

# Impact of cervical preservation on vaginal length and female sexual function after hysterectomy for benign conditions: a retrospective cohort study

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## Abstract

**Objective:** To evaluate how preserving the cervix and maintaining vaginal length influenced sexual function in patients undergoing hysterectomy for benign disorders.

**Material and Methods:** This retrospective analysis included patients who had either total or subtotal hysterectomy for benign disorders between 2020 and 2022, with vaginal lengths recorded both before and after surgery. The female sexual function index (FSFI) was completed by the patients before surgery and again 24 months postoperatively, while their partners were given the International Index of Erectile Function.

**Results:** Eighty-five patients were included, with 42 (49%) in the total hysterectomy group and the remainder in the sub-total group. While no significant change in vaginal length was observed in women who underwent subtotal hysterectomy ( $p > 0.05$ ), the total hysterectomy group showed a marked reduction in vaginal length postoperatively ( $10 \pm 1$  cm vs.  $6.6 \pm 1.1$  cm,  $p < 0.001$ ). The reduction in FSFI scores for the subtotal hysterectomy group was notably lower compared to the total hysterectomy group [ $1.4$  ( $0.8-2.1$ ) vs.  $9.2$  ( $8.2-10.1$ ),  $p < 0.001$ ].

**Conclusion:** While both total and subtotal hysterectomy procedures were associated with decreased sexual function, patients who underwent total hysterectomy showed lower FSFI scores. Previous research has suggested this may be due to lack of cervical ring protection and loss of erogenous zones in the posterior vagina through nerve damage. [J Turk Ger Gynecol Assoc. 2026; 27(2): 107-13]

**Keywords:** FSFI, hysterectomy, IIEF, sexual function, subtotal hysterectomy, vaginal lengths

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## Introduction

Globally, hysterectomy is one of the most common gynecologic operations, second in frequency only to cesarean section (1). Based on the surgical technique used, it may be conducted through vaginal, laparoscopic, or open abdominal approaches. Furthermore, depending on the patient's specific clinical condition, the procedure can be executed either as a complete

(total) or partial (subtotal) removal of the uterus (2). In total hysterectomy, both the uterus and cervix are entirely excised, which may lead to a reduction in vaginal length. Earlier research has shown that removal of the cervix can lead to deep dyspareunia, so the importance of the cervix for sexual response and sensory function has become increasingly recognized (3). Assessing sexual function after hysterectomy is therefore important to understand the broader impact on



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intimate health and emotional well-being. Validated tools, such as the female sexual function index (FSFI), provide a structured and reliable way for healthcare providers to evaluate sexual difficulties and develop individualized management strategies (4).

One of the most commonly expressed worries among women during pre-hysterectomy consultations is how the procedure might affect their sexual health (5). Worries about a decline in sexual function after the procedure are common and well-documented. In addition to sexual concerns, possible disruptions in urinary or bowel function remain relevant issues following hysterectomy (6). This topic is especially pertinent since a large proportion of individuals undergoing the procedure are still of reproductive age and maintain active sexual lives. Sexual difficulties after hysterectomy may manifest in various ways, including reduced libido, discomfort or pain during intercourse, insufficient vaginal lubrication, challenges in reaching orgasm, or even a complete lack of orgasmic response. In particular, shortening of the vaginal canal post-surgery has been associated with painful intercourse and reduced sexual satisfaction (7). However, existing studies have offered inconsistent conclusions regarding how hysterectomy influences sexual function, creating uncertainty for both clinicians and patients seeking guidance (8). While findings are mixed, some research suggests that diminished vaginal length following hysterectomy may contribute to sexual dysfunction (6). The physical dimensions of the vagina, particularly its length, may influence sexual experiences. Though vaginal length naturally varies across individuals, it typically ranges from 7 to 9 centimeters (9). Certain studies have indicated that a longer vaginal canal may be associated with increased sexual satisfaction and a greater likelihood of orgasm during penetrative sex (7).

