Comparison of laparoscopic pectopexy with the standard laparoscopic sacropexy for apical prolapse: an exploratory randomized controlled trial

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Abstract

Objective: To compare laparoscopic pectopexy with the standard laparoscopic sacropexy in women with symptomatic apical prolapse.

Material and Methods: An interim analysis of an exploratory randomized controlled trial with the primary objective of comparing mesh fixation time and secondary objectives were to compare total operating time, blood loss, and intra-operative and post-operative complications. Additionally, patients completed the Prolapse Quality of Life (P-QOL) and Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire (PISQ-12) questionnaires before surgery and during six months follow-up visit to evaluate the overall improvement in quality of life and sexual function. Patient Global Impression of Improvement (PGI-I) score was calculated on the 7-10th day post-operatively and then at six months to assess the level of improvement.

Results: The study included 30 patients; 15 underwent laparoscopic sacropexy, and 15 underwent laparoscopic pectopexy. Baseline characteristics were comparable in both groups. The mean duration of mesh fixation was significantly less with laparoscopic pectopexy (45.00±11.34 minutes) than laparoscopic sacropexy (54.67±9.35 minutes) (p=0.019). The total operating time and blood loss tended to be less in the pectopexy group, but not significantly so. Only one patient in the pectopexy group had a bladder injury. No patient in either group had any post-operative complications. One case in each group had a relapse of apical prolapse. All the domains of PISQ-12, P-QOL, and PGI-I scores improved significantly after both procedures.

Conclusion: Laparoscopic pectopexy is a safe, feasible, and comfortable alternative procedure to the standard sacropexy for apical prolapse. We noted significantly less mesh fixation time and less operating time, while blood loss tended to be less with laparoscopic pectopexy than with laparoscopic sacropexy. Post-operative parameters were comparable between techniques. Both corrective techniques for prolapse improved the PGI-I, P-QOL, and PISQ-12 scores. (J Turk Ger Gynecol Assoc 2023; 24: 144-51)

Keywords: Laparoscopic pectopexy, laparoscopic sacropexy, apical prolapse, mesh fixation

Received: 27 December, 2022 **Accepted:** 19 April, 2023

Introduction

Pelvic organ prolapse (POP) is a common disorder in women. According to Women's Health Initiative data, the prevalence of anterior wall prolapse is 34.3%, posterior wall prolapse is 18.6%, and uterine prolapse is 14.2% of women (1). The gold standard treatment for apical prolapse is laparoscopic sacropexy (2).

Laparoscopic pectopexy is a newer alternative to sacropexy, first described by Banerjee and Noé (3) in 2011. It is associated with fewer complications, shorter hospital stay, more rapid recovery, and safer operative field. In pectopexy, the mesh is fixed at the lateral areas of the bilateral ilio-pectineal ligaments and the apex of the vaginal vault or anterior cervical wall. The mesh follows the natural anatomical structure (round and broad ligament) to maintain the physiological axis, far from the ureter, bowel, and hypogastric vessels.

In laparoscopic sacropexy, the mesh is placed between the sacral promontory or anterior longitudinal ligament and the vaginal vault or the posterior cervical wall. It leads to narrowing of the pelvis, adhesions, or injury to the hypogastric nerves,

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DOI: 10.4274/jtgga.galenos.2023.2022-12-15

which might cause chronic pain and defecation disorders (4). Pre-sacral bleeding is the most concerning intra-operative complication of sacropexy and may have life-threatening effects. Incidence of de novo defecation disorders and stress urinary incontinence (SUI) are greater with sacropexy (5). Furthermore, sacropexy becomes more challenging in obese women, due to enlargement of the sigmoid colon by fatty tissue, which can easily be obviated with the alternative technique; pectopexy.

The ilio-pectineal ligament is statistically much stronger than the sacrospinous ligament and the arcus tendinous of the pelvic fascia (6). The cranial anchor point for creating a physiological axis of the vaginal canal should be at the level of S2. The S2 level corresponds to the height of the lateral part of the ilio-pectineal ligament.

