

Research article

DOI: 10.59715/pntjimp.4.3.13

## Evaluation of initial outcomes of Laparoscopic Pectopexy in the treatment of severe apical prolapse at Binh Dan Hospital

Hoang Le Nguyen Minh<sup>1</sup>, Mai Huynh Doan Phuong<sup>1</sup>, Linh Tran Ngoc Thao<sup>1</sup>

<sup>1</sup>Functional and Female Urology Department, Binh Dan Hospital

### Abstract

**Background:** Pelvic organ prolapse (POP) is a health problem affecting approximately 40% of postmenopausal women over 50 years old who have given birth, significantly impacting their quality of life. Apical prolapse (uterine prolapse, vaginal vault prolapse) causes discomfort, including vaginal bulging, palpable or visible prolapsed tissue, pelvic pain, dyspareunia, or obstructed sexual intercourse. Treatment is particularly necessary for patients with severe prolapse at stage II or higher. In 2007, Banerjee and Nỗ described a novel laparoscopic surgical method for treating pelvic organ prolapse. This technique uses the lateral portions of the pectineal ligament to anchor mesh on both sides of the cervix or vaginal vault, known as pectopexy. The method demonstrated comparable efficacy to sacrocolpopexy, the traditional surgery that anchors the uterus to the sacral promontory.

**Methods:** This is a prospective case series study, from March 2019 to July 2024 on 30 patients. Pectopexy was performed to treat mid-compartment pelvic prolapse. The patients were evaluated for anatomical improvements in all three compartments of the pelvic floor after 1 and 3 months. Quality of life metrics (P-QoL), pelvic floor function (PFIQ-7, PFDI-20), and sexual dysfunction (FSFD) scores were also assessed. We use SPSS 26 software, with **Annova, Mann-Whitney test**

**Results:** In this study, the average operative time was  $142.6 \pm 49.3$  minutes, with an average blood loss of  $93.3 \pm 56.8$  mL and a mean hospital stay of  $4.6 \pm 1.6$  days. Pectopexy significantly apical prolapse with a success rate of 93.3% after 5.4 months of follow-up. Improvements in cystocele and rectocele were also observed, with success rates of 91.3% and 92.9%, respectively. Postoperative complications included new-onset stress urinary incontinence (12.5%), constipation (10%) and pelvic pain (22.2%).

**Conclusions:** Pectopexy is highly effective in treating severe mid-compartment pelvic organ prolapse. Adjacent pelvic floor compartments, including the anterior and posterior compartments, also showed improvements following surgery. However, longer follow-up is necessary to confirm the long-term efficacy of this method compared to traditional sacrocolpopexy.

**Keywords:** Pelvic organ prolapse (POP), apical prolapse, Pectopexy, Sacrocolpopexy, stress urinary incontinence

Received: 17/02/2025

Revised: 06/3/2025

Accepted: 20/7/2025

Author contact:

Hoang Le Nguyen Minh

Email: drhoangle85

@gmail.com

Phone: 0908508091

## 1. BACKGROUND

Pelvic organ prolapse (POP) is a health issue affecting approximately 40% of women who have given birth and are over the age of 50, significantly impacting their quality of life [1]. The rate of surgical intervention is about 11%, with around 30% requiring reoperation due to recurrent prolapse [2]. Apical prolapse (uterine prolapse or vaginal vault prolapse) falls within the mid-compartment prolapse group of pelvic organ prolapse, causing symptoms that make patients uncomfortable, such as vaginal bulging, the ability to feel or see the prolapsed mass, pelvic pain, pain during sexual intercourse, or obstructed sexual activity. Most women recognize POP symptoms when the prolapsed mass is approximately 0.5 cm from the hymenal ring. Treatment is essential, particularly for patients with severe prolapse (stage II or higher), those still sexually active, or cases of apical prolapse causing additional complications such as recurrent gynecological infections, pain during intercourse, or prolapse accompanied by other pelvic organs [3].