Although numerous studies have examined the effects of different hysterectomy techniques on female sexual function, the distinct contributions of vaginal length preservation and cervical retention have received relatively little focus. The aim of the present study was to shed light on how maintaining vaginal length and conserving the cervix may influence sexual health outcomes in women undergoing subtotal or total hysterectomy for benign gynecological disorders.

## Material and Methods

This retrospective analysis included patients who visited the gynecology outpatient department between 2020 and 2022 and subsequently underwent either a total or subtotal hysterectomy during that period. The study was approved by the İstanbul Esenyurt University Ethics Committee overseeing the review and authorization of clinical research (approval number: 2024-01-26, date: 15.02.2023).

All patients were thoroughly counseled regarding the surgical alternatives available, and the final decision on the type of procedure was made in agreement with individual preferences. The study population consisted of individuals who underwent surgery for benign gynecological conditions, including treatment-resistant abnormal uterine bleeding, uterine leiomyomas (fibroids), or persistent endometrial polyps. Exclusion criteria were patients who had surgery for non-benign indications, were lost to follow-up, had changed sexual partners within two years or had multiple partners, were less than 24 months postoperative, or had missing critical preoperative data. Patients who underwent concurrent oophorectomy, were postmenopausal, or had conditions that could independently affect sexual function, such as pelvic pain or endometriosis, were also excluded.

Demographic data, detailed medical history, FSFI scale, pelvic examination and vaginal ultrasound data routinely obtained preoperatively in our institution were collected by retrospective file review. Preoperative Pap smear and human papilloma virus (HPV) screening results were also recorded to provide additional background information regarding cervical status. A Samsung Hera W9 Obstetrics/GYN ultrasound device was used during the examinations. Vaginal lengths were measured preoperatively and postoperatively by a physician, with patients awake and positioned in the lithotomy position. Using a speculum, the posterior vaginal fornix was identified and the speculum was removed to avoid unnecessary vaginal tension. The distance between the vaginal posterior fornix and the hymen was measured with forceps and noted in centimeters.

### Surgical techniques

All surgical interventions were performed by a single specialist surgeon using a uniform and well-structured surgical approach.

**Abdominal total hysterectomy:** Abdominal total hysterectomy is a surgical procedure involving the complete excision of the uterus and cervix via an opening made in the abdomen. In this procedure, the entire uterus along with the cervix is surgically excised. Energy devices and uterine manipulators were not used. The point where the external cervical os ends was determined as the surgical margin. The paravaginal tissues were preserved as far as possible.

**Subtotal abdominal hysterectomy:** Subtotal abdominal hysterectomy is a surgical technique where the uterus is removed via an abdominal incision while the cervix is left intact. Therefore, during this procedure, the uterus is excised partially, preserving the cervix. No uterine manipulator was used during total abdominal hysterectomy, and the cervix of all patients was sutured with a continuous suture. The point where the internal cervical os begins was accepted as the surgical margin.

**Laparoscopic hysterectomy:** Laparoscopic hysterectomy is a minimally invasive surgical technique carried out through several small abdominal incisions, using a laparoscope. Throughout the procedure, a uterine manipulator was employed to assist in positioning, and the cervix of all patients was sutured with a continuous suture.

No surgical complications or injuries were reported among the patients during hysterectomy procedures. Those included in the study were planned for follow-up assessments 24 months postoperatively. Informed consent was obtained from all participants prior to their enrollment in the study. Sexual function was evaluated using the FSFI scale, a detailed questionnaire designed to measure six key aspects: sexual desire; arousal; vaginal lubrication; orgasm; overall satisfaction; and discomfort or pain during sexual activity. The assessment consisted of 19 items aimed at providing a thorough understanding of sexual health. Each section is structured to detect particular aspects of sexual dysfunction. Moreover, the International Index of Erectile Function (IIEF) questionnaire was administered to the patients' partners to assess their sexual function (10). The IIEF is a standardized tool composed of several questions aimed at evaluating erectile function in men. These questions cover various areas such as the rigidity of erections, ability to achieve and maintain erections, sexual desire, orgasm function, and sexual intercourse satisfaction. Various subscales of the IIEF are used to evaluate an individual's overall sexual function. The questionnaires were manually completed by the same physician, who provided patients and their partners with privacy and adequate time for thoughtful completion in a designated private room.

