

- All functional outcomes were assessed at six and twelve months postoperatively and compared to the preoperative ones.

Postoperative Care and Instructions

Ceftriaxone (1 gm) was given once /day for five days. Analgesia was given as patient-controlled analgesia (PCA) pump. Early postoperative laxatives were prescribed to avoid straining and discontinued gradually.

The visual analogue score (VAS) was used to assess postoperative pain. Patients started taking oral fluids on the surgery day evening and soft food the day after surgery.

All patients were admitted on the surgery day. The hospital stay duration was calculated from admission to the day of discharge.

Outcomes and Follow Up

Primary outcome: The 1ry outcome was successful POPS surgery with relief of obstructed defecation symptoms.

Secondary outcomes: The 2 ry outcome was improvement of the sexual function QOL score.

Postoperative follow-up was done in the outpatient clinic one week after the operation and then every month for 12 months.

At 6 and 12 months, patients were reassessed by anorectal manometry and modified Longo score. Additionally, sexual function was assessed by FSFI. In the outpatient clinic, the questionnaire was distributed by a nurse and administered by the patients. Recurrence was evaluated clinically and monitored for one year or until the study ended.

Statistical Analysis

The primary goal of this study is to reduce the occurrence of ODS symptoms; hence the sample size was estimated accordingly. Using the G*power 3.1 programme (Universities, Dusseldorf, Germany), a sample size of 35 was considered with a power of 80%, P value of 0.05, and an effect size of 0.7.

By examining the data distribution, the normality of the measured results was investigated. A parametric distribution was visible for all examined parameters. The IBM Corp., Armonk, NY, USA used a two-way mixed model MANOVA to compare measured variables over several time periods. Independent t test was used for participant demographic information, and 2 was used for nominal information. Nominal data was given as a number and a percentage whereas numerical data was presented as mean and SD. With a P value of less than or equal to 0.05, the significance level was established. The statistical analysis was performed using SPSS Statistics version 20.

Results

This study included 35 females with multiorgan pelvic prolapse with obstructed defecation. A residual rectal prolapse was still present despite the manual reduction of uterine prolapse during examination under general anesthesia.

Table 1 Baseline characteristics in the study participants

	n =35
Age (years)	33 ± 8.12
Gender (Female)	35 (100%)
BMI (kg/m^2)	39.03 ± 11.81
Comorbidities	9 (25.7%)
Main complaint	
OBD	26 (74.3%)
OBD + Sexual complaint	9 (25.7%)

Data are presented as mean ± standard deviation (SD) or n (%), BMI: Body mass index, OBD: Obstructive bowel disorder.

As shown in ►**Table 1,** the mean age of the studied patients was 33 ± 8.12 years. The mean BMI was 39.03 ± 11.81. Nine patients (25.7%) had comorbidities. The main complaint was OBD in 26 patients (74.35%), while OBD with sexual complaints was reported in 9 (25.7%).

►**Table 2** shows intra and postoperative findings. The ASA score was 1 in 12 patients (34.3%), 2 in 19 (54.3%), and 3 in only 4 (11.4%). The median operative time was 90 minutes. The median blood loss was 20 ml. No cases were converted to open. Concerning the intraoperative complications, only two patients (5.71%) had bleeding. No intestinal, uterine, or bladder injuries occurred. Regarding postoperative findings, the median pain score was 4. Wound infection occurred in two patients (5.7%). Only one patient (2.9%) had a hematoma. No recurrence was reported. The median hospital stay was 2.2 days.

►**Table 3** and ►**Figure 4** show the change in anorectal manometry parameters at 6 and 12 months postoperatively. Compared to baseline values, the mean resting and squeezing pressures significantly increased at 6 and 12 months postoperatively ($P < 0.001$ for each). In contrast, 1st rectal sensation volume significantly decreased at 6 and 12 months postoperatively (50 and 60 cc, respectively, vs. 70 cc,

Table 2 Intra and postoperative data in the study participants

	n =35
*Operative data	
ASA score	12 (34.3%)
1	19 (54.3%)
2	4 (11.4%)
3	90 (90 - 100)
Operative time (minutes)	20 (20 - 30)
Blood loss (mL)	0 (0%)
Conversion to open	
*Intraoperative complications	
Bleeding	2 (5.71%)
Intestinal injury	0 (0%)
Uterine or bladder injury	0 (0%)
*Post operative data	
Post operative pain score	4 (2 - 4)
Wound infection	2 (5.7%)
Hematoma	1 (2.9%)
Hospital stay (days)	2.2 (2 - 3)
Recurrence	0 (0%)

