

# Comparison of High Uterosacral and Sacrospinous Ligament Suspension Surgeries for the Treatment of Pelvic Organ Prolapse in Women

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## Abstract

**Background:** Pelvic floor disorders include urinary incontinence, fecal incontinence, and pelvic floor prolapse, which are common complaints in women. Patients that suffer from uterine prolapse could benefit from surgical procedures that stabilize pelvic ligaments. Here, we aimed to compare the high uterosacral and sacrospinous ligament suspension surgeries.

**Materials and Methods:** This clinical trial was performed in 2019–2021 on 64 women with uterine prolapse. Demographic data of the patients, including age, body mass index (BMI), past medical diseases, history of delivery, type of delivery, and duration of hospitalization, were collected. We assessed their urinary symptoms, prolapse degree, and sexual symptoms using the Female Sexual Function Index (FSFI) and Pelvic Floor Disability Index (PFDI-20) questionnaires before surgical interventions. Patients were divided into two groups undergoing high uterosacral and sacrospinous ligament suspension. They were followed up 6 and 12 months after surgeries.

**Results:** Patients treated with sacrospinous ligament suspension had higher frequencies of surgical complications ( $P = 0.039$ ), and the most common complication was low back pain (15.6%). The uterine prolapse and C point degree improved significantly in all cases after 6 and 12 months ( $P < 0.001$ ). The Pelvic Organ Prolapse Quantifications System (POP-Q) scores improved significantly in both groups 6 and 12 months after surgery ( $P < 0.001$ ), and patients who underwent sacrospinous ligament suspension had significantly lower pain intensity compared to the other group ( $P = 0.003$ ). FSFI scores improved significantly in patients treated in both groups ( $P < 0.001$ ).

**Conclusion:** Both high uterosacral and sacrospinous ligament suspension techniques significantly improved pain, uterine prolapse, and C point degree.

**Keywords:** General surgery, ligaments, uterine prolapse

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## INTRODUCTION

Pelvic floor disorders including urinary incontinence, fecal incontinence, and pelvic floor prolapse are common complaints in older women.<sup>[1]</sup> In the United States, 50% of women with a history of childbirth have some degree of pelvic floor relaxation, with 10%–20% becoming

symptomatic and 11% requiring pelvic floor surgery during their lifetime.<sup>[2,3]</sup> Uterine prolapse and rectocele are almost the most common indications for gynecological surgeries.<sup>[4]</sup> Epidemiological studies have identified pelvic organ prolapse as women's third most common cause of hysterectomy.<sup>[5,6]</sup> The leading cause of pelvic floor

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disorders is unknown, but several factors are involved in its formation.<sup>[7]</sup>

Previous epidemiological studies have suggested many predisposing factors for pelvic floor disorders, which include natural delivery using devices such as forceps or vacuum, episiotomy, coarse neonate, epidural anesthetic, and maternal age, and other predisposing factors, including previous hysterectomy, increased age, menopause, and obesity.<sup>[8-10]</sup> A study in the United States found that increased births and obesity significantly increased the likelihood of developing pelvic floor disorders.<sup>[11]</sup> This study also concludes that the probability of these disorders varies in different races. It has been shown that African-American women have the lowest risk of developing prolapse, and Hispanic women have the highest risk of prolapse.<sup>[2,12]</sup>

Pelvic floor disorders affect the quality of life (QoL) of women. Urinary incontinence is seen in 17%–45% of adult women, and in 4%–17% of these women, fecal incontinence is seen, which increases with age.<sup>[13]</sup>

Various surgical procedures are performed to treat these disorders for patients. The surgical technique for vaginal apex suspension is conducted mainly through two methods of vaginal and abdominal approaches. The abdominal method is the same as sacral colpopexy in which mesh is used, and the most common vaginal methods include high uterosacral and sacrospinous suspension. Recently, high uterosacral suspension techniques have become increasingly popular among obstetricians.<sup>[14]</sup> A 2017 study by Spelzini *et al.*<sup>[15]</sup> comparing this with the McCall Culdoplasty procedure showed good safety and effectiveness in treating prolapse. There are a few comparative studies on the two common methods: sacrospinous and high uterosacral ligament suspension.