The choice of treatment for this condition depends on factors such as age, sexual activity needs, and desire for future pregnancies. Surgical treatment options include hysterectomy, fixation of the uterus to pelvic structures (using autologous tissue or synthetic mesh), or vaginal obliteration [3]. Among these, sacrocolpopexy—fixation of the uterus to the sacral promontory—is considered the gold standard, as it restores the vaginal anatomical axis using various approaches such as open surgery, laparoscopic surgery, or robot-assisted laparoscopy [4].

Despite its high efficacy, sacrocolpopexy has limitations and complications, including digestive disorders, stress urinary incontinence (SUI), constipation, or significant postoperative pelvic pain [5]. A proposed hypothesis suggests that the mesh placed between the pelvis and vagina (cervix) narrows the pre-sacral space (causing obstruction of the digestive tract outlet) [6], while adhesions, injury to abdominal autonomic nerves, or excessive tension on the mesh attached posteriorly to the uterus may also contribute to postoperative pelvic pain [7].

In 2007, Banerjee and Noé described a new endoscopic surgical technique for pelvic organ prolapse, specifically developed for obese patients. This method utilizes the lateral portions of the pubocervical ligaments to bilaterally fix the mesh to the cervix or vaginal vault, also known as pectopexy (fixation to the pectineal ligaments) [6]. In this approach, the mesh is placed along the round ligaments without crossing structures such as the ureter or colon, yet it remains highly effective in treating apical prolapse, with success rates of 97.7–100%, surpassing sacrocolpopexy (83.8–90.2%). Additionally, immediate postoperative complications and those observed during follow-up with this method are very low.

### **Advantages of Pectopexy Surgery [6,7]:**

- Significantly shorter procedure time, reduced blood loss during surgery, and less disruption to bowel function compared to sacrocolpopexy.
- Decreased risk of severe adhesion-related complications or pelvic vascular injury, without narrowing the pre-rectal space.

- According to some authors, the incidence of new-onset urinary incontinence and constipation post-surgery is lower than with sacrocolpopexy, while the success rate in treating vault prolapse is higher.
- More suitable for obese patients.
- Overall complications during and after laparoscopic pectopexy are significantly lower than with sacrocolpopexy: bladder (0-1%), ureter (<1%), blood vessels (1%-3%), nerves (hypogastric plexus) (very rare), rectum (<1%).

## 2. MATERIAL AND METHODS

### **Anatomy and Pathology:**

According to the DeLancey hypothesis, there are two suspension axes of female pelvic floor:

#### a. Primary suspension axis

This axis forms the “central septum” separating the two pelvic compartments and plays a key role in suspending and supporting the uterine, vaginal, and pelvic floor complex. It consists of five components from bottom to top: 1. Perineal body, 2. Rectovaginal fascia, 3. Pericervical ring (posterior margin), 4. Uterosacral ligaments, 5. Presacral fascia at S2-S4

- Uterosacral ligaments: a critical part of the primary suspension axis, supporting the posterior aspect of the uterus and maintaining its normal position. Weakness or injury to these ligaments can cause uterine descent, leading to uterine prolapse.

- Perineal body and rectovaginal fascia: play important roles in maintaining the integrity of the pelvic floor support system from below. Injuries to these structures, such as from childbirth or trauma, can

weaken the entire pelvic floor support, predisposing to uterine prolapse.

- Additionally, damage to the presacral fascia (S2-S4) may destabilize the posterior suspension axis, contributing to uterine prolapse. In such cases, not only the uterus but also the rectum and vagina may be affected, leading to rectocele.

Defecation disorders, mainly mechanical constipation, often result from injuries to components of the primary suspension axis, disrupting the continuity of the pelvic support system.

#### b. Secondary suspension axis

Located in the anterior vaginal wall, consisting of the perineal membrane, pubocervical fascia, and the anterior margin of the pericervical ring. This axis mainly supports the bladder and urethra.