Data are presented as mean ± standard deviation (SD), median (IQR), or n (%), ASA: American Society of Anesthesiologists

Table 3 Anorectal manometry preoperatively and in 6 and 12 months postoperatively

	Preoperative	6 months postoperative	12 months postoperative	P value
Mean resting pressure	35 (30 - 75)[a]	40 (35 - 50)[b]	40 (40 - 50)[b]	<0.001
Mean squeezing pressure	110 (100 - 120)[a]	130 (120 - 160)[b]	140 (130 - 160)[b]	<0.001
1st rectal sensation volume (cc)	70 (60 - 80)[a]	50 (40 - 60)[b]	60 (50 - 60)[b]	<0.001
1st urge sensation volume (cc)	140 (130 - 170)[a]	130 (130 - 150)[a]	150 (130 - 160)[a]	0.034
Intense urge sensation volume (cc)	230 (210 - 260)[a]	210 (190 - 230)[b]	220 (200 - 230)[b]	<0.001

Data are presented as mean ± standard deviation (SD), median (IQR), or n (%). Different super-scripted letters indicate significant difference and vice versa. Level if significance were set at p value ≤0.05.

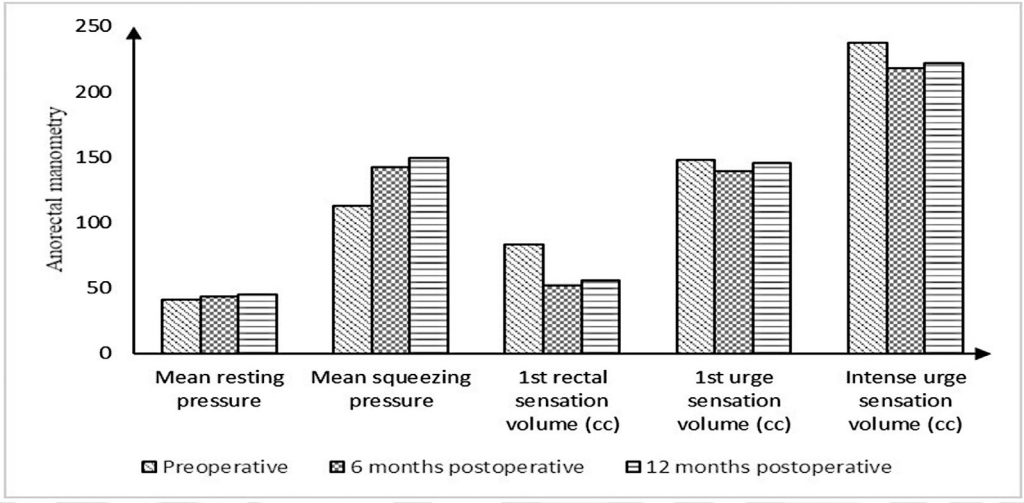

Fig. 4 Anorectal manometry preoperatively and in 6 and 12 months postoperatively.

$P < 0.001$). Additionally, intense urge sensation volume significantly decreased at 6 and 12 months postoperatively (210 and 220 cc, respectively, vs. 230 cc, $P < 0.001$). No significant differences were reported between the six- and twelve-month values of resting and mean squeezing pressures, 1st rectal sensation volume, and intense urge sensation volume. Furthermore, pre and postoperative 1st urge sensation volume did not significantly differ.

As shown in ►**Table 4**, the modified Longo score significantly declined at 6 and 12 months postoperatively compared to baseline (10 and 8, respectively, vs. 18, $P < 0.001$), indicating an improvement in ODS. In contrast, no significant difference was observed between the six- and twelve-month scores. A lower number of patients needed laxatives at 6 and 12 months postoperatively (6 and 5 patients, respectively) compared to baseline (35) ($P < 0.001$).

►**Table 5** and ►**Figure 5** reveal the change in FSFI score at 6 and 12 months postoperatively. Desire, arousal, and orgasm scores significantly increased at 6 months compared to baseline. In addition, they significantly increased at 12 months compared to 6 months and baseline ($P < 0.001$ each). Lubrication, satisfaction, and pain scores significantly increased at 6 months compared to baseline, but no significant differences were observed between six and twelve months. The total FSFI score significantly increased at six months (21.34 ± 1.68) compared to baseline (14.03 ± 1.62). Additionally, it significantly increased at 12 months (25.32 ± 2.2) compared to 6 months and baseline.