Keeping in mind the advantages of laparoscopic pectopexy, a study was planned in an Indian scenario to compare laparoscopic pectopexy with the standard laparoscopic sacropexy in women with symptomatic, apical prolapse. The primary objective was to compare the average time for mesh fixation, and the secondary objectives were to compare intra-operative parameters, and peri- and post-operative complications during laparoscopic pectopexy and laparoscopic sacropexy.

POP is known to significantly affects a woman's quality of life (QoL) and sexual health, which is expected to be improved by prolapse corrective surgery. Validated questionnaires, such as the Prolapse Quality of Life (P-QOL), Pelvic Organ Prolapse/ Urinary Incontinence Sexual Questionnaire (PISQ-12), and Patient Global Impression of Improvement (PGI-I) were used to investigate the effectiveness of both techniques (7,8).

Material and Methods

This was an exploratory, randomized, controlled trial conducted in the department of obstetrics and gynecology at a tertiary care center to compare laparoscopic pectopexy with the standard laparoscopic sacropexy in women with symptomatic apical prolapse. Prior permission for data analysis was obtained from the All India Institute of Medical Sciences (AIIMS) Institutional ethical board (AIIMS/IEC/20/823, date: 21.11.2020).

Women with apical prolapse of pelvic organ prolapse-quantification (POP-Q) > stage 2 (vault prolapse or uterine prolapse) who agreed to participate were included in the study. Both reproductive age-group women and postmenopausal women were included. Women with active pelvic inflammatory disease, history of vaginal prolapse corrective surgery, current pregnancy, history of premalignant or malignant diseases of uterus, cervix, or adnexa, any contraindication for laparoscopic surgery, patient unfit for anesthesia or not willing to comply with the protocol were excluded from the study.

The primary objective was to compare the average time for mesh fixation in laparoscopic pectopexy versus laparoscopic sacropexy. The secondary objectives were to compare intra-operative parameters such as operation time, blood loss, and peri- and post-operative complications during both techniques. Patients answered P-QOL and PISQ-12 questionnaires before the surgery and during six-month follow-up visits to evaluate the overall improvement in QoL and sexual functions. PGI-I score was calculated on the 7-10th day post-operatively and then at six months to assess the level of improvement.

Sample size calculation was performed using G Power 3.1.9.2. The sample size was calculated based on comparison of mean operation time in the two groups for a two-tailed test in a randomized controlled trial by Noé et al. (9). Using an alpha error of 0.05 and a power of 80%, the sample size was identified as 28 in each group. After assessment of eligibility criteria, patients were randomized by computer-generated random number allocation, and underwent the assigned surgical procedure. This report contains an interim analysis of 30 patients with apical prolapse (POP-Q > stage 2) who met the eligibility criteria over a period of 18 months (October 2020 to March 2022).

A detailed history was obtained, followed by a thorough examination, including POP-Q for prolapse staging. Routine pre-operative work-up was performed, and informed written consent was taken for surgery. Baseline characteristics, such as age, body mass index, parity, and socio-economic status, were recorded for all the patients.

Laparoscopic sacropexy (group A) was performed in 15 women [sacro-colpopexy (n=13), sacro-hysteropexy (n=2)]. In group B, 15 women underwent laparoscopic pectopexy [pecto-colpopexy (n=9), pecto-hysteropexy (n=6)]. The same surgeon performed all surgery. The surgery was documented using surgical notes and intra-operative videos. An additional procedure, such as anterior colporrhaphy, was performed in patients with stage 3 cystocele. Bilateral tubal ligation was performed simultaneously in patients with an intact uterus who opted for it as a permanent contraceptive method.

