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Original Research Article

Feasibility of laparoscopic sacrocolpopexy in pelvic organ prolapse: a single centre prospective observational study

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ABSTRACT

Background: Pelvic organ prolapse (POP) is a prevalent gynaecological condition that significantly impacts women's quality of life across all age groups. Surgical treatment is often necessary, laparoscopic sacrocolpopexy (LSC), offers a minimally invasive option with promising results. This study done in a tertiary care laparoscopic and robotic centre (GEM Hospital, Coimbatore) aims to explore the advantages of laparoscopic sacrocolpopexy.
Methods: This is a prospective study conducted over a period of 5 years. The participants are women who attended the gynecology clinic and were detected to have prolapse symptoms with a grade 2 or more descent of anterior wall, apex or posterior wall of vagina. Participants were followed until the 6th month of post-operative period.
Results: A total of 54 women were included in the study, most of them being multiparous. 30 out of the 54 women were obese, that signifies the association of obesity with pelvic organ prolapse. 54 patients underwent laparoscopic sacrocolpopexy, of which 7 patients underwent concomitant total laparoscopic hysterectomy (TLH) with sacrocolpopexy. 4 patients underwent laparoscopic sacrocolpopexy along with paravaginal cystocoele repair. The average time calculated was 182 minutes. All the patients reviewed at 3 months and 6 months post-op, had no symptoms of descent and on examination, 2 patients had Bp point at the level of -1.
Conclusions: Laparoscopic sacrocolpopexy offers comparable objective and subjective cure rates to open surgery and is a safe and effective treatment for vaginal vault prolapse, providing long-term anatomical restoration and cure.

Keywords: Laparoscopic sacrocolpopexy, Pelvic organ prolapse, Mesh repair, Vault prolapse

INTRODUCTION

Pelvic organ prolapse is a prevalent gynaecological condition that affects the quality of life for women across various age groups. Although the global prevalence of prolapse ranges from 41% to 50%, only about 3% of women with prolapse symptoms seek medical help.[1] In India, the incidence is considerably higher, with around 2% of nulliparous women and 5-8% of young women who have had one or two deliveries experiencing bothersome prolapse.[2,3] Pelvic floor dysfunction, particularly among older women, presents a significant health concern, as demonstrated by the 11.1% lifetime risk of undergoing surgery for pelvic organ prolapse and urinary incontinence, along with a high rate of reoperations.[4] Treatment for prolapse is individualized, based on factors like age, reproductive history, symptoms, and patient preference. It ranges from conservative management to both conservative and definitive surgeries, as well as obliterative procedures.

Pelvic organ prolapse refers to the symptomatic descent of the anterior or posterior vaginal walls, the cervix, uterus, vaginal apex (vault or cuff), or a combination of these[5]. Depending on the location of the prolapse, women may experience symptoms such as vaginal bulging, urinary or bowel issues, sexual discomfort, or back pain. Treatment focuses on addressing either the prolapsed sites, the associated symptoms, or both.

Support for the cervix—and, in its absence, the vaginal apex—is provided by vertically oriented fibres that extend from the sacrum and lateral pelvic walls. These structures, known as the utero-sacral and cardinal ligaments, were described by DeLancey as the "level I support" system in 1992.[6] When these support structures fail, uterine or vaginal vault prolapse occurs. Loss of apical support is often accompanied by defects in the anterior or posterior vaginal walls in 67-100% of cases.[7]

Laparoscopy offers superior exposure and surgical precision, reduces blood loss, and minimizes the need for extensive abdominal packing or bowel manipulation, leading to lower morbidity. Abdominal sacrocolpopexy with mesh, initially introduced in 1957 by Ameline and Huguiez, remains the gold-standard technique for treating genital prolapse. This method provides a longer-lasting restoration of pelvic anatomy and sexual function compared to vaginal approaches.[8] In 1994, Nezhat et al reported the first laparoscopic sacrocolpopexy, effectively replicating the abdominal procedure.[9] Since then, the technique has gained widespread acceptance among pelvic floor surgeons, with various modifications introduced to improve its effectiveness and reduce complications. Despite its proven efficacy, the adoption of laparoscopic sacrocolpopexy remains limited, primarily due to the need for advanced laparoscopic skills and a thorough understanding of pelvic organ and pelvic floor anatomy.