Discussion

POP is a disability that typically affects older women and alters their lifestyles. Over 23% of community-dwelling women will have a minimum of one of the following, obstructed defecation syndrome (ODS), pelvic organ prolapses (POP), or fecal incontinence.[12] Half of the women

Table 4 Modified [Q4]Longo score and need for laxatives preoperatively and in 6 and 12 months postoperatively Q4

	Preoperative	6 months postoperative	12 months postoperative	P value
Modified longo score	18 (16–20)[a]	10 (8–12)[b]	8 (8–10)[b]	<0.001
Need for laxatives	35 (100%)[a]	6 (17.14%)[b]	5 (14.28%)[b]	<0.001

Data are presented as mean ± SD or median (IQR), or n (%). Different super-scripted letters indicate significant difference and vice versa. FSFI: Female Sexual Function Index. Level of significance were set at p value ≤0.05.

Table 5 FSFI score preoperatively and in 6 and 12 months postoperatively

	Preoperative	6 months postoperative	12 months postoperative	P value
Desire	2.4 (1.2–2.4)[a]	3.6 (3.6–3.6)[b]	4.8 (3.6–4.8)[c]	<0.001
Arousal	2.1 (2.1–2.4)[a]	3 (2.4–3.6)[b]	3.6 (3–3.9)[c]	<0.001
Lubrication	2.4 (2.4 – 3)[a]	3.6 (3–3.9)[b]	3.9 (3.6–4.2)[b]	<0.001
Orgasm	2.8 (2.4–3.2)[a]	3.6 (3.2 – 4)[a]	4.8 (4–4.8)[c]	<0.001
Satisfaction	2 (1.6–2.4)[a]	4 (3.2–4.8)[b]	4.8 (4–5.6)[b]	<0.001
Pain	2 (1.6–2.8)[a]	4 (3.2–4.8)[b]	4.4 (4–5.2)[b]	<0.001
Total score	14.03 ± 1.62[a]	21.34 ± 1.68[b]	25.32 ± 2.2[c]	<0.001

Data are presented as mean ± SD, median (IQR), or n (%). Different super-scripted letters indicate significant difference and vice versa. FSFI: Female Sexual Function Index. Level if significance were set at p value ≤0.05.

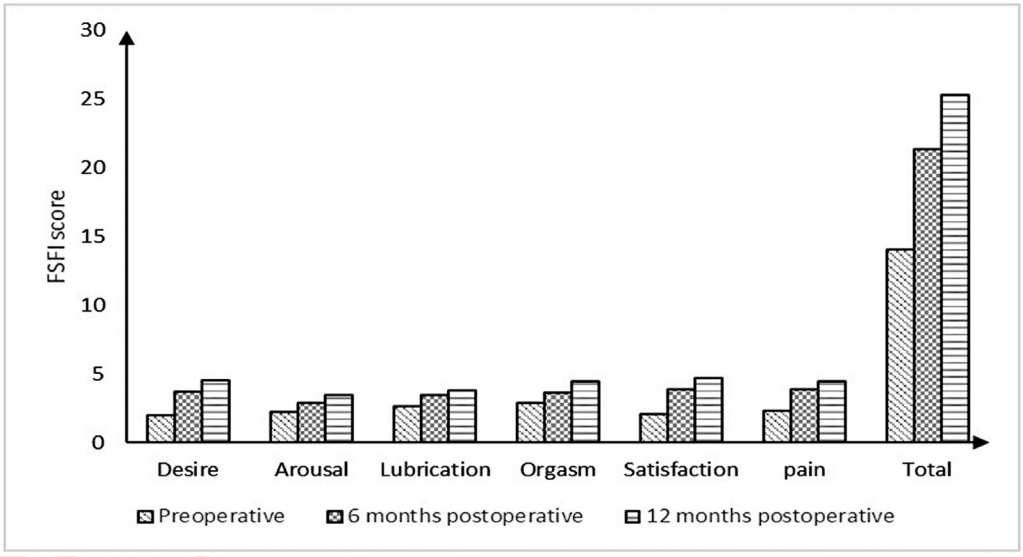

Fig. 5 FSFI score preoperatively and in 6 and 12 months postoperatively.

with ODS caused by rectal prolapse and rectocele also had uterine prolapse.[13] Thirty percent of women who underwent POP surgery require further pelvic surgery.[14]

In 2014, Longo et al. decided to improve pelvic organ prolapse surgery to achieve simultaneous prolapse correction of all pelvic organs and remission of the associated symptoms by POPS surgery, which is considered a one-stage treatment for multiorgan female pelvic prolapse. Ceci et al. state that laparoscopic POPS has outstanding morphological outcomes for vaginal prolapse, enterocele, rectocele, and rectal prolapse, with no complications or functional impairments as dyspareunia or mesh-related erosion of the rectum. Nevertheless, it can be linked to a persistent and recurrent rectal prolapse. Therefore, they concluded that the STARR technique should be utilized if a residual rectal prolapse continues.[6]