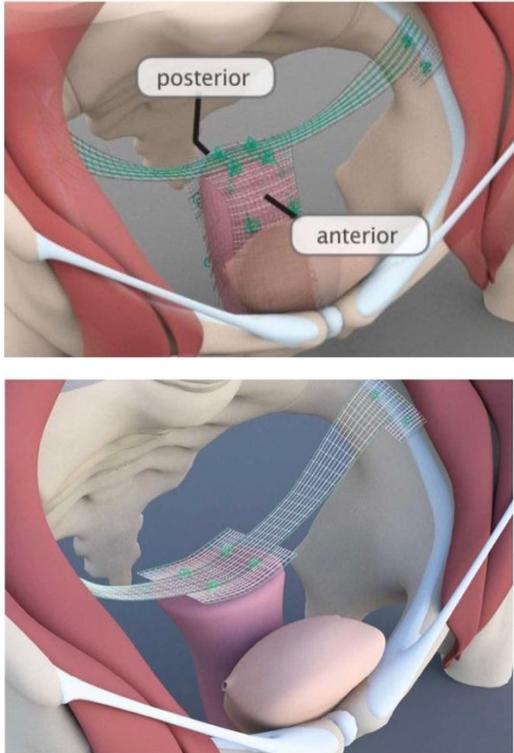
In summary, repairing the secondary suspension axis (anteriorly) primarily addresses anterior vaginal wall prolapse (cystocele) and does not contribute to suspending the uterus, vagina, or pelvic floor. In contrast, repairing the primary suspension axis (central septum) addresses pelvic organ prolapse syndrome, including apical vaginal prolapse, posterior vaginal wall prolapse, and pelvic floor descent.

### **History of apical prolapse surgery**

The pectopexy technique, which involves fixing the uterus to the pectineal ligaments (pubocervical fascia), was performed in 2007 by Banerjee and Noé [6]. Regarding the placement of the mesh, this uterine fixation method does not compress or narrow the pre-sacral space, resulting in fewer postoperative complications such as pelvic bleeding, indigestion, constipation, or stress urinary incontinence (SUI).

In Vietnam, pectopexy surgery has begun to be implemented at various

urology and gynecology centers nationwide. V.P.Long [8](2020) reported 58 cases of pectopexy with a success rate of 98.3% after 6 months of follow-up, while Trần Ngọc Dũng [9] (2022) reported 32 cases with a success rate of 96.9% after 18 months.



**Figure 1.** DynaMesh® PRP 17x15cm and 3x18 cm

### Surgical Technique

The patient is placed under general anesthesia with endotracheal intubation. The abdomen is accessed using four trocars:

The peritoneum is dissected to expose the uterus, along with opening both paravesical spaces and identifying the arcus tendineus. Care is taken to avoid the internal iliac vessels, as well as the obturator artery and nerve during dissection.

A suitable **DynaMesh® PRP** graft is selected.

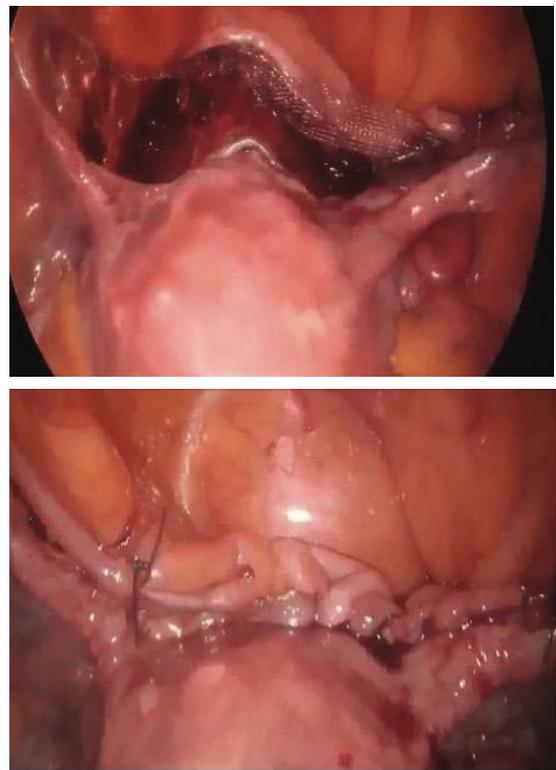
Non-absorbable monofilament suture (Monocryl 2.0) is used for fixation:

- Four sutures secure the mesh body to the uterus or vaginal cuff.
- Two sutures connect the mesh to the cervix ring.

