



# Long-Term Outcomes of Pelvic Organ Prolapse by Laparoscopic Butterfly Suspension

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**Abstract:** Aim The study aimed to investigate the long clinic value of laparoscopic colpo-uterine butterfly suspension for pelvic organ prolapse. Methods *Ninety*-three patients who underwent the laparoscopic colpo-uterine butterfly suspension from December 2012 to May 2018 at the first affiliated hospital of zhengzhou university were analyzed in a retrospective study. Baseline characteristics and perioperative data were recorded. The POP quantification (POP-Q) system indicates the pre- and post-operative data. Respectively, the symptoms, health-related quality of life (HRQL) and Sexual function were evaluated by the Pelvic Floor Distress Inventory (PFDI-20), the Pelvic Floor Impact Questionnaire (PFIQ-7) and the Pelvic organ prolapse urinary Incontinence Sexual Questionnaire (PISQ-12). *Results* In 5 years' follow-up, the objective cure ratio reached 97.8%, and the subjective success rate of the laparoscopic colpo-uterine butterfly suspension was 93.5%. Two cases was identified as clinical relapse. There was only one abdominal erosion during the long-term follow-up. The quality of life had improved significantly without any genital symptoms. No patients abstained from sex due to the operation or postoperative sexual discomfort. *Conclusions* The laparoscopic colpo-uterine butterfly suspension is a safe, feasible and highly effective technique that offers a good long-term results for the treatment of pelvic organ prolapse, also a good option for sexually active women.

**Keywords:** Colpo-uterine Suspension, Pelvic Organ Prolapse, Laparoscopic, Erosion, Sexually Active

## 1. Introduction

Pelvic organ prolapse (POP) is a condition commonly affecting millions of parous women. Globally, up to half of all parous women have some degree of clinical prolapse, and 10–20% are symptomatic. [1-2] All these symptoms have an adverse impact on socio-economic, psychological and physical. [3] More and more women who having complications using pessulum are likely to choose surgical treatment. [4] The data indicates that the lifetime risk of undergoing POP surgery alone varies from 5 to 19%. [5] There is a growing need for high-quality and cost-effective treatment options for POP. [6]

Mesh has been widely used and effective treatment for pelvic organ prolapse. The surgical complications of mesh include mesh exposure, mesh-associated infections and mesh-stimulated tissue reactions, etc. [7-8] Therefore, the mesh was forbidden to apply in gynecologic surgery by the

U.S. Food and Drug Administration (FDA) in 2008 and 2011. To improve the efficacy and minimize the surgical complications of mesh, our team proposed a modified mesh laparoscopic technique for POP. This study evaluated the feasibility of the Laparoscopic butterfly suspension and reported the long-term outcomes.

## 2. Methods

### 2.1. Patients

The study was conducted at the department of Obstetrics and Gynecology, the first affiliated hospital of zhengzhou university and included all consecutive the laparoscopic colpo-uterine butterfly suspension performed from December 2012 to May 2018. It was approved by the local ethics committee (The first affiliated hospital of zhengzhou university). The operation indication was symptomatic and minimally presenting as stage 2. All patients had preoperative clinical assessment according to

POPQ-S [9] by one surgeon. [9]

All patients accepted pre- and post-operative self-administered questionnaires for the assessment of symptoms and HRQL and sexuality. They completed these in follow-up visits. PFDI-20, PFIQ-7 and PISQ-12 were used to evaluate the severity of symptoms, the impact of these symptoms on HRQL and Sexuality respectively, all specific and validated in China [10-11] All patients were re-examined at 1 month, 3 months, 6 months, and then once a year after surgery. Informed consent was obtained from all patients. Only patients with 0 or 1 prolapse were considered as cured [12] and with 2 or more stage were considered as recurrence.

## 2.2. Surgical Technique

The procedures were performed under general anesthesia, then a urethral catheter was inserted. Patients were placed in a dorsal lithotomy position. The surgical technique has two steps. The first step was to make mini mesh. The second step was the application of the mini mesh and non-absorb polyester sutures to perform the butterfly suspension. The procedures were performed as literature. [13]

## 2.3. Data Analysis

SPSS 17.0 (SPSS, Chicago, USA) was used for data analysis. The primary analysis about perioperative and postoperative adverse events was descriptive. The datas were presented as the mean  $\pm$  SD (standard deviation) and analysed using paired Student's t-test when were normally distributed continuous parameters; non-normal distribution parameters were presented as median (range); Categorical parameters were presented as number (percentage) and analysed using chi-square test. A  $P < 0.05$  was considered statistically significant.