### Statistical analysis

Statistical analyses were performed with SPSS, version 27 (IBM Inc., Armonk, NY, USA). Parametric tests were applied to data that met the assumptions of normality. The independent samples t-test was used to compare measurements between two independent groups, while the paired samples t-test was used for comparisons within paired groups. Non-parametric techniques were used for non-normally distributed data. Continuous variables with normal distribution were reported as means with standard deviations ( $\pm$ ), whereas non-

normally distributed variables were presented as medians with interquartile ranges (25<sup>th</sup> to 75<sup>th</sup> percentiles). Descriptive statistics and frequency distributions were employed to summarize the findings. A p-value less than 0.05 was regarded as statistically significant.

To assess the statistical power of the sample size for identifying the observed effect, a post-hoc power analysis was conducted using G\*Power 3.1 software. Using the FSFI score differences between total and sub-total hysterectomy groups, with a Cohen's d of 0.83, a total sample size of 85, an alpha value of 0.05, and applying the Mann-Whitney U test, the study's power was determined to be 0.97.

### Results

Table 1 presents the demographic characteristics of the patients categorized by groups. The study included a total of 85 patients, with 42 (49%) undergoing total hysterectomy, of whom 20 (48% were operated via the abdominal route and 22 (52%) via laparoscopic route. The remaining 43 (51%) of patients underwent subtotal hysterectomy via the abdominal route. Among patients who underwent total hysterectomy, 16 (38%) had uterine myoma, 16 (38%) had abnormal uterine bleeding resistant to treatment, and 10 (24%) had endometrial polyps. In the subtotal hysterectomy group, 31 (72%) were diagnosed with uterine myoma, nine (21%) had abnormal uterine bleeding resistant to treatment, and three (0.7%) had endometrial polyps.

Preoperative cervical screening data were available for 73 (85.9%) patients. Among these, Pap smear results were normal in 65 of women. HPV results were available only in a limited number of patients, all of which were negative.

Participants in the subtotal hysterectomy group were notably younger compared to those in the total hysterectomy group ( $p < 0.001$ ). However, no meaningful differences were detected between the groups regarding the number of pregnancies, number of births, or body mass index ( $p > 0.05$ ) (see Table 1).

Figure 1 illustrates the vaginal length measurements in the total hysterectomy group before and after surgery. The preoperative and postoperative vaginal length measurements in the subtotal hysterectomy group did not differ significantly ( $9.9 \pm 1.2$  vs.  $9.8 \pm 1.3$ ,  $p > 0.05$ ). However, in the total hysterectomy

**Table 1. Demographic data of groups undergoing total and subtotal hysterectomy**

	Total hysterectomy (n=42)	Subtotal hysterectomy (n=43)	Statistical analysis
Age (year)	44.1 $\pm$ 2.8	41.7 $\pm$ 2.3	$p < 0.001$
Gravida	3.4 (2-4)	3.4 (3-4)	$p = 0.773$
Parity	2.2 (2-3)	2.3 (2-3)	$p = 0.856$
BMI (kg/m <sup>2</sup> )	25.7 $\pm$ 2.3	25.6 $\pm$ 2.7	$p = 0.867$
BMI: Body mass index			

group, a significant reduction in vaginal length was observed postoperatively compared to the preoperative measurements (6.6±1.1 cm vs. 10±1 cm, respectively; p<0.001). Vaginal tissue loss observed after the operation was not related to the type of surgery (abdominal or laparoscopic) performed or indication. (p>0.05).

The comparison of preoperative and postoperative FSFI scores for the groups is shown in Table 2. Analysis of the subtotal hysterectomy group’s FSFI subscales revealed a statistically significant decline in sexual arousal, lubrication, orgasm, satisfaction, and total scores (p<0.001). Nonetheless, sexual desire and pain/discomfort scores remained largely unchanged, showing no statistically significant differences (p>0.05). Likewise, the total hysterectomy group experienced a marked reduction in every FSFI domain along with a significant decline in overall scores (p<0.001).