Non-absorbable monofilament suture (Monocryl) is used to secure two additional sutures fixing the long arms of the mesh to the pubic tendinous arch on both sides.

The peritoneum is restored to cover the mesh using Chromic 3.0 suture, and a drain is placed in the Douglas pouch or between the bladder and uterus. The abdominal incisions are then closed.

A urethral catheter is inserted and vaginal packing is applied for hemostasis.



**Figure 2.** Mehmet, Gynecology and Minimally Invasive Therapy, 2021.

### Patient Selection Criteria

- All patients diagnosed with stage III or higher middle compartment prolapse.

- May have accompanying anterior compartment prolapse (stage I-IV), with posterior vaginal wall prolapse not exceeding stage III.
- Patients must have a surgical indication and provide consent for surgery.

Postoperative Success Criteria

- Middle compartment prolapse and cystocele after surgery should be ≤ stage II according to the POP-Q classification.
- Rectocele after surgery should be ≤ stage I according to the POP-Q classification.

Follow-up:

- 30 cases of pectopexy performed between March 2019 and July 2024 were reviewed. The patient was followed-up at least 3 months after the pectopexy surgery, to investigate the success of pectopexy and the surgical complications

Statistical analysis

- Statistical analysis was performed with SPSS 20.0

**3. RESULTS**

Patient characteristics are summarized in Table 1, the duration of prolapse, menopause, BMI and number of children increase the prevalence of apical prolapse (OR = 1.513; 2.137; 1.210 and 1.890, respectively), but only BMI is statistically significant (P<0.05). The parity does not show the increasing of uterus prolapse's incidence.

The average operative times were 142.6 ± 49.3 minutes, the blood loss were 93.3 ± 56.8 mL . Patients were stayed in the hospital 4,6 days after the procedure and the time of follow up was 5.4 months (table 2).

The investigation after pectopexy showed the success of apical prolapse, cystocele and rectocele is 93.3%; 91.3% and 92.9%, respectively, after 3 months follow-up (table 3). We reported 2/30 cases relapse of the apical prolapse after cervical pectopexy . We also can see the improvement of POP after pectopexy with POP-Q scores (table 4). All the POP-Q variables were showed the success of pectopexy, statistically.

**Table 1.** Socio-demographic characteristics of patient in this research

	OR	Confidence Interval (95%)	P (*)
Duration of prolapse	1,513	0.625 – 3.731	0.997
Duration of menopause	2,137	0.252 – 3.823	0.979
BMI	1.210	0.297 – 1.873	0.028
Number of children	1.890	0.446 – 1.329	0.348
Parity	0.758	0.113 – 5.096	0.776

(\*) *Multivariable regression*

**Table 2.** Operation related variables

	Mean value	Range
Blood loss (ml)	93.3 ± 56.8	50-250
Operative time (minutes)	142.6 ± 49.3	80-285
Postoperative hospital stay (days)	4.6 ± 1.6	2-8

Drain removal day (days)	2.3 ± 1.5	1-5
Mesh complication (erosion, removal...)	0	
VAS	5.43 ± 1.1	4-8
Follow-up (months)	5.4 ± 2.8	3-12

**Table 3.** Success Rate of Pectopexy

		Grade 0	Grade I	Grade II	Grade III	Grade IV	Success Rate
Apical prolapse	Preoperation	-	-	-	13	17	93.3%
	3 months follow-up	0	13	15	2	0	
Cystocele	Preoperation	0	3	10	10	7	91.3%
	3 months follow-up	8	13	0	2	-	
Rectocele	Preoperation	0	10	18	2	-	92.9%
	3 months follow-up	12	14	2	-	-	