Due to the increasing need for pelvic disorder surgeries and the need to improve the QoL of patients, we decided to take a step to improve the QOL and performance of patients by designing this study and comparing sacrospinous suspension and high uterosacral suspension methods and evaluating their effectiveness.

## MATERIALS AND METHODS

This clinical trial was performed from 2019 to 2021 in educational hospitals affiliated with Isfahan University of Medical Sciences. The current study was conducted on women with uterine prolapse candidates for total vaginal hysterectomy (TVH) and repair surgeries. The research committee of Isfahan University of Medical Sciences approved the study protocol, and the ethics committee confirmed it (Ethics code: IR.MUL.MED.REC.1399.757, Iranian Registry of Clinical Trials (IRCT) code: IRCT20200825048515N21).

The inclusion criteria were symptomatic uterine prolapse (i.e., feeling tissue bulge out of the vagina, feeling heaviness or pulling in the pelvis, and urinary leak and incontinence), having a prolapse with grade 2 or more based on a Pelvic

Organ Prolapse Quantifications System (POP-Q) examination, not responding to conservative treatments or no desire to take them, being a candidate for TVH and vaginal apex suspension surgeries with cystocele repair, and signing the written and informed consent to participate in this study. The exclusion criteria had a contraindication to major surgery or anesthesia, any malignancy in the urogenital system and vulva, active infection of the urinary, genital, and pelvic systems, pregnancy and breastfeeding, and lack of consent.

The sample size was calculated using a formula in which the 95% confidence interval (CI) was 1.96, the test power factor of 80% was equal to 0.84; P1 was an estimate of the relative frequency of prolapse symptoms in the first group, and P2 was an estimate of the relative frequency of prolapse symptoms in the second group, which according to previous studies was 28% and 4%, respectively. P1 – P2 was the minimum relative difference in the frequency of prolapse symptoms in the two groups, which showed a significant difference and was considered 24%. According to the above formula, the sample size was 32 patients in each group and 64 patients in total.

Eligible patients were entered based on the mentioned criteria via easy sampling. Demographic data of the patients, including age, body mass index (BMI), past medical diseases, history of delivery, type of delivery, and duration of hospitalization, were collected using a checklist. We also assessed their urinary, uterine prolapse, and sexual symptoms using the Female Sexual Function Index (FSFI) and the Pelvic Floor Disability Index (PFDI-20) questionnaires before surgical interventions. The POP-Q was also conducted to assess the prolapse degree and C-point position. Patients scored their symptoms on a Likert scale from 0 to 10, and a similar scoring system assessed their satisfaction with interventions.

The FSFI is a validated questionnaire that assesses different domains of sexual function (desire, arousal, lubrication, orgasm, satisfaction, and pain) and provides an overall score regarding sexual function. Possible FSFI total score ranges from 2.0 to 36.0.

The PFDI-20 is the short-form version of the Pelvic Floor Distress Inventory (PFDI). It is a health-related QoL questionnaire for women with pelvic floor conditions. The PFDI-20 consists of three separate scales: the disability index with six questions about the inconvenience of the prolapse, Colorectal-Anal Distress Inventory (CRADI-8) with eight questions concerning difficulties of defecation, and the Urinary Distress Inventory (UDI-6) with six questions on difficulties in urination.

The patients were divided into two groups using Random Allocation Software. All patients underwent TVH using standard and similar methods. The first group of patients underwent high uterosacral ligament suspension and the second group underwent sacrospinous ligament suspension. In this study, only the patients and data collectors were blinded to the patient groups and surgical procedures.

In the two groups, TVH was performed using the same method. In the high uterosacral ligament suspension group before cuff closure, gentle tension was applied to allow the ligaments to be identified. Sutures were passed ventral to dorsal to reduce the possibility of ureteral damage.

In the second group, after cuff closure, the surgery began with a posterior colpotomy, which opened the rectovaginal space. The rectum was gently moved to the patient's left until the right ischial spine and sacrospinous ligament were palpated. Two non-absorbable monofilament polypropylene sutures were inserted 2 and 3 cm medial to the ischial spine on the sacrospinous ligament. We used the Capiro technique (Boston Scientific Corporation, Natick, Massachusetts, USA). The sutures were fixed to the posterior of the vaginal cuff at the site of uterosacral fixation. It should be noted that all patients in the high uterosacral ligament suspension underwent cystoscopy as part of the surgical procedure to check for possible injuries, and no ureter injury was reported.