When comparing preoperative and postoperative FSFI scores, the decline in FSFI scores was significantly less pronounced in the subtotal hysterectomy group compared to the total hysterectomy group (p<0.001) (Table 3).

No notable changes were observed in erectile or orgasmic function scores when comparing preoperative and postoperative assessments of partners in both the total and subtotal hysterectomy groups (p>0.05).

## Discussion

The present study found that the decrease in FSFI scores in both total and sub-total hysterectomy groups highlighted the adverse impact of the operation on sexual function, regardless of cervix preservation. However, the significantly larger decrease in FSFI scores among patients who underwent total hysterectomy compared to the subtotal hysterectomy group suggests a

potential association with neural damage resulting from the loss of erogenous zones along with the cervix. These findings further suggest the benefit of choosing subtotal hysterectomy whenever possible, as it may better preserve sexual function and reduce adverse outcomes.

In the literature, the influence of vaginal tissue loss on sexual functions remains unclear. Previous studies have not established a direct connection between vaginal length and sexual function (11). Damage to the autonomic and somatic nerves in the upper vaginal region may result in reduced lubrication, potentially hindering the ability to achieve orgasm. Potential reasons for sexual dysfunction following hysterectomy involve injury to branches of the pelvic plexus located in various anatomical areas, including the nerve networks traversing the paravaginal tissue (12). Furthermore, scar formation secondary to the operation may also contribute to changed sexual function (13). It has been suggested that the cervix may be associated with sexual arousal and orgasm through the uterovaginal nerves via the Frankenhauser plexus. Therefore, these authors suggested that the cervix should be protected in appropriate cases to avoid nerve damage. Another study comparing vaginal hysterectomy with abdominal hysterectomy associated the dyspareunia observed after vaginal hysterectomy with vaginal shortening (13). Dyspareunia arising from vaginal tissue loss may adversely affect sexual functions. This may lead to issues such as reduced sexual desire and difficulty achieving orgasm. Moreover, the discomfort and pain resulting from dyspareunia can potentially heighten emotional strain and interpersonal stress. In the current analysis, individuals who underwent total hysterectomy demonstrated a more pronounced reduction in vaginal tissue compared to those who had a subtotal procedure. This tissue reduction, coupled with the significant

**Table 2. Comparison of preoperative and postoperative FSFI scores of total and subtotal hysterectomy groups**

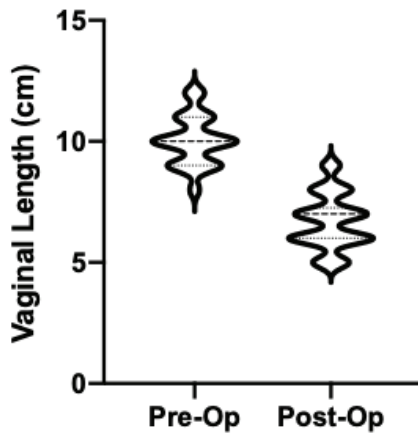
	Total hysterectomy (n=42)		Statistical analysis	Subtotal hysterectomy (n=43)		Statistical analysis
	Pre-op	Post-op		Post-op	Pre-op	
	Median (Q1-Q3)	Median (Q1-Q3)		Median (Q1-Q3)	Median (Q1-Q3)	
Desire	4.8 (4.8-4.8)	3.6 (3.4-4.2)	p<0.001	(4.8-6)	(4.8-5.4)	p=0.033
Arousal	4.3 (4.2-4.8)	3.0 (2.7-3.6)	p<0.001	(4.2-5.4)	(3.9-5.1)	p<0.001
Lub.	5.2 (4.8-6)	(3.6-4.5)	p<0.001	(4.8-6)	(4.5-5.7)	p<0.001
Orgasm	4.5 (4.3-4.8)	(2.8-3.2)	p<0.001	(4.4-5.6)	(4-5.2)	p<0.001
Satis.	4.5 (3.9-4.8)	(2.8-4)	p<0.001	(4.8-6)	(4 -5.2)	p<0.001
Pain	5.7 (5.6-6)	(2.4-3.2)	p<0.001	(5.6-6)	(5.2-6)	p=0.007
Total	29.2±3.1	20.3±2.2	p<0.001	30.8±2.8	29.3±2.8	p<0.001