The STARR technique utilizes a double stapling approach with two circular staplers to remove the circumferential anorectal mucosa and fortify the anterior anorectal junction wall, rectifying the structural defects linked to ODS.[7] On the other hand, using two circular staplers, which cost about 1250 USD, is considered very expensive in such a low-income country and is not covered by the insurance company in most cases. In addition, the time lost in changing patients' positions from being supine during the POPS procedure to a lithotomy position in the STARR procedure in the operative room makes the procedure more time-consuming.

Based on this background, for patients with multiorgan prolapse in which residual rectal prolapse is still present after vaginal suspension, we modified the POPS procedure and proposed a new combined laparoscopic technique, laparoscopic vaginal suspension and rectopexy, in which middle and posterior pelvic compartment prolapse can be corrected.

We preferred adding suture rectopexy to vaginal suspension over ventral mesh rectopexy for two reasons. First, to avoid many mesh-related complications such as pain, dyspareunia, rectovaginal fistula, and rectal stricture. Second, vaginal suspension alone corrects the rectocele by stretching the posterior vaginal wall but does not optimally correct rectoanal intussusception, particularly if the intussusception is of a high level, necessitating suture rectopexy rather than ventral mesh rectopexy. In 2017, Yang et al. modified POPS surgery for rectal and uterine prolapse by adding suture rectopexy to vaginal suspension using a trimmed 3-strip mesh.[15]

In this study, obstructed defecation symptoms were observed in 35 females with multiorgan pelvic organ prolapse. These symptoms were assessed preoperatively by the modified Longo score. Postoperatively, significant improvements

in ODS score were observed, which may be due to the surgical approach utilized. The lateral ligaments were separated for complete rectal mobilization, and the posterior vaginal wall was stretched by vaginal suspension to correct the rectocele. Finally, the lateral peritoneum was sutured to the rectum at a new higher point for more suspension. Despite improvement in ODS, five patients (14%) depended on laxatives, which may be due to these patients' slow colonic transit time, so we recommend resection rectopexy to those patients despite the risk associated with colonic anastomosis.[16]

Women with pelvic organ prolapse experience impairments in sexual function. In the current study, the sexual activity of all patients was assessed pre and postoperative using the Female Sexual Function Index Scoring. Nine patients (26%) preoperatively complained of sexual dysfunction, while postoperatively, all parameters, including arousal, desire, orgasm, satisfaction, lubrication, and pain scores, significantly improved. However, only one patient had a worsened pain score postoperatively, which may be a reaction to the mesh inserted in the anterior vaginal fornix. She was managed conservatively with non-steroidal analgesics, and the pain gradually decreased with time. The 26 patients (74%) who did not complain of preoperative sexual problems reported better sexual function postoperatively, and all parameters were significantly increased.

Treating genital prolapse has a good impact on sexual activity. It helps eliminate vaginal dryness and chronic pelvic pain related to uterine prolapse and symmetrical traction of the mesh and avoids excessive shortening of the vagina. Rogers reports that surgical treatment of the prolapse improves sexual function and body image. This has been demonstrated in both native tissue and grafted repairs in most patients.[17] However, a meta-analysis by Abed et al. states that roughly 10% of mesh-repaired prolapse patients experience dyspareunia after surgery.[18]

The recurrence incidence is a key metric for evaluating pelvic prolapse surgery. In this study, no recurrence was reported postoperatively, which could be attributed to adding suture rectopexy to vaginal suspension, full mobilization of the rectum to the pelvic floor, and bilateral suturing of the rectum to the sacral promontory. While in a study done by Yang et al. in which modification POPS surgery were done using a trimmed 3-strip mesh, 1 patient had a recurrence from 69 patients included in the study.[15]

The current study had limitations, such as the small sample size and the limited follow-up. In addition, it is a single-center study. We also did not spot the light on urological problems accompanied by pelvic organ prolapse.

Conclusion

The laparoscopic vaginal suspension combined with suture rectopexy has outstanding functional outcomes, minimal morbidity, and a low cost compared to POPS described by Longo (when STAR operation is needed). In addition, it is associated with a short hospital stay, alleviation of obstructed defecation symptoms, low recurrence rate, minimal mesh-related complications and postoperative functional impairment, and correction of middle-compartment prolapses. The long-term outcomes will be achieved by follow-up.

Conflicts of Interest
None.

Acknowledgment
None

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