Patients were followed up 6 and 12 months after the surgeries and were assessed for urinary, and intestinal symptoms, prolapse, and sexual function. We also assessed the recurrence and complications of surgery (such as bleeding, infection and low back pain) using the POP-Q examination and FSFI and PFDI-20 questionnaires.

Data were analyzed using the IBM SPSS Statistics software, including independent *t*-test and Chi-squared test.

## RESULTS

In the present study, 78 patients entered the study that was divided into two groups, each containing 39 patients. Fourteen patients (seven in each group) were excluded during the study. One patient in the sacrospinous group was excluded due to her husband's death and inability to assess her sexual functions. Data of 64 patients were analyzed. The CONSORT flow chart of the patients is shown in Figure 1.

The primary analysis of demographic data showed no significant differences between the two groups regarding age, BMI, past medical diseases, history of delivery, type of delivery, previous history of surgery, duration of hospitalization, and duration of surgeries ( $P > 0.05$  for all). We observed that patients treated with sacrospinous ligament suspension had higher frequencies of surgical complications ( $P = 0.039$ ). The most common complication was low back pain and pain in the buttocks (15.6%). No complications were observed in the high uterosacral group. There were no significant differences between the two groups regarding relapse ( $P > 0.99$ ). The data are shown in Table 1.

Based on the data presented in Table 2, there were no significant differences between the two groups regarding the degree of prolapse before and after surgery ( $P = 0.58$ ). Still, it was indicated that the degree of prolapse improved significantly in all cases after 6 and 12 months ( $P < 0.001$ ). Similar results were observed for C points in both groups. All patients

showed significant improvements after 12 months ( $P < 0.001$ ), but there were no significant differences between the two groups ( $P = 0.950$ ).

Based on the FSFI scoring system, analysis of pain intensity and satisfaction in patients showed that these scores improved significantly in both groups 6 and 12 months after surgery ( $P < 0.001$ ), and all patients had improved pain intensity. Patients who underwent sacrospinous ligament suspension had significantly lower pain intensity than the other group ( $P = 0.003$ ). No other significant differences were observed ( $P > 0.05$ ) [Table 3].

As shown in Table 4, the FSFI scores improved significantly in patients treated in both groups ( $P < 0.001$ ), and there were no significant differences between them regarding different domains of the questionnaire ( $P > 0.05$ ). There were also no significant differences between the two groups regarding other territories of the PFDI questionnaire ( $P > 0.05$ ). Still, all cases had significantly improved prolapse and gastrointestinal and urinary complications ( $P < 0.001$ ) [Table 5].

## DISCUSSION

Our study showed significant improvements in all patients regarding the degree of prolapse, C point, satisfaction, FSFI scores, prolapse severity, and gastrointestinal and urinary complications. These data show the effectiveness of high uterosacral and sacrospinous ligament suspension methods. We also observed significant differences between the two groups regarding surgical complications and pain intensity. Based on our data, patients who underwent sacrospinous ligament suspension had lower pain but higher complications, including low back pain 6 and 12 months after surgery. However, all patients had similar satisfaction after interventions.

These explain the efficacy of both surgical methods in patients with apical prolapse. It is indicated that the surgical repair of uterine prolapse is associated with significant improvements in various patient's signs and symptoms, including urinary incontinence and feeling the prolapse. The advances in patients' symptoms and C points after surgical interventions show the beneficial effects of the procedures. Both surgical approaches are practical and efficient; all patients had improved prolapse degree and C point.