This study highlights the benefits of laparoscopic sacrocolpopexy, focusing on its precise techniques, minimal hospital stays, reduced complication rates including a negligible incidence of mesh infections and faster recovery times.

METHODS

Study design

It was a prospective observational study.

Study period

The duration of the study was from July 2019 – June 2024 (5 years). Cases were followed up to December 2024.

Place of study

The study was conducted at the department of endo-gynaecology, GEM Hospital and Research Centre, Coimbatore.

Patients were assessed in the pre-op period, at the time of surgery and at 2 weeks, 3 months, 6 months of surgery, in the post-operative period.

Inclusion criteria

Women planned for laparoscopic sacrocolpopexy with prolapse symptoms, laparoscopic sacrocolpopexy for non-prolapse indications with a grade 2 or more descent of anterior wall, and apex or posterior wall of vagina were included.

Exclusion criteria

Patients with frozen pelvis/severe pelvis endometriosis, and patients not willing for definitive surgery/removal of uterus were excluded.

Sample size

54 patients underwent laparoscopic sacrocolpopexy and were taken into the study. 2 patients who were planned for laparoscopic sacrocolpopexy underwent laparoscopic pectopexy as there were complications related to obesity.

Analysis

The data from the follow-up study was entered into an excel sheet and analysed with appropriate statistical software (SSPS-26). Quantitative variables are expressed as mean and standard deviation. Qualitative variables are expressed using percentage.

Technique of laparoscopic sacrocolpopexy

We operate only symptomatic vault prolapse, minimally presenting as stage II prolapse of the apex. Oestrogen application for ulcers is used pre-operatively, followed by a 2-week interval before surgery. All comorbidities assessed prior and optimised before surgery. All patients receive bowel preparation, low molecular weight heparin, and prophylactic antibiotics (cefazolin and ornidazole).

Patient is usually posted as first case. Sterrad sterilised instruments are used. All aseptic measures taken to prevent infection. After anaesthesia, the patient is positioned in lithotomy, catheterized, and parts painted and draped. Primary port placed above umbilicus after thorough assessment (Figure 1). Four trocars are used, with the bowel retracted for exposure. Dissection begins after identifying key structures (L5-S1, iliac vein, ureter). The promontory is dissected, avoiding pitfalls like the median sacral vessels or lateral movement past the ureter. The bladder may be retrogradely filled to assess extent.

The peritoneal incision extends to the rectosigmoid and cul-de-sac. The mesh (Figure 2) (cut into a Y-shape) is fixed to the sacral promontory, anterior vaginal wall, and posterior vaginal wall with PDS and prolene sutures. Typically, four sutures are placed in each vaginal wall and three over the sacral promontory. The vault is positioned in a tension-free position (Figure 3).

The peritoneum is closed with vicryl to prevent adhesions (Figure 4). Vaginal packing is removed after 18-24 hours, and the urinary catheter is removed after 48 hours. Patients ambulate and are started on liquid diet 4 hours post-surgery. Stool softeners are used for 6 weeks. Sexual

abstinence for 3 months is advised. Patients are reviewed at 3 months and 6 months for symptoms and undergo relevant tests to monitor for complications.

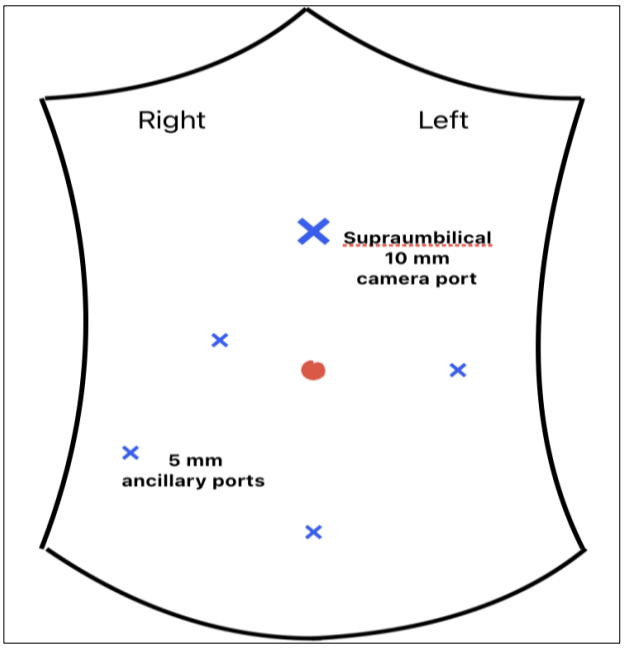

Figure 1: Port placement.