## 3. Results

In this study, 93 women were included in all. The median age was  $52.7 \pm 5.4$  years. The average parturition was  $3.1 \pm 1.2$ . The mean body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters) was  $25.4 \pm 3.2$ . No patients had a surgical history of total or subtotal hysterectomy due to benign causes. 5 (5.4%) patients had UI surgery. The median duration of disease was 3 years (range from 1 month to 20 years) and the median follow-up was 5 years (range from 1 to 6 years). After Laparoscopic butterfly suspension, patients' subjective symptoms were significantly improved, urinary symptoms ( $p = 0.0004$ ), and ano-rectal ( $p = 0.0367$ ), respectively (Table 1), and the subjective success rate of the Laparoscopic butterfly suspension operation performed in 93 patients was 93.5%. 90 patients were sexually active, in which 87 patients reported an improved quality of postoperative sex, and no patients abstained from sex due to postoperative discomfort.

When performed, the time for the complete procedure was  $135.6 \pm 9.5$  min (range 120-152). The estimated intra-operative blood loss was  $18.7 \pm 5.1$  ml, the average postoperative hospital stays were  $4.8 \pm 1.5$  day, and

postoperative catheterization was  $2.9 \pm 0.9$  day. No perioperative complications were associated with this surgery. One cases (%) was verified to have mesh abdominal erosion. 11 (11.8%) patients reported chronic pain and discomfort on the abdominal, operative incision or puncture area (Table 2).

There was no loss of follow-up. The anatomical results in points Aa, Ba, C, Ap, and Bp, but not in total vaginal length were improved ( $P < 0.001$ ), relative to the preoperative values (Table 3). During the 5-year follow-up, only one case had a relapsed prolapse, and the objective cure ratio reached 97.8%. (Table 4)

**Table 1.** Pre-operation and post-operative subjective symptoms.

Variable (n)	Total (%)	P**
Mean (SD) age, years	52.7 $\pm$ 5.4	
Mean (SD) body mass index, kg/m <sup>2</sup>	25.4 $\pm$ 3.2	
Mean (SD) parity	3.1 $\pm$ 1.2	
median duration of POP	3.6 $\pm$ 0.3	
Sexually active	90 (96.8)	
Postmenopausal women	76 (81.7)	
II stage	35 (37.6)	
III stage	42 (45.2)	
IV stage	16 (17.2)	
Previous UI surgery	5 (5.4)	
Previous prolapse surgery	0	
Pelvic prolapse symptoms (pre-/post-)	86 (92.5)/6 (6.5)	<0.0001
Constipation or diarrhoea (pre-/post-)	10 (10.8)/2 (2.2)	0.0367
Storage symptoms (pre-/post-)	12 (12.9)/2 (2.2)	0.0124
Voiding symptoms (pre-/post-)	16 (17.2)/1 (1.1)	0.0004
Dyspareunia (pre-/post-)	31 (34.4)/1 (1.1)	<0.0001

\*\*Comparisons of patient reported outcomes between pre-operation and post-operation.

Data are given as n (%) or mean  $\pm$  standard deviation.

**Table 2.** Peri-operative condition and complications of surgery.

variable	value
Blood loss (ml)	18.7 $\pm$ 5.1
Surgery duration (min)	135.6 $\pm$ 9.5
Hospital stay (day)	4.8 $\pm$ 1.5
Retained ureter (day)	2.9 $\pm$ 0.9
Intraoperative	
Blood transfusion, n	0
Bladder perforation, n	0
Subcutaneous hematoma, n	1 (1.1)
Ureteral injury, n	0
Postoperative	
Erosion, n	1 (1.1)
Wound infection, n	2 (2.2)
Postoperative chronic pain	11 (11.8)

Data are given as n (%) or mean  $\pm$  standard deviation.

**Table 3.** Anatomical results of pre-operation and post-operative by using the POP-Q classification.

	Mean (SD) Score:	
	Pre-operative value, cm	Post-operative value, cm
Aa	1.7 $\pm$ 1.0	-2.6 $\pm$ 0.8*
Ba	1.1 $\pm$ 1.2	-2.9 $\pm$ 1.9*
C	0.2 $\pm$ 1.8	-5.0 $\pm$ 1.7*
Ap	0.8 $\pm$ 1.3	-2.7 $\pm$ 0.8*
Bp	-0.8 $\pm$ 1.6	-3.6 $\pm$ 1.5*
TVL	7.6 $\pm$ 0.5	7.4 $\pm$ 0.5

\* $P < 0.001$  vs pre-operative value

There were significantly improvement in many aspects of the urodynamics after surgery ( $P < 0.05$ ) (Table 5). We performed the TVT-O in patients who endured stress and occult urinary incontinence. While, urge urinary incontinence cases were suggested to take drugs and bladder training.

All patients complete the PFDI-20 and PFIQ-7

**Table 4.** The POP-Q stages of the preoperative and postoperative prolapse in the laparoscopic colpo-uterine butterfly suspension (n).