Surgical technique

All surgery was performed under general anesthesia, in the low dorso-lithotomy position with both arms next to the patient. After the creation of pneumoperitoneum with veress needle, a 10 mm supra umbilical port was inserted to introduce a 30-degree laparoscope. Under vision, three side ports were inserted; two 5 mm ports on the left for working instruments and one 5 mm on the right side for assistance. A uterine manipulator (in cases of the intact uterus) or a ring forceps with sponge (in hysterectomised patients) was introduced trans-vaginally at the beginning of the procedure for vaginal manipulation during surgery.

Laparoscopic sacropexy

During this procedure, the uterus (sacro-hysteropexy), or vaginal vault (sacro-colpopexy) was fixed to the anterior longitudinal ligament of the sacrum (S1-S2).

The peritoneum over the sacral promontory was opened, and the anterior longitudinal ligament was exposed. Then, the peritoneal incision was extended towards the pouch of Douglas up to the cervico-uterine junction in between the right ureter and rectum. A type-1, monofilament, macroporous, polypropylene mesh was used for uterine suspension. The single mesh (15x3 cm) was first fixed to the posterior cervix and uterosacral ligaments and then to the anterior longitudinal ligament at the level of S1-S2 with a 2-0 ethibond (polyethylene terephthalate) suture. The cervix level was checked by vaginal examination and its position was confirmed at or approximately 1 cm above the ischial spines. The peritoneum over the mesh was closed using a 2-0 vicryl (polyglactin) suture.

In cases of sacro-colpopexy, a Y-shaped mesh (15x3 cm) was prepared to cover the anterior and posterior walls of the vault, sutured with 2-0 ethibond. Then the vault was suspended to the sacral promontory, as described above.

Laparoscopic pectopexy

During this procedure, the uterus (pecto-hysteropexy), or vaginal vault (pecto-colpopexy) was fixed to the bilateral ileo-pectineal ligament.

Initially, the vesico-vaginal fold was opened, and the bladder was pushed down. The peritoneal layer parallel to the bilateral round ligaments was opened toward the pelvic sidewalls, one by one. The ileo-pectineal ligament (Cooper ligament) can be identified as a white glistening ligament adjacent to the insertion of the ilio-psoas muscle. The iliopectineal ligament was recognized at the base of the triangle, which is surrounded by the round ligament, external iliac vein (cranial/ventral), and obturator nerve (dorsal/caudal). The peritoneal layer was opened towards the vaginal apex on both sides, and the vaginal apex was prepared both anteriorly and posteriorly for the mesh fixation. With an intact uterus, the lower uterine segment was prepared anteriorly for mesh fixation. A polypropylene, monofilament mesh (15x3 cm) was fixed to the vaginal apex or anterior lower uterine segment and both iliopectineal ligaments in a tension-free manner with intracorporeal suturing, using a non-absorbable, ethibond 2-0 suture. Finally, the peritoneum over the mesh was covered with an absorbable 2-0 vicryl suture.

Outcome measures were mesh fixation time, total operating time, blood loss, and occurrence of major complications. The duration of mesh fixation was measured from the first to the last stitch for mesh attachment, and the duration of surgery was calculated as time taken from first skin incision to the last skin suture. Additionally, duration of hospital stay, hemoglobin (Hb) decline, and visual analog score (VAS) for pain was noted in the immediate post-operative period. Hb decline was calculated in both groups by subtracting post-operative Hb from pre-operative Hb.

Follow-up was maintained over six months in all patients, with data recorded at two time points, the first at 7-10 days and the second at six months post-operatively. Bladder and bowel dysfunctions, wound-related complications, new onset lower abdominal pain/ backache/ buttock pain, dyspareunia, relapse of apical prolapse > stage 2, de novo occurrence of anterior and/or lateral defect, and cystocele or rectocele were documented on each follow-up visit.

All of the patients underwent a PGI-I survey post-operatively on the first and last follow-up visits. Satisfaction with the surgery was queried on between seven and ten days post-operatively.

The validated P-QOL questionnaire was used both pre-operatively and post-operatively at six months in all women. The PISQ-12 questionnaire was used only in sexually active women with an intact uterus.