Figure 2: Polypropylene macropore non-absorbable mesh.

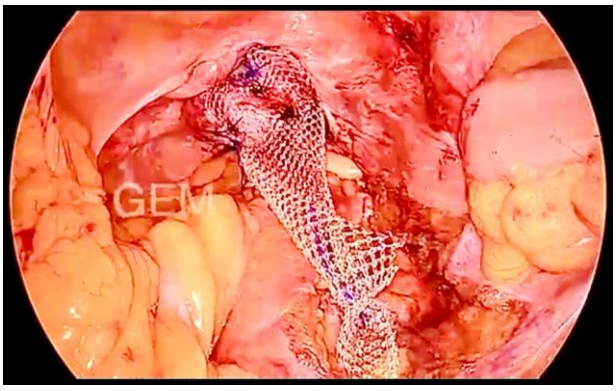

Figure 3: Mesh placed and fixed.

Patients were reviewed again after 3 and 6 months. They were asked about any symptoms including bulge symptoms, symptoms of descent or bowel and bladder disturbance. The patients underwent investigations including hemoglobin, random blood sugar and serum creatinine and an ultrasound of abdomen and pelvis to rule out any complications. Findings were documented.

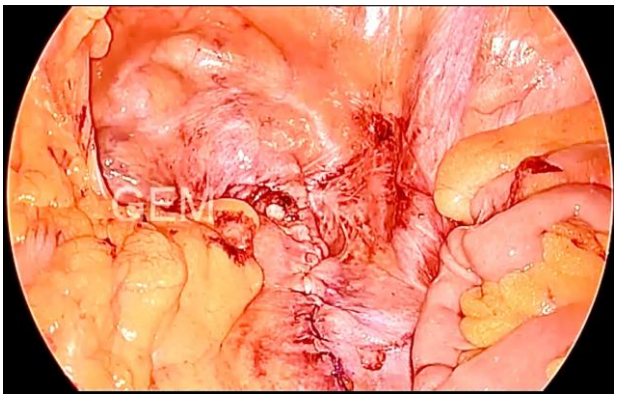

Figure 4: Mesh retroperitonealised.

RESULTS

This study was a prospective observational study conducted at the endogynaecology department of GEM Hospital, Coimbatore, over a period of 5 years. Women who presented with symptoms of primary prolapse and an apical descent of stage 2 or higher, and who were willing to undergo definitive surgery, were included in the study. After a detailed history, examination, and assessment, the participants underwent laparoscopic sacrocolpopexy, including those with concurrent total laparoscopic hysterectomy (TLH). Patients were followed up at 15 days, 3rd month and 6th post-operatively. An ultrasound was performed at the 3-month review to check for any pathology. A total of 54 women were included in the study.

Table 1: Participants.

Participants	Frequency
At surgery	54
14 days post op	54
90 days post op	54
120 days post op	54

All participants presented with both vaginal prolapse and urinary symptoms. Among the women who underwent surgery, the average age ranged from 61 to 69 years (70.3%) (Table 2). The average number of children (parity) was two (Table 2), accounting for 78%. 30 out of the 54 women were classified as obese, with a body mass index (BMI) ranging from 25 to 35 kg/m^2 (Table 2).

Most patients had previously undergone total abdominal hysterectomy (27 patients), amongst the other patients, vaginal hysterectomy was done for 15 patients, 2 patients had undergone TLH with high uterosacral repair, 3

patients had undergone laparoscopic-assisted vaginal hysterectomy, 1 patient had undergone sling surgery previously and did not have uterine descent but had enterocoele – apical descent, 6 patients did not have previous surgeries. Apart from the pelvic surgeries, 8 patients had undergone mesh repair surgery for hernia in the past (Table 3).