**Table 4.** POP – Q in Preoperation and 3 months follow-up after Pectopexy

	Preoperation	3 months follow-up	<i>P</i> (*)
Aa	2.78 ± 0.73	-0.79 ± 0.39	0.01
Ba	4.16 ± 1.07	-2.27 ± 0.94	< 0.001
Ap	0.56 ± 1.42	-1.33 ± 0.81	0.03
Bp	2.13 ± 0.48	-1.77 ± 0.95	< 0.001
C	4.96 ± 1.12	-3.52 ± 2.31	< 0.001
D	3.89 ± 0.85	-4.24 ± 2.56	< 0.001
Tvl	7.81 ± 0.68	8.12 ± 1.27	0.285

(\*)Mann-Whitney test

In this study, 2 out of 30 cases experienced intraoperative complications, all of which were classified as grade II according to the Satava classification system. These complications involved burn injuries to the visceral peritoneum of the intestine.

Postoperatively, 9 out of 30 cases (33.3%) developed complications. Among them, 2 cases were classified as grade I and 7 cases as grade II according to the Clavien-Dindo classification system.

Some follow-up complications of functional pelvic floor were observed, including de novo SUI (12.5%), de novo constipation (9%), and de novo chronic pelvic pain (22.2%) (Table 6).

**Table 5.** Intraoperative and Postoperative complications

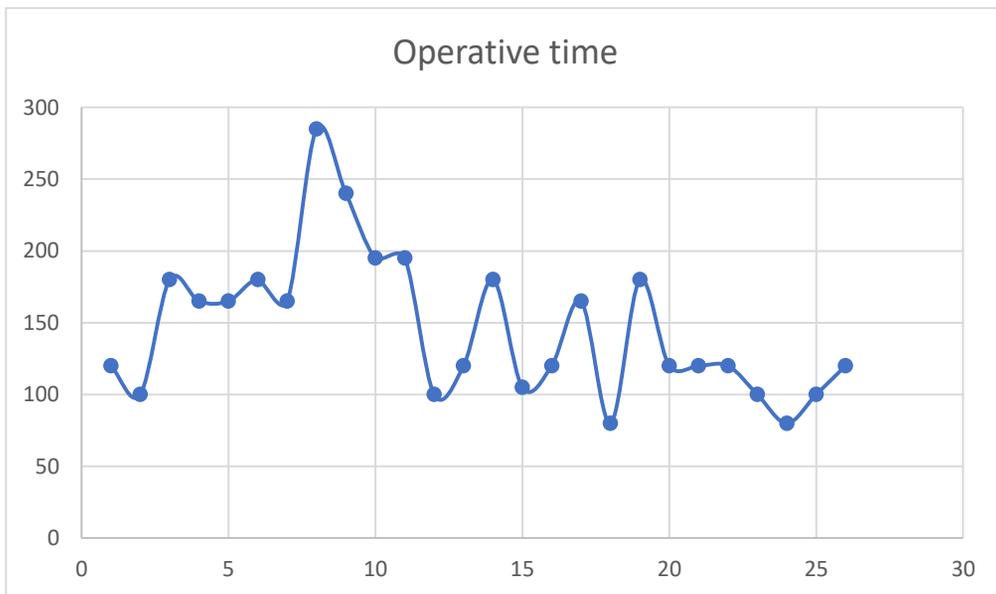
	Rate
Intraoperative complications	2/30 (6.7%)
Postoperative complications	9/30 (33.3%)

**Table 6.** Postoperative complications of functional pelvic floor

	Rate	P (*)
De novo SUI	3/24 (12.5%)	0.002
De novo constipation	2/22 (9%)	< 0.001
De novo chronic pelvic pain	6/27 (22.2%)	< 0.001

(\*) Fisher test

The operative time relatively decrease, we also controlled the peri-operative complication case by case. We have fixed the anterior vaginal wall effectively by performing deeper dissection into the space between the bladder and uterus, combined with the use of a PRP mesh 3x18 cm. This enhancement optimizes anterior wall support in cystocele treatment. As a result, in many cases, operative time may be prolonged.