Statistical analysis

SPSS, version 21 (IBM Corp., Armonk, NY, USA) was used for data analysis. Descriptive statistics were documented as means ± standard deviations and median ± IQRs for continuous variables and frequencies and percentages for categorical variables. A $p<0.05$ was considered statistical significant.

Results

A total of 30 patients, 15 in each group, were included in this interim study. Both groups were comparable with respect to socio-demographic characteristics, as shown in Table 1. The mean age was 50.33±12.11 years (range: 33-70 years) in group A and 46.53±11.54 years (range: 30-61) in group B, which was similar in both groups.

Intra-operative parameters

Table 2 shows the intra-operative parameters of both groups. The mean duration of mesh fixation was significantly less in laparoscopic pectopexy than in standard laparoscopic sacropexy ($p=0.019$). Average blood loss and operating time tended to be less in laparoscopic pectopexy than sacropexy, but not significantly so. Only one patient, who underwent laparoscopic pectopexy, had a bladder injury, which was repaired intra-operatively (Clavien-Dindo complication classification 3b). No patient in any group required blood transfusion or conversion to another approach.

Post-operative parameters

Table 3 shows the post-operative parameters in the immediate post-operative period, and at the first and last follow-up visit.

Table 1. Socio-demographic characteristics of both groups

Parameters	Group A (n=15)	Group B (n=15)	p
Age (years)	50.33±12.11	46.53±11.54	0.506[1]
BMI (kg/m^2)	21.95±1.22	22.23±1.65	0.602[2]
Socio-economic status			
Upper	0 (0.0%)	0 (0.0%)	0.403[3]
Upper middle	5 (33.3%)	3 (20%)	
Lower middle	6 (40.0%)	6 (40.0%)	
Upper lower	4 (26.7%)	3 (20.0%)	
Lower	0 (0.0%)	3 (20.0%)	
Menopausal status			
Premenopausal	2 (13.3%)	6 (40.0%)	0.215[3]
Postmenopausal	13 (86.7%)	9 (60.0%)	
Parity			
Primigravida	0 (0.0%)	0 (0.0%)	1.000[4]
Multigravida	15 (100.0%)	15 (100.0%)	
History of any previous surgery	14 (93.3%)	9 (60.0%)	0.031[4]
POP-Q			
Stage 3	15 (100.0%)	9 (60.0%)	0.017[3]
Stage 4	0 (0.0%)	6 (40.0%)	
Pre-operative cystocele	5 (33.3%)	6 (40.0%)	0.705[4]
Additional procedure			
Anterior colporrhaphy	5 (33.3%)	6 (40.0%)	0.705[4]
Bilateral tubal ligation	0 (0.0%)	6 (40.0%)	<0.001[3]
Bladder rent repair	0 (0.0%)	1 (6.7%)	1.000[4]
PISQ-12 (pre-operative)	12.78±0.97	12.83±0.75	1.000[1]

Data are shown as mean ± standard deviation or frequency (%). [1]: Wilcoxon-Mann-Whitney U test, [2]: t-test, [3]: Fisher's exact test, [4]: Chi-square test, BMI: Body mass index, POP-Q: Pelvic organ prolapse-quantification, PISQ-12: Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire

Table 2. Intra-operative parameters of both groups

Parameter	Group A (n=15)	Group B (n=15)	p
Duration of mesh fixation (minutes)	54.67±9.35	45.00±11.34	0.019[1]
Blood loss (mL)	52.00±8.62	44.67±9.15	0.052[1]
Operating time (minutes)	107.67±17.8	96.00±9.86	0.053[1]
Occurrence of major complications	0 (0.0%)	1 (6.7%)	1.000[4]
Blood transfusion	0 (0.0%)	0 (0.0%)	1.000[4]
Conversion to other approach	0 (0.0%)	0 (0.0%)	1.000[4]

Data are shown as mean ± standard deviation or frequency (%). [1]: Wilcoxon-Mann-Whitney U test, [4]: Chi-squared test