Table 2: Demographic characteristics.

Variables	Frequency	Percent
Age distribution (years)		
41 to 49	3	5.5
50 to 59	10	18.5
60 to 69	38	70.3
70 and above	3	5.5
Total	54	100
Parity		
1	2	4
2	42	78
3	10	18
Total	54	100
BMI (kg/sq. m)		
<18.5	2	3.7
18.5 to 22.9	9	16.6
23 to 24.9	11	20.3
25 to 35	30	55.5
Above 35	2	3.7

Table 3: Previous pelvic surgery.

Previous pelvic surgery	Frequency
LAVH	3
Nil	6
SLING	1
TAH	27
TLH with HUSL	2
VH	15
Total	54
Hernial repair with mesh	8

54 patients underwent laparoscopic sacrocolpopexy, of which 7 patients underwent concomitant TLH with sacrocolpopexy. 4 patients underwent laparoscopic sacrocolpopexy along with paravaginal cystocoele repair.

53 patients had urinary symptoms and the patient with sling surgery had no urinary symptoms as anterior compartment had no descent. 20 patients had defecatory issues and 15 patients with h/o splinting. According to Baden-Walker classification, most of the patients were in the stage 3 of prolapse (38 patients). 1 patient had no utero-vaginal decent due to the sling surgery. 4 patients had stage 4 prolapse (Table 4).

42% of the patients were diabetic, 56% of the patients were hypertensive. One of the patients had chronic liver disease with portal hypertension. 4% of the patients had coronary artery disease (Table 5).

Table 4: Prolapse stages.

Prolapse stages	Frequency	Percent
0	1	1.8
2	10	18.5
3	38	70.3
4	4	7.4
Total	54	100.0

Table 5: Comorbidities.

Comorbidities	Frequency	Percent
Hypertension	30	56
Asthma	8	14
Diabetes	23	42
Ulcerative colitis	1	1.8
Depression	1	1.8
Aortic valve sclerosis	1	1.8
Hypothyroid	13	24
Pulmonary artery hypertension	1	1.8
Anaemia	4	7.4
Coronary artery disease	2	4
Chronic liver disease	1	1.8

Most of the patients had undergone abdominal hysterectomy, a couple of patients had undergone previous IPOM surgery, so including the time for adhesiolysis, for some patients the surgery was prolonged to nearly 3-4 hours. The average time calculated was 182 minutes.

POP Q applied before and after the surgery was assessed (Table 6). All the patients reviewed at 3 months and 6 months of post-op period, had no symptoms of descent and on examination, 2 patients had Bp point at the level of -1.

Table 6: POP-Q at pre-op, 3 months and 6 months.

POP-Q	Pre-op	3 months	6 months
Number of patients at each time point	54	54	54
POPQ ≥ -1 at any compartment	54	2	2
POPQ point Ba ≥ -1	52	0	0
POPQ point C ≥ -1	54	0	0
POPQ point Bp ≥ -1	53	2	2

DISCUSSION

All the cases planned were completed through laparoscopy and there was zero conversion to laparotomy. No mesh related complications were seen. One patient had chylous ascites in pelvis witnessed on entry, prompting a thorough evaluation. After confirming the diagnosis, she was re-

scheduled for laparoscopic sacrocolpopexy. Post-operatively, she experienced vaginal discharge for two months, which was managed symptomatically. No other complications were observed during her recovery.

Most women in the study were obese – 30 amongst 54 women were in the obese range.[10] 2 patients who was planned for sacrocolpopexy, not included in the study, underwent pectopexy due to obesity as the sacral promontory could not be identified with ease and was vascular. Obesity does play a role in the management of prolapse.[11]

Initial data on laparoscopic sacrocolpopexy (LSC) primarily come from retrospective studies of various sizes. These studies mostly focused on perioperative parameters and short-term outcomes. The largest retrospective study (n=363) reported an anatomical cure rate of 96% with a mean follow-up of 14.6 months. Higgs noted an 8% recurrence rate at the vault after long-term follow-up, with over a third of recurrences occurring in the anterior or posterior compartments. The overall reoperation rate for prolapse was 16%.[12] Prospective studies on LSC are still limited.