Lub: Lubrication, Satis: Satisfaction, FSFI: Female sexual function index

**Table 3. Comparison of within-group reduction rates of preoperative and postoperative FSFI scores**

	n	Median (Q1-Q3)	p
Total hysterectomy	42	9.2 (8.2-10.1)	<0.001
Subtotal hysterectomy	43	1.4 (0.8-2,1)	

FSFI: Female sexual function index

**Figure 1. Comparison of vaginal length means before and after total hysterectomy. (Pre-op mean:  $6.6 \pm 1.1$ ; post-op mean:  $10 \pm 1$ ,  $p < 0.001$ )**

drop in FSFI scores observed among the total hysterectomy group, may relate to the removal of sensitive areas within the vaginal wall and potential nerve disruption, as earlier studies have proposed.

However, it should also be acknowledged that in countries where regular cervical screening programs are not in place, leaving the cervix *in situ* carries the potential risk of retaining precancerous lesions or developing cervical malignancy later, which may complicate subsequent management with both surgery and radiotherapy (2).

Interestingly, despite improvements in sexual satisfaction, no significant reduction in pain scores was observed in either group. This could be related to persistent pelvic floor tension or psychological adaptation following surgery, as previously reported by Dedden et al. (14).

The variability in findings related to sexual function post-hysterectomy highlights the need for a deeper exploration of how vaginal structure impacts sexual well-being. Some studies have shown that the frequency of orgasm significantly declined within the first year following total hysterectomy compared to the period before surgery, whereas this decline was not observed in those undergoing supracervical procedures (3). Another study comparing total laparoscopic hysterectomy to supracervical laparoscopic hysterectomy noted improved sexual function among premenopausal participants (13). Similarly, in a study involving premenopausal women, FSFI

scores improved after total laparoscopic, supracervical laparoscopic, and vaginal hysterectomies, regardless of the approach taken (15). Bastu et al. (16) investigated the role of vaginal length, a factor frequently overlooked, and found a positive, albeit statistically non-significant, correlation between vaginal length and FSFI scores. These findings are consistent with earlier research in heterosexual women over 40 years, which suggested a slight positive link between increased vaginal length and elevated FSFI scores (17).

There may be a critical length threshold, beyond which additional preservation of the vaginal canal does not produce significant functional gains. Although both total and subtotal hysterectomy procedures have been linked to declines in sexual function, women who underwent total hysterectomy experienced more pronounced reductions in FSFI scores. This discrepancy may stem from the more extensive removal of nerve-dense, sensitive tissues and an increased risk of nerve damage, as noted in previous reports. Such evidence highlights the potential advantages of subtotal hysterectomy in well-selected patients, as it may help preserve vital anatomical features, including vaginal length, and support better sexual health outcomes.

Radosa et al. (15) proposed that hysterectomy could improve sexual function by addressing the underlying physical causes that negatively influence it, irrespective of the surgical approach used. Similarly, Dedden et al. (14) observed a significant rise in sexual function scores measured by FSFI after the procedure. Supporting studies have included patients suffering from conditions such as endometriosis and chronic pelvic pain, both known to profoundly affect sexual health, and documented sexual dysfunction prior to surgery. By surgically removing these pathogenetic cause of these problematic conditions, patients may experience better sexual function despite a decrease in vaginal tissue length. Moreover, factors such as having lower sexual function before surgery, being younger, and experiencing a shorter period of pelvic pain are associated with more pronounced improvements following hysterectomy, whereas psychological factors such as catastrophizing, may negatively influence recovery. In contrast, our study found that patients' existing medical conditions did not significantly affect sexual function, and none exhibited sexual dysfunction before undergoing surgery. The use of the IIEF questionnaire to assess the sexual function of patients' partners further ensured that partner-related dysfunction did not confound the results.