Table 3. Post-operative parameters

Parameters	Group A (n=15)	Group B (n=15)	p
Immediate post-operative period			
Hemoglobin decline (g/dL)	0.84±0.52	1.21±0.66	0.098[2]
Pain (VAS score)	3.73±0.70	3.60±0.51	0.691[1]
Episode of constipation	0 (0.0%)	0 (0.0%)	1.000[4]
Urinary complaints	0 (0.0%)	0 (0.0%)	1.000[4]
Infection	0 (0.0%)	0 (0.0%)	1.000[4]
Duration of analgesic			
2 days	12 (80.0)	12 (80.0)	1.000[3]
3 days	3 (20.0)	3 (20.0)	
Duration of hospital stay (days)	3.60±0.74	3.40±0.51	0.539[1]
1st follow-up visit (7-10 days)			
Wound related complications	0 (0.0%)	0 (0.0%)	1.000[4]
Bladder and bowel dysfunction	0 (0.0%)	0 (0.0%)	1.000[4]
Low backache, lower abdominal pain, buttock pain	0 (0.0%)	0 (0.0%)	1.000[4]
PGI-I score at 1st follow-up visit (7-10 days)	2.53±0.83	2.40±0.51	0.693[1]
2nd follow-up visit (6 months)			
Wound related complications	0 (0.0%)	0 (0.0%)	1.000[4]
Bladder and bowel dysfunction	0 (0.0%)	0 (0.0%)	1.000[4]
Dyspareunia	0 (0.0%)	0 (0.0%)	1.000[4]
Mesh erosion	0 (0.0%)	0 (0.0%)	1.000[4]
Relapse of apical prolapse	1 (6.7%)	1 (6.7%)	1.000[3]
De novo occurrence of anterior and lateral de-fect cystocele	0 (0.0%)	0 (0.0%)	1.000[4]
De novo urgency and urinary incontinence	0 (0.0%)	0 (0.0%)	1.000[4]
De novo constipation and rectocele	0 (0.0%)	0 (0.0%)	1.000[4]
Satisfaction rate	14 (93.3%)	14 (93.3%)	1.000[3]
PGI-I score (6 months)	1.60±1.06	1.40±1.06	0.290[1]
PISQ-12 score (6 months)	18.89±1.17	18.33±1.86	0.534[1]

Data are shown as mean ± standard deviation or frequency (%). [1]: Wilcoxon-Mann-Whitney U test, [2]: T-test, [3]: Fisher's exact test, [4]: Chi-square test, VAS: Visual analog score, PGI-I: Patient Global Impression of Improvement, PISQ-12: Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire

In the immediate post-operative period, Hb decline, VAS score, requirement for additional analgesics, and hospital stay were similar in both groups. No patient had an episode of constipation, urinary complaint, or infection.

At the first visit, there were no wound-related complications, bladder and bowel dysfunction, lower abdominal pain, low

backache, or buttock pain in either group. At the six-month visit, there were no bladder and bowel dysfunction (constipation, dyschezia), dyspareunia, lower abdominal pain, low backache, buttock pain, mesh erosion, de novo occurrence of anterior and lateral defect cystocele, de novo urgency, de novo urinary incontinence or de novo constipation and rectocele in either group.

The overall patient impression of improvement by PGI-I score improved significantly over time in both groups. The mean PGI-I score decreased from 2.53±0.83 to 1.60±1.06 in group A (p-value=0.009) and from 2.40±0.51 to 1.40±1.06 in group B (p-value=0.006) from first visit to last visit post-operatively.

The PISQ-12 questionnaire was used in women younger than 45 years old with intact uterus, both pre-operatively and post-operatively at the 6-month follow-up visit. Nine patients in group A and six patients in group B completed the PISQ-12. In group A, the mean PISQ-12 score increased from 12.78±0.97 to 18.89±1.17 (p<0.001), while in group B, these scores were 12.83±0.75 and 18.33±1.86 (p<0.001), respectively at the same time points. All P-QOL domain scores improved post-operatively (p<0.001) in both groups, as shown in Table 4, which suggests all women had a better QoL after surgery compared to their pre-operative status.