There have been previous studies on the use and effectiveness of these surgical techniques in patients. Most previous studies have assessed one of these two surgical techniques or have compared unilateral with bilateral methods. Only a few studies have compared high uterosacral and sacrospinous ligament suspension techniques. In a recent study in 2021, Yilmaz *et al.*<sup>[16]</sup> compared two therapeutic procedures of high uterosacral and sacrospinous ligament suspensions in 235 patients suffering from pelvic floor disorders using the POP-Q. This study showed that both surgical methods had similar results, and there were no significant differences between the outcomes and complications of patients in both

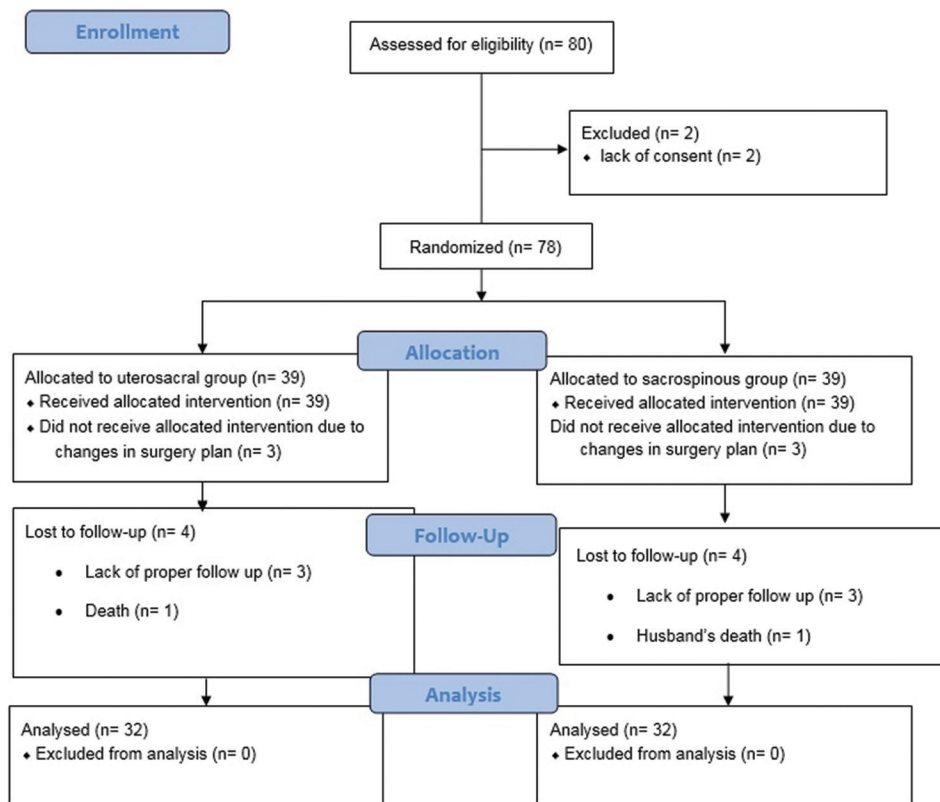


Figure 1: The CONSORT flow chart of the patients

Table 1: Comparison of demographic data and clinical outcomes of patients			
	High Uterosacral suspension	Sacrospinous Ligament Suspension	P
Age (years) (mean±SD)	58.25±8.05	56.16±8.93	0.386
BMI (kg/m <sup>2</sup> ) (mean±SD)	24.62±2.03	25.07±2.23	0.408
Duration of hospitalization duration (days) (mean±SD)	2.13±0.49	2.16±0.51	0.985
Previous vaginal delivery (times) (mean±SD)	5.97±2.85	5.25±2.59	0.362
Caesarean section delivery (times) (mean±SD)	0.25±0.51	0.34±0.6	0.539
Past medical history (n (%))			
No	17 (53.10)	19 (59.40)	0.841
Diabetes mellitus (DM)	6 (18.80)	5 (15.60)	
Hypertension (HTN)	1 (3.10)	1 (3.10)	
Hypothyroid	5 (15.60)	3 (9.40)	
Hypothyroid + DM	1 (3.10)	0 (0.00)	
DM + HTN	2 (6.30)	2 (6.30)	
Cardiac disease	0 (0.00)	2 (6.30)	
Surgical complication (n (%))			
No	32 (100)	27 (84.40)	0.039
Low back pain	0 (0.00)	5 (15.60)	
Duration of surgery (hour) (mean±SD)	2.66±0.38	2.63±0.29	0.466
Relapse (n(%))			
No	31 (96.9)	30 (93.8)	1.000
Yes	1 (3.1)	2 (6.3)	
Previous surgery (n (%))			
No	28 (87.5)	27 (84.4)	1.000
Yes	4 (12.5)	5 (15.6)	

groups. Low back pain was also reported as the most common patient complication after surgery. The results of our study are

in line with this survey showing the effectiveness of these two surgical methods.