Numerous investigations than those who had a total abdominal hysterectomy (17). However, a more recent study comparing laparoscopic, abdominal, and vaginal hysterectomies reported similar postoperative reductions in vaginal length across all three groups (7). Kiremitli et al. (18), who investigated how various hysterectomy techniques affect vaginal length

and sexual function, included patients undergoing vaginal hysterectomy in their analysis. Their findings also demonstrated a significant reduction in FSFI scores among patients who experienced marked loss of vaginal tissue. Similarly, Kiyak et al. (19) suggested that the use of uterine manipulators during hysterectomy procedures might help minimize vaginal tissue damage, thereby aiding in the preservation of sexual function. Their study further revealed no significant difference in vaginal tissue loss between patients who underwent laparoscopic total hysterectomy and those who had an abdominal total hysterectomy. Nonetheless, the application of uterine manipulators in abdominal hysterectomy remains a debated topic within the surgical community.

### Study limitations

The retrospective, single-center design of this study restricts the generalizability of its findings to wider populations. In addition, our sample did not include a group undergoing laparoscopic subtotal hysterectomy, which restricts direct comparison with the abdominal subtotal hysterectomy cohort. Nevertheless, a post-hoc power analysis demonstrated that the study maintained strong statistical power. The IIEF evaluations were conducted on the patients' partners both pre- and postoperatively, effectively accounting for potential confounding variables related to the spouse; nonetheless, parameters like penile length were not measured, which might have impacted the findings. Other limitations may stem from participants' discomfort or embarrassment when responding to sensitive questions about their sexual lives. On a positive note, all surgical procedures were carried out by the same experienced surgeon using consistent techniques, thereby minimizing variability in pre- and post-operative outcomes related to surgical methods.

In this study, preoperative Pap smear and HPV results were included when available; however, not all patient records contained complete cervical screening data, which we acknowledge as a limitation.

Although there was a modest sample size, the post-hoc power analysis indicated a statistical power of 0.97 with the observed FSFI differences, suggesting that the study had sufficient strength to detect clinically meaningful effects despite its retrospective nature.

This study highlights the considerable negative impact that loss of vaginal tissue has on sexual function, regardless of the hysterectomy method used. Consequently, opting for a subtotal hysterectomy when appropriate may be more advantageous in preserving sexual health compared to a total hysterectomy. Further research is required to gain a deeper understanding of how various surgical techniques affect sexual outcomes and how these are related to changes in vaginal tissue and

cervical preservation, ultimately aiding in the improvement of patient care. We believe this research offers a stimulus for healthcare providers to increase their attention to a frequently overlooked and under-researched aspect of hysterectomy. Better understanding of this may serve as a valuable foundation for improving patient counseling and tailoring treatment plans for women undergoing hysterectomy for benign conditions.

While hysterectomy is a long-established surgical procedure, the preservation of sexual function and vaginal length remains a contemporary and clinically relevant issue, particularly with the growing focus on patient-reported outcomes and quality-of-life measures.

### Conclusion

The findings of the present study highlight the importance of cervical preservation and anatomical factors influencing sexual health. It is hoped that this will encourage additional research in this field and renew attention to individualized surgical planning.

### Ethics

**Ethics Committee Approval:** *The study was approved by the İstanbul Esenyurt University Ethics Committee overseeing the review and authorization of clinical research (approval number: 2024-01-26, date: 15.02.2023).*

**Informed Consent:** *Informed consent was obtained from all participants prior to their enrollment in the study.*

### Footnotes

**Author Contributions:** *Surgical and Medical Practices: O.D., Concept: O.D., Design: O.D., H.E.C., Data Collection or Processing: O.D., D.U.K., Analysis or Interpretation: M.Y., Literature Search: P.K., Writing: P.K., M.Y.*

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

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