**Figure 1.** Time of operation by case number

**4. DISCUSSION:**

**Principal findings:**

Our data showed that the short-term outcomes of laparoscopic pectopexy are similar to those that we have historically obtained with sacrocolpopexy. While we tend to perform this procedure in complex cases with relative contraindications to sacrocolpopexy, the incidence of

complications in patients undergoing pectopexy was comparable to that observed in sacrocolpopexy

Although the recurrence rates of prolapse are relatively high, these findings should be interpreted cautiously due to the limited follow-up duration in patients undergoing pectopexy. With extended follow-up, the incidence of prolapse recurrence and the need for reoperation may rise among pectopexy patients,

though previous randomized controlled trials have not reported such an increase.

***The pelvic anatomy recovery:***

Apical prolapse:

After 3 months follow-up, we observed 2/30 cases (6.7%) still classified as POP-Q III-IV. These patients have the prolonged disease duration, extended menopausal period, multiple vaginal deliveries, and recurrent pelvic inflammatory diseases. The recurrence rate of Noé [10]: 3.2% (12 months follow-up), Obut [11] 4.9% (24 months follow-up), Biler [12] 0% (6 months follow-up). Because we chose the high grade of POP so the success rate is still lower than other studies

According to Noé [10], the recurrence rate increased slightly over time, from 12 months to 24 months of follow-up.

Cystocele:

In this study, the success rate of pectopexy alone in treating cystocele improved from 86.9% at 1 month to 91.3% at 3 months. When compared with international studies: Peng [5] (2023) reported a slight increase in cystocele recurrence over time, from 1% at 6 months post-surgery to approximately 3-5% at 18 months, Sauerwal [13] (2016) found no significant difference in cystocele recurrence (<5%) during long-term follow-up (>24 months).

Rectocele:

After 3 months of follow-up, we only had 2 cases (7.1%) of rectocele recurrence (stage II). This could be attributed to our emphasis on fixing the anterior surface of the uterus, aiming for maximum anterior vaginal wall support.

Most authors have reported that postoperatively, patients experience mild

abdominal pain, transient gas retention for 2–3 days, urinary tract infections (3–7%), pelvic pain (10–20%), and newly onset SUI (2–6%). However, no severe complications such as massive bleeding requiring blood transfusion or reoperation have been observed [10,14]

In this study, we found that postoperative complications is rather low and not too severe. They were also statistically different compared to the length of hospital stay.

***The postoperative pelvic functional disorders:***

Many authors have observed that the pelvic functional disorders tends to increase over time during follow-up. The reasons include:

- The long-term effects of surgery on the supportive structures of the pelvic floor and urethra.
- Activities that increase intra-abdominal pressure (e.g., chronic coughing, constipation) may expose weaknesses in certain areas of the pelvic floor.
- The natural weakening of pelvic floor muscles or degenerative factors over time.

De novo SUI in this study is 12.5% is rather higher than other authors: Noé [10] (4.8%), Mehmet [15] (4.9%). Many authors have noted that de novo SUI tends to increase over time during follow-up and it's stable at least 12 months follow-up [11].

Moreover, de novo constipation and CPP in our study is also high (9% and 22.2%, respectively). Compared to other authors, our study reported a higher rate of pelvic pain and constipation after pectopexy (the rate of de novo constipation: 3-4% [15,16] and CPP: 0-

3.1% [17] in other studies). The reason may be due to our short follow-up period (3 months), while others followed up for  $\geq 12$  month. We expect this rate to decrease with a longer follow-up.

Additionally, our study had a relatively high number of cases with stage IV apical prolapse and stage III cystocele, so it require the deeper dissection of the anterior vaginal wall and the tighter mesh placement to address severe bladder prolapse. These factors likely contributed to the increased incidence of de novo constipation and pelvic pain.

In the pectopexy procedure, a Y-shaped mesh is sutured to both sides of the iliopectineal ligaments without pulling the uterus or vaginal vault tightly toward the fixation points. The mesh is positioned in a way that supports the uterus in its normal anatomical location (at the level of S3 and S4 – the normal vaginal axis in nulliparous women). Unlike older methods where excessive tension on the uterosacral ligaments or sacral promontory could cause postoperative pelvic pain or dyspareunia, the tension-free technique reduces the strain on pelvic tissues. This minimizes the risk of nerve compression, mesh-related complications (e.g., mesh erosion), or pelvic floor dysfunction.