**Table 2: Comparison of prolapse degree and C point in patients based on the POP-Q**

Time	Degree	High Uterosacral suspension	Sacrospinous Ligament Suspension	P
Prolapse degree				
Before intervention	2	14 (43.80)	12 (37.50)	0.580
	3	12 (37.50)	12 (37.50)	
	4	6 (18.70)	8 (25.00)	
After 6 months	0	30 (93.80)	29 (90.60)	
	1	2 (6.20)	1 (3.10)	
	2	0 (0.00)	2 (6.30)	
After 12 months	0	30 (93.80)	29 (90.60)	
	1	1 (3.10)	1 (3.10)	
	2	1 (3.10)	2 (6.30)	
P		<0.001	<0.001	
C point				
Before intervention		3.81±3.29	4.03±3.24	0.950
After 6 months		-8.25±3.29	-8.03±3.24	
After 12 months		-8.12±1.95	-7.96±2.14	
P		<0.001	<0.001	

**Table 3: Evaluation and comparison of satisfaction score in different subgroups in patients**

	Time	High Uterosacral suspension	Sacrospinous Ligament suspension	P
Urinary symptoms (mean±SD)	Before intervention	5.78±1.88	5.25±2.11	0.360
	After 6 months	1±0	1±0	
	After 12 months	1.28±0.46	1.09±0.3	
	P	<0.001	<0.001	
Gastrointestinal symptoms (mean±SD)	Before intervention	3.34±2.67	3.38±2.47	0.795
	After 6 months	1±0	1±0	
	After 12 months	1.22±0.55	1.06±0.25	
	P	<0.001	<0.001	
Pain (mean±SD)	Before intervention	3.78±2.18	5±1.88	0.003
	After 6 months	1.09±0.39	1±0	
	After 12 months	1.63±0.83	1.09±0.53	
	P	<0.001	<0.001	
Sexual function (mean±SD)	Before intervention	6.34±2.46	6.75±2.29	0.180
	After 6 months	1.09±0.39	1±0	
	After 12 months	1.53±0.8	1±0	
	P	<0.001	<0.001	
Pelvic score (mean±SD)	Before intervention	5.81±3.07	5.97±2.81	0.770
	After 6 months	1±0	1±0	
	After 12 months	1.13±0.34	1.03±0.18	
	P	<0.001	<0.001	

In 2021, Panico *et al.*<sup>[17]</sup> evaluated data of 60 patients that underwent high uterosacral ligament suspension due to a high grade of apical prolapse. This study demonstrated that patients' pain and gastrointestinal, urinary, and sexual complaints improved significantly after surgery, and no major complications were reported. This led to significant improvements in the QoL of patients. In a study by Goeschen and Gold,<sup>[18]</sup> it was shown that injuries to the high uterosacral ligament played a pivotal role in the development of pelvic floor disturbance, genitourinary complications, and chronic pelvic pain, and suspension of this ligament through surgical interventions could have significant beneficial effects on

vaginal prolapse. Chaudhry *et al.*<sup>[19]</sup> conducted a study in 2018 that evaluated the anatomy and ligaments of the pelvis and showed that high uterosacral ligament played an important role in pelvic floor diseases. All these data emphasized high uterosacral ligament suspension surgery in patients with pelvic floor diseases and genital prolapse. As mentioned above, patients treated with high uterosacral ligament suspension surgery showed significant improvements in their symptoms and did not have significant complications.