There were no intra-operative or post-operative complications through the 6-month follow-up. The average length of hospital stay was 2 days. All patients were able to ambulate 4-6 hours after surgery, started on oral medications early to promote faster recovery, and were discharged on second post-operative day.

At the 6-month post-op review, 2 patients exhibited minimal posterior descent, with the Bp point measured at -1. However, these patients were asymptomatic, with no complaints, and had normal bowel and bladder function. 6 patients, who had no descent at 6th month review, complained of occasional constipation but not on a regular basis. It's important to note that objective and subjective cure rates do not always align; subjective outcomes are more influenced by functional recovery rather than anatomical results, which is why long-term follow-up should also focus on functional aspects. North et al reported on 22 women with a 2-year follow-up, noting excellent vault support but high recurrence rates in the anterior (n=5) and posterior (n=12) compartments.[13] One case of mesh exposure at the vault level was documented.

Laparoscopic surgery demonstrated better compliance, including reduced blood loss due to improved surgical visualization, less postoperative pain, shorter hospital stays, smaller incisions with better cosmetic results, lower morbidity, fewer complications, and high patient satisfaction.

Surgeons performing vaginal vault repairs should be skilled in a variety of techniques, tailoring the approach to each patient's needs. The results of laparoscopic sacrocolpopexy were comparable to open sacrocolpopexy, with the main difference being the shorter total surgery time, as many of the women undergoing laparoscopic sacrocolpopexy also had other procedures performed simultaneously.

Recent studies with larger sample sizes and longer follow-up periods have been published. Granese et al reported on 165 procedures with a mean follow-up of 43 months, achieving a success rate of 94.9%.[14]

Sabbagh et al analysed anatomical and functional outcomes in 186 women with a mean follow-up of 60 months, finding an anatomical success rate of 92.4% and a functional cure rate of 95%.[15]

Price et al examined the impact of laparoscopic sacrocolpopexy on sexual function in 84 women. Overall, sexual function improved, and the rate of de novo postoperative dyspareunia was low (8%), despite 5 cases of exposure (1 mesh-related and 4 suture-related).[16]

Ganatra et al reviewed 11 series with a mean follow-up of 24.6 months.[17] The mean operative time was 158 minutes, with a 2.7% conversion rate. The overall satisfaction rate was 94.4%, with a 6.2% reoperation rate for prolapse and a 2.7% mesh erosion rate. The objective success rate was 92%. Postoperative urinary dysfunction occurred in up to 17.8% of patients, with 42% requiring surgical intervention for stress incontinence (sub-urethral sling, bulking agents, or bladder-neck procedures). Bowel dysfunction occurred in 9.8% of patients presenting as constipation, anal pain, and a single case of faecal incontinence. Most bowel symptoms resolved within 6 months.

Polypropylene TRULENE mesh was used in the surgery. The average time for surgery was 182 minutes. In a prospective study of 132 consecutive women, Manodoro et al followed patients who underwent LSC using an Amid type I polypropylene implant over a 5-year period. They were prospectively monitored using a standardized protocol to assess anatomical cure (≤POP-Q stage I), subjective cure, and quality of life, with assessments before and after surgery.[18] The mean operative time was 175 minutes. Type I macroporous polypropylene grafts are now commonly used and provide excellent long-term anatomical outcomes.

Overall, these studies demonstrate that laparoscopic sacrocolpopexy is a safe and effective alternative to open surgery, offering good apical support, functional outcomes, and low morbidity.

Limitations

Due to the limited number of women who underwent laparoscopic sacrocolpopexy in this study, it is challenging to establish a significant association between risk factors and the condition. The average surgery time can be calculated by excluding the time spent on adhesiolysis and hysterectomy.

CONCLUSION

Laparoscopic sacrocolpopexy offers comparable objective and subjective cure rates to open surgery. Observational data show that patients experience low peri-operative complications and a fast recovery. When performed by an expert surgeon, laparoscopic sacrocolpopexy is a safe and effective treatment for vaginal vault prolapse, providing long-term anatomical restoration and cure rates similar to those of open sacrocolpopexy.

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