Because the entire pectopexy operation takes place in the anterior pelvis, dissection in the deep pelvis is avoided in patients with extensive adhesions, and we have not needed to convert any patients to an open approach as we became proficient in performing pectopexy. Similarly, the need for dissection of the presacral space, with its consequent bleeding risk, is avoided in patients requiring anticoagulation and those at high risk of

adverse events related to blood loss. Moreover, the location of the operation exclusively in the anterior pelvis allows for a less steep Trendelenburg position, which may be beneficial for patients with respiratory or circulatory compromise. The placement of the mesh relatively distant from the colon may also reduce the chance of colonic mesh erosion or extensive adhesions, which could complicate future surgery for colonic pathology.

#### ***Compare to sacrocolpopexy:***

Sacrocolpopexy has been performed laparoscopically for over 20 years and still the gold standard for apical prolapse treatment [10]. However, laparoscopic pectopexy carries a low intraoperative risk because the mesh placement follows the path of the round and broad ligaments, avoiding the ureters and bowel. Furthermore, since it does not narrow the pelvic outlet, defecation disorders are unlikely to occur.

Additionally, the hypogastric vessels and nerves remain at a safe distance from the surgical field, minimizing the risk of injury [5,10]. Pectopexy provides distinct practical advantages and demonstrates recurrence rates comparable to those of Sacrocolpopexy (2.3% vs 9.8%) and the mean operating time and blood loss were significantly reduced in the pectopexy group [10]. No major complications were reported in either group (bladder injuries was 3.1- 4.2%, hemorrhages, blood transfusions was 4.4-6.1% [6]), and the length of hospital stay did not differ significantly. The authors concluded that laparoscopic pectopexy serves as an effective alternative to laparoscopic sacrocolpopexy, particularly in cases where the surgical field is challenging.

The most worrying intraoperative complication of sacrocolpopexy is hemorrhage from the presacral vessels (1-6%), which may have life-threatening consequences [5]. Defecation problems and de novo SUI ranging from 17-37% and 4-50%, respectively, are the most frequently reported complications associated with sacrocolpopexy [4,11].

Pectopexy surgery does not directly utilize components of the pelvic floor suspension axis as described by DeLancey, but it is indirectly related to maintaining the uterus in its normal position. Specifically, pectopexy supports the uterus and vagina anteriorly by anchoring them to the iliopectineal ligament, enhancing stability in the anterior and central pelvic compartments while avoiding interference with posterior structures such as the uterosacral ligaments, which are key elements of the primary suspension axis.

In a pectopexy procedure, a Y-shaped mesh is sutured to both sides of the iliopectineal ligaments without pulling the uterus or vaginal vault tightly toward the fixation points. The mesh is positioned in a way that supports the uterus in its normal anatomical location (at the level of S3 and S4 – the normal vaginal axis in nulliparous women).

Unlike older methods where excessive tension on the uterosacral ligaments or sacral promontory could cause postoperative pelvic pain or dyspareunia, the tension-free technique reduces the strain on pelvic tissues. This minimizes the risk of nerve compression, mesh-related complications (e.g., mesh erosion), or pelvic floor dysfunction.

## 5. CONCLUSION

Pectopexy surgery has proven to be highly effective in treating severe middle compartment pelvic organ prolapse, with a high success rate.

Although the follow-up period remains short, initial results have demonstrated the effectiveness of this approach. Moreover, Pectopexy has been recognized by international authors as having advantages over sacrocolpopexy in terms of shorter operative time, a more favorable learning curve, and fewer complications and surgical risks.

Additionally, adjacent pelvic compartments, such as the anterior and posterior compartments, can be simultaneously addressed during the procedure. If cystocele and rectocele are not severe, there is no need for additional procedures, such as four-arm mesh placement or rectovaginal septum repair.

However, longer follow-up periods are required to further confirm the effectiveness of this technique compared to traditional sacrospinous hysteropexy, especially in evaluating the long-term complications associated with Pectopexy.

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