Discussion

Various surgical procedures for POP correction have been described, which include sacrospinous fixation, sling techniques for nulliparous prolapse, paravaginal repairs, abdominal or laparoscopic sacrocolpopexy and hysteropexy (10-15). The laparoscopic sacropexy is considered to be the gold standard for correcting an apical prolapse.

Laparoscopic pectopexy is the most recent alternative surgical technique for POP, first described by Banerjee and Noé (3) in obese patients. There are only a few studies published in the literature that compared laparoscopic pectopexy with the standard laparoscopic sacropexy (9,16-18).

To the best of our knowledge, this is the first study to compare the duration of mesh fixation. We documented a significantly shorter duration of mesh fixation with laparoscopic pectopexy than laparoscopic sacropexy. No other study has described this parameter and thus comparison with the literature is impossible. The total operating time was also comparatively shorter using laparoscopic pectopexy (p=0.053). Similarly, Noé et al. (9) found a significantly shorter mean operating time using laparoscopic pectopexy (43.1 minutes; n=42) compared to laparoscopic sacropexy (52.1 minutes; n=41) (p=0.0002). Chuang et al. (16) also reported significantly shorter operative time with laparoscopic pectopexy [182.9±27.2 minutes; (n=18)] than sacropexy [256.2±45.5 minutes; (n=21)] (p<0.001). However, Obut et al. (17) reported no difference (88.44±15.42 vs. 88.33±14.22; p=0.978).

Table 4. Comparison of P-QOL domains

Prolapse quality of life domain scores	Group	Pre-operative (mean ± SD)	Post-operative (mean ± SD)	p^1	p^2	p^3
GHP	Group A	3.53±0.52	1.73±0.70	<0.001	0.479	0.785
	Group B	3.67±1.67	1.67±0.72			
PI	Group A	3.47±0.52	1.47±0.52	<0.001	0.487	0.479
	Group B	3.60±0.51	1.33±0.49			
RL	Group A	3.27±0.42	1.67±0.52	<0.001	0.690	0.618
	Group B	3.33±0.45	1.57±0.50			
PL	Group A	3.20±0.46	1.53±0.55	<0.001	0.485	0.619
	Group B	3.03±0.61	1.63±0.55			
SL	Group A	3.37±0.48	1.70±0.56	<0.001	0.457	0.742
	Group B	3.50±0.42	1.63±0.55			
PR	Group A	3.80±0.61	2.04±0.61	<0.001	0.439	0.450
	Group B	3.97±0.60	1.87±0.58			
EM	Group A	3.13±0.53	1.84±0.57	<0.001	0.572	0.438
	Group B	3.25±0.55	1.67±0.63			
SE	Group A	2.90±0.71	1.70±0.56	<0.001	0.455	0.748
	Group B	3.10±0.69	1.63±0.58			
SM	Group A	3.24±0.64	1.94±0.55	<0.001	0.555	0.479
	Group B	3.33±0.68	1.80±0.49			

GHP: General health perceptions, PI: Prolapse impact, RL: Role limitations, PL: Physical limitations, SL: Social limitations, PR: Personal relationships, EM: Emotions, SE: Sleep/energy, SM: Severity measures, SD: Standard deviation, p^1: Compare pre-operative and post-operative value in the same group, p^2: Compare two groups according to pre-operative value, p^3: Compare two groups according to post-operative value

Tahaoglu et al. (19), Karslı et al. (20), and Salman et al. (21) conducted observational, non-comparative studies in laparoscopic pectopexy and reported mean operating times of 86.8±17.7, 33.8±14.6, and 48±9.8 minutes, respectively.

In the present study, the intra-operative blood loss was minimal in both groups, but comparatively less with laparoscopic pectopexy. Likewise, Noé et al. (9) reported significantly less blood loss with laparoscopic pectopexy than with sacropexy. Other studies by Chuang et al. (16) and Obut et al. (17) documented similar blood loss in both groups.