On the other hand, our study emphasizes the effectiveness of sacrospinous ligament suspension as an effective treatment

**Table 4: Evaluation and comparison of FSFI questionnaire and its different domains**

FSFI domain	Time	High Uterosacral suspension	Sacrospinous Ligament Suspension	P
Desire (mean±SD)	Before intervention	2.18±0.88	2.14±0.91	0.217
	After 6 months	3.67±0.96	3.9±0.72	
	After 12 months	3.49±0.87	3.77±0.72	
	P	<0.001	<0.001	
Arousal (mean±SD)	Before intervention	1.83±1.23	2.02±1.3	0.745
	After 6 months	4.06±1.08	4.23±0.74	
	After 12 months	3.94±1.08	4.22±0.77	
	P	<0.001	<0.001	
Lubrication (mean±SD)	Before intervention	1.57±1.3	1.81±1.29	0.745
	After 6 months	3.51±1.13	3.84±0.78	
	After 12 months	3.51±1.05	3.71±0.81	
	P	<0.001	<0.001	
Orgasm (mean±SD)	Before intervention	1.56±1.31	1.99±1.43	0.895
	After 6 months	4.05±1.09	4.55±0.76	
	After 12 months	4.14±0.91	4.53±0.78	
	P	<0.001	<0.001	
Satisfaction (mean±SD)	Before intervention	1.84±1.47	1.92±1.02	0.513
	After 6 months	4.62±0.94	4.89±0.76	
	After 12 months	4.49±1	4.86±0.74	
	P	<0.001	<0.001	
Pain intensity (mean±SD)	Before intervention	1.6±1.38	1.88±1.48	0.117
	After 6 months	4.14±1.21	4.96±0.78	
	After 12 months	4.12±1.25	4.95±0.87	
	P	<0.001	<0.001	
Total score (mean±SD)	Before intervention	10.51±6.41	11.62±6.84	0.637
	After 6 months	24.66±5.43	26.01±3.92	
	After 12 months	24.15±5.3	26.11±3.6	
	P	<0.001	<0.001	

**Table 5: Evaluation and comparison of PFDI domains**

PFDI Domain	Time	High Uterosacral suspension	Sacrospinous Ligament suspension	P
Prolapse (mean±SD)	Before intervention	13.78±5.85	12.94±5.87	0.552
	After 6 months	0.38±0.66	0.53±1.05	
	After 12 months	1.09±1.35	0.84±1.32	
	P	<0.001	<0.001	
Gastrointestinal symptoms (mean±SD)	Before intervention	5.78±6	4.72±4.21	0.448
	After 6 months	0.72±1.14	0.63±1.1	
	After 12 months	1.28±1.44	0.97±1.36	
	P	<0.001	<0.001	
Urinary (mean±SD)	Before intervention	14.69±5.89	12.03±4.9	0.096
	After 6 months	1.44±1.44	0.81±1.09	
	After 12 months	1.69±1.6	1.41±1.7	
	P	<0.001	<0.001	

procedure. A recent analysis was performed by Karacaoglu *et al.*<sup>[20]</sup> in 2021 in Turkey on 21 women with genital prolapse. Assessments of the efficacy and complications of unilateral sacrospinous ligament fixation showed that this technique was more effective and was associated with lower surgery duration than other techniques. Another recent study was performed by Ashby *et al.*<sup>[21]</sup> in 2021 that highlighted the roles of the sacrospinous ligament in providing a stable pelvic floor. It showed that surgical interventions for sacrospinous ligament

repair were significantly effective in alleviating genitourinary and sexual complaints in patients.

Similarly, Liu *et al.*<sup>[22]</sup> reported significantly improved patient symptoms after sacrospinous ligament fixation. Still, they also reported that surgeons should consider different surgical complications, including low back pain and urinary retention in patients.<sup>[22]</sup> These data were also in line with the findings of our study.

A critical shortcoming of our survey was that we conducted this study on a restricted population. It is recommended that further multicentric studies on larger populations should be conducted. Furthermore, we should note that we could not compare our data with multiple surveys due to the lack of similar comparative studies between high uterosacral and sacrospinous ligament suspension techniques.

## CONCLUSION

Both high uterosacral and sacrospinous ligament suspension techniques significantly improved the patient's symptoms and complaints. Those who underwent sacrospinous ligament suspension had significantly lower pain but higher post-surgical complications. It is suggested that gynecologists pay more attention to the beneficial use of these two techniques.

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### Conflicts of interest

There are no conflicts of interest.

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