Compartment	Preoperative					Postoperative				
	0	I	II	III	IV	0	I	II	III	IV
Anterior	0	9	17	49	18	39	53	1	0	0
Posterior	52	10	14	14	3	72	21	0	0	0
Central	0	16	22	35	20	42	50	1	0	0

**Table 5.** Urodynamic changes of Pre-operation and post-operative.

Parameters	Pre-operative	Post-operative	P value
DO	27 (29.0)	12 (12.9)	0.0069*
Qmax (ml/s)	17.9±3.2	17.5±3.6	0.7237**
RU (ml)	55.8±12.5	38.2±9.0	<0.001**
FS (ml)	163.1±11.0	166.1±12.7	0.4037**
MCC (ml)	362.0±11.2	367.7±12.6	0.1136**
Pdet (cm H <sub>2</sub> O)	26.8±2.9	27.9±3.6	0.2210**
FUL (mm)	25.0±2.6	23.3±2.3	0.0271**
MUCP (cm H <sub>2</sub> O)	63.1±11.0	67.8±12.0	0.1785**
UCA (mm cm H <sub>2</sub> O)	924.5±214.8	973.3±163.4	0.4157**

Data are given as n (%) or mean ±standard deviation.

DO, detrusor overactivity; Qmax, maximum flow rate; RU, residual urine; FS, first sensation to void; MCC, maximumcystometric capacity; Pdet, detrusor pressure at peak flow; FUL, functional urethral length; MUCP, maximum urethral closure pressure; UCA, urethral closure area.

\*Chi-square test. \*\*Paired t-test

**Table 6.** Improvement in Symptoms, HRQ and sexual function of Pre-operation and post-operative.

	Mean (SD) Score:	
	Pre-operative	Post-operative
PFDI-20	52.1±3.7	35.7±5.60*
PFIQ-7	34.4±3.92	17.8±3.19*
PISQ-12	30.7±4.34	36.1±4.23*

HRQL health-related quality of life, PFDI-20 Pelvic Floor Distress Inventory, PFIQ-7 Pelvic Floor Impact Questionnaire, PISQ-12 Pelvic organ prolapse urinary Incontinence Sexual Questionnaire

\* $P < 0.05$  vs preoperative value

## 4. Discussion

This study was conducted at a single high-volume center to describe the new style surgery of POP. The suspension axis of bilateral non-absorb suture may lead to enterocele or Douglas pouch hernia when insufficiency of perineal muscles or descent of the upper part of the rectum. Therefore, we perform posterior colpoperineorrhaphy and the suspension of uterine body at the same time. There is only one case of hysterocele in our study in the long-term follow-up.

The use of laparoscopic colpo-uterine butterfly suspension can provide an alternative surgical approach with favorable objective and subjective cure rate when compared with others. In a study that involved 108 patients with a 2-year follow-up, Maher [14] reported a 23% recurrence rate for laparoscopic

questionnaire. The results showed a significant improvement ( $P < 0.05$ ) after operation. 90 (96.8%) patients were sexually active and 88 (97.8%) of these patients completed the PISQ-12 questionnaire at their follow-up. The long-term score remained significantly improved compared with the preoperative score ( $P < 0.05$ ) (Table 6).

sacrocolpopexy as compared with a 57% recurrence rate for transvaginal mesh procedure ( $P < 0.001$ ). In another study, comparing mesh and conventional repair in patients with recurrent prolapse, the failure rate at 12 months follow-up was 45% in the conventional way and 10% with mesh. [15] In our study, the objective cure ratio reached 97.8%; and the subjective success rate was 93.5%. Two cases (2.1%) was identified as clinical relapse. There was only one abdominal erosion during the long-term follow-up without symptoms. Our results demonstrate that this new technique is safe and effective.

The advantages of this surgery include, no perineum incision; using mini mesh; a short operating time and a fast postoperative recovery; the natural movements of the vagina; and solving the postoperative problems of the traditional repair operation, such as diminished vaginal volume and dysuria, mesh shrinkage and achieves the goal of recovering pelvic functions. [16-18]

In the study, the successful results of PFDI-20, PFIQ-7 and PISQ-12 scores may make this surgery popular before long, especially for the young women. With the improvement of life quality, more and more patients who with pelvic organ prolapse want to reserve their uterus. Study shows that hysterectomy is a serious psychological trauma that can affect sexual activity [19]. This surgery satisfies patients' hope of reserving the uterus but also avoids all the complications related to hysterectomy.

As there are pros and cons in using a mesh in each vaginal compartment repair, patients should be informed of the inherent complications by using prostheses before the surgery, [20] especially mesh erosion. Some research shows that the mesh exposure rate is between 4% and 19%. [14] It is more frequently observed with transvaginal placed meshes. [21] In our study, we use polyester non-absorb sutures and mini mesh, mesh only placed four skin incision and anterior walls of vaginal, reducing the proportion of mesh. Only one mesh erosion in our study may be related to the thin of patient's subcutaneous fat. In addition, the reduction of mesh size in our procedure may help to prevent the formation of creases.

Finally, to date this study is one of the larger laparoscopic series. We believe that this operation may become an attractive treatment option for young patients with pelvic organ prolapsed.

## 5. Conclusion

Finally, to date this study is one of the larger laparoscopic series. We believe that this operation may become an attractive treatment option for younger patients with pelvic organ prolapsed.

## Conflict of Interest

No conflict of Interest statement for each author

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