The overall rate of major surgical complications was low (3.33%) in the present study. Similarly, the complication rate was also low in other studies. Noé et al. (9) reported 5 (1%) patients with severe complications [haemorrhage (n=1), bladder injury (n=3), ureter injury (n=1)]. Tahaoglu et al. (19) reported that one patient (4.5%) had urinary tract infection (Clavien-Dindo complication classification-grade 2) as an early complication and was treated with antibiotics. Biler et al. (22) reported haemorrhage in 1/16 patients (3.6%) during pectopexy but did not require blood transfusion. No patient required blood transfusion in the present study.

Tahaoglu et al. (19) reported that one patient (4.5%) of those (n=22) undergoing laparoscopic pectopexy converted to laparotomy due to adhesions and bleeding. In the present study, conversion to laparotomy was not required in any of the cases. Chuang et al. (16) and Obut et al. (17) did not find any major complications, including bladder, ureteral, or bowel injury, or uncontrolled bleeding in either group.

In the present study, no patient was lost to follow-up, and the follow-up period to six months after surgery was similar in both groups. We did not find any post-operative complications, such as wound-related complications, bladder, and bowel dysfunction, dyspareunia, mesh erosion, de novo occurrence of the anterior and lateral defect, cystocele, de novo urgency, and urinary incontinence, de novo constipation and rectocele in either groups.

A comparatively longer follow-up of 21.8 months for patients undergoing pectopexy and 19.5 months for sacropexy was described by Noé et al. (18), who reported that no patient had de novo defecation disorder in the pectopexy group while 19.5% patients developed it in the sacropexy group. The occurrence of rectoceles (9.5% vs. 9.8%) and de novo SUI (4.8% vs. 4.9%) was similar in both groups. No patient had de novo lateral defect and cystocele following pectopexy, whereas these affected 12.5% of the sacropexy group. Obut et al. (17), during a follow-up period of 12 months, noted that exacerbation of existing cystocele was greater after sacropexy than after the pectopexy procedure (6.3% vs. 10%; p=0.469). De novo urgency was similar in both groups (6.7% vs. 6.3%; p=0.669) while exacerbation of the existing rectocele was more marked in the pectopexy group (9.9% vs. 0%; p=0.131). Chuang et al. (16) used a post-operative mean follow-up period of 7.2 months in the pectopexy group and 16.2 months in the sacropexy group. They reported that occurrence of low back pain (0% vs. 19%; p=0.11) and low abdominal pain (11.1% vs. 19%; p=0.667) was greater after sacropexy than pectopexy while post-operative SUI affected more patients in the pectopexy group (33.3%) than the sacropexy group (9.5%) (p=0.112). In the present study, no patient had such complaints during follow-up periods. Tahaoglu et al. (19) noted the rate of cystocele, rectocele, de novo SUI, and de novo urgency UI was 4.5%, 9.0%, 4.5%, and 4.5%, respectively, during six months follow-up period of laparoscopic pectopexy.

Defecation disorders, including constipation, are often neglected. This can be attributed to injury to the hypogastric nerve during the sacropexy procedure. Noé et al. (18) documented significantly fewer de novo defecation problems after pectopexy than sacropexy (0% vs. 19.5%; p=0.002). Similarly, Chuang et al. (16) noted no defecation symptoms with pectopexy compared with sacropexy (0% vs. 19%; p=0.11). Obut et al. (17) also reported that more constipation occurred in sacropexy (20%) than pectopexy (3.2%) (p=0.036). Tahaoglu et al. (19) did not report any de novo defecation problem after the pectopexy procedure. In the present study there were no de novo defecation problems in either group over the follow-up period.

Data on surgical failures and recurrence rates after the pectopexy procedure are limited. In the present study, we noticed a relapse of apical prolapse in 1/15 (6.7%) patients in each group, for which repeat corrective surgery was performed. Likewise, an apical prolapse relapse rate of 2.3% in the pectopexy group and 9.8% in the sacropexy group (p=0.36) was reported by Noé et al. (18). Obut et al. (17) reported apical prolapse relapse in 3.3% cases after pectopexy and no relapse after sacropexy. On the contrary, Chuang et al. (16), Tahaoglu et al. (19), and Biler et al. (22) did not report recurrence of apical prolapse.

QoL, sexual function, and overall improvement in health was investigated in the present study using P-QOL, PISQ-12, and PGI-I questionnaires. P-QOL and PISQ-12 scores improved significantly from pre-operative to post-operative status and PGI-I scores improved significantly from first follow-up visit to the six-month follow-up visit. However, there was no difference between the two groups, suggesting that both corrective techniques were equally effective. Similar to our study, Karslı et al. (20) performed laparoscopic pectopexy [(n=31); of which pectouteropexy (n=10), pectocolpopexy (n=21)] and compared P-QOL and PISQ-12 questionnaires pre-operatively and six months post-operatively, documented significant improvement after surgery (p<0.05). Salman et al. (21)

performed laparoscopic pectohysteropexy in 36 women and reported significant improvement in POP-Q, and PISQ-12 scores after a follow-up of 12 months, ($p<0.05$).

Likewise, Tahaoglu et al. (19) [(n=22); hystero-pectopexy (n=21) and cervicopectopexy (n=1)] reported significant improvement in QOL and sexual score after pectopexy surgery ($p=0.0001$). Obut et al. (17) demonstrated that the quality of female sexual functions (FSFI) and P-QOL were significantly improved after both procedures ($p<0.01$). However, there was no difference between groups in terms of FSFI and P-QOL scores.

The above data suggest that the newer technique - pectopexy - bears no new intra-operative risks and has less post-operative complications, such as de novo defecation problems and constipation when compared to the standard technique, sacropexy. During pectopexy, the risk of injury to hypogastric nerves, ureter, sigmoid colon, and presacral veins is negligible. Therefore, laparoscopic pectopexy seems to be a novel and promising alternative corrective surgery for apical prolapse.

Study Limitations

This is probably the first study from India which compared laparoscopic pectopexy with laparoscopic sacropexy. The small number of cases, making the study underpowered, and relatively short follow-up period are the major limitations. Nevertheless, the results are reproducible due to the prospective nature of the study. Additionally, we evaluated the QoL, sexual function, and global impression of improvement through specific questionnaires, enhancing the value of the findings.

Conclusion

Laparoscopic pectopexy appears to be a safe, feasible, and comfortable alternative procedure to the standard sacropexy for apical prolapse. There was a significantly shorter mesh fixation time, shorter operating time, and less blood loss with laparoscopic pectopexy than with laparoscopic sacropexy, whereas the post-operative parameters were comparable in both techniques. Both corrective techniques for prolapse improved the PGI-I, P-QOL, and PISQ-12 scores from pre-operative to six-month follow-up points. Unfortunately, this study was underpowered and so future studies with appropriately large sample sizes and including longer follow-up periods, are required to produce more robust, reliable results.

Ethics Committee Approval: *Prior permission for data analysis was obtained from the All India Institute of Medical Sciences (AIIMS) Institutional ethical board (AIIMS/IEC/20/823, date: 21.11.2020).*

Informed Consent: *Informed written consent was taken for surgery.*

Peer-review: *Externally peer-reviewed.*

Author Contributions: *Surgical and Medical Practices: K.K., K.C.D.; Concept: K.K., K.C.D.; Design: K.C.D., Data Collection or Processing: K.K., K.C.D., A.G.; Analysis or Interpretation: K.K., K.C.D., A.G., J.C.; Literature Search: K.K., K.C.D.; Writing: K.K., K.C.D.; Critical Review: J.C.*

Conflict of Interest: *No conflict of interest is declared by the authors.*

Financial Disclosure: *The authors declared that this study received no financial support.*

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