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Do hysterectomy techniques affect sexual functions and lower urinary system complaints?

Histerektomi tekniklerinin cinsel fonksiyonlara, alt üriner sistem semptomları ve yaşam kalitesi üzerine etkisi var mıdır?

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Abstract

Aim: Hysterectomy is the most common gynecological surgical procedure. Therefore, detailed consultation about the postoperative effects of hysterectomy is an integral part of the operation. However, available data on these issues are limited and conflicting. The aim of this study is to evaluate the effects of hysterectomy types on lower urinary tract symptoms (LUTS), sexual function and quality of life.

Methods: Patients between 38-60 years of age who underwent total laparoscopic hysterectomy (TLH), vaginal hysterectomy (VH), and, in addition to standard total abdominal hysterectomy (TAH), uterosacral ligament-cuff suturing operation between June 2017 and 2019 were included in this cross-sectional study. Urgency, urge incontinence, frequency, abnormal emptying, hesitancy, nocturia, overflow, and interrupted stream are considered LUTS symptoms. Sexual functions were evaluated by Index of Female Sexual Function Index (FSFI) and the quality of life was evaluated by the EQ-5D (European Quality of Life Five- Dimension Scale) during the post-operative period.

Results: There was a significant decrease in urgency, urge incontinence, frequency, abnormal emptying, nocturia and interrupted stream symptoms (P<0.05) in the VH group (n=30), and urge and urge incontinence symptoms in TAH group (n=213) (P<0.05) postoperatively. In terms of the FSFI total score, the highest sexual dysfunction was in the TAH group whereas the lowest was in the TLH (n=60) group.

Conclusions: Hysterectomy does not worsen LUTS. The best post-operative sexual functions were found in the TLH group. The post-operative quality of life was better in patients operated vaginally and laparoscopically.

Keywords: Vaginal hysterectomy, Abdominal hysterectomy, Laparoscopic hysterectomy, Sexual dysfunction, Lower urinary tract symptoms, Quality of life

Öz

Amaç: Histerektomi, en yaygın jinekolojik cerrahi prosedürdür. Bu nedenle, histerektominin postoperatif etkileri hakkında ayrıntılı konsültasyon operasyonun ayrılmaz bir parçasıdır. Ancak, bu konularla ilgili mevcut veriler sınırlıdır ve çelişkilidir. Bu çalışmanın amacı, histerektomi tiplerinin alt üriner sistem semptomları (LUTS), cinsel fonksiyon ve yaşam kalitesi üzerine etkilerini değerlendirmektir.

Yöntemler: Haziran 2017-2019 tarihleri arasında benign nedenlerle total laparoskopik (TLH), vajinal (VH) ve standart total abdominal histerektomi (TAH) operasyonuna ek olarak sakrouterin ligamanent-cuff sütürizasyonu yapılmış olan 38-60 yaş arasındaki hastalar bu kesitsel çalışmaya dahil edildi. Urge, urge inkontinansı, frequency, anormal boşalma, zor idrar yapma, noktüri, taşma, kesik kesik idrar yapma AÜSS semptomları olarak değerlendirildi. Sexüel fonksiyon Index of Female Sexual Function Indexi (FSFI) ve yaşam kalitesi European Quality of Life Five-Dimension Scale (EQ-5D) ölçeği ile postoperatif dönemde değerlendirildi.

Bulgular: Preoperatif döneme göre postoperatif dönemde, VH (n=30) grubunda urgency, urge incontinence, frequency, anormal boşalma, noktüri ve kesik kesik idrar yapma semptomlarında (P<0,05), TAH (n=213) hastalarında ise urge ve urge inkontinans semptomlarında anlamlı olarak azalma olduğu saptandı (P<0,05). FSFI total skoruna göre sexual disfonksiyonun en fazla TAH ve en az TLH (n=60) grubunda görüldü. En iyi genel yaşam kalitesi skorunun VH ve ardından TLH grubunda saptandı.

Sonuç: Histerektomi AÜSS'nı kötüleştirmemektedir. Vajinal yaklaşım pelvik taban onarımı imkanıyla en belirgin düzelmeyi sağlamaktadır. Post-operatif en iyi sexual fonksiyonlar TLH grubunda saptanmıştır. Vajinal ve laparoskopik olarak opere edilen hastalarda postoperatif yaşam kalitesinin daha iyi olduğu görülmektedir.

Anahtar kelimeler: Vajinal histerektomi, Abdominal histerektomi, Laparoskopik histerektomi, Cinsel işlev bozukluğu, Alt üriner sistem semptomları, Yaşam kalitesi

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Introduction

Hysterectomy is the most common major procedure in gynecological practices and is often performed for benign reasons [1]. The choice of hysterectomy technique varies depending on the patient, surgeon, and indication. Between 2000 and 2015, of the 157.589 hysterectomies performed in the United States for benign reasons, 52.8% was minimal invasive, 28.6% was abdominal and 18.6% was vaginal hysterectomy (VH) [2]. American College of Obstetrician and Gynecologist (ACOG) states that laparoscopic hysterectomy should be the standard approach in patients in which VH cannot be performed [3]. Although total laparoscopic hysterectomy (TLH) has the advantages of minimally invasive surgery such as shorter hospital stay, lower intraoperative blood loss, less postoperative pain, faster recovery, and lower infection rate compared to total abdominal hysterectomy (TAH), abdominal hysterectomy is performed more frequently [4]. Regardless of the technique, 85% of women who underwent hysterectomy are sexually active [5]. Therefore, along with the technique, the effects of the operation on urinary and genital systems, and hence on the pelvic floor, should be well known. Although it was thought for many years that hysterectomy damages the pelvic floor, recent studies have indicated that it improves existing sexual functions and some urinary complaints.

The effects of hysterectomy types, especially laparoscopic procedures, which have been applied more frequently in recent years, on the continence mechanisms and pelvic floor are important research subjects. It is still unclear whether this surgery targeting minimal tissue damage is superior to vaginal and abdominal procedures which have been performed for many years. Evaluating the effects of hysterectomy types on the pelvic floor can clarify problems and help find suitable solutions. The present study aimed to evaluate the quality of life, lower urinary tract symptoms, and sexual functions of women after vaginal, abdominal, and laparoscopic hysterectomy.

Materials and methods

This present cross-sectional research included women who underwent benign hysterectomy between June 2017 and June 2019 at the Gynecology Clinic of Yozgat Bozok University Hospital, Yozgat, Turkey. Approval was granted by Yozgat Bozok University Clinical Research Ethics Committee (2017-KAEK-189_2019.12.25_12) and written consent forms were obtained from the patients.

Women aged 38-60 years, who underwent pre-operative basic laboratory tests, transvaginal ultrasound and TAH, TLH, VH for benign reasons were included in the study. Lower urinary tract symptoms (LUTS), sexual functions, and quality of life levels of the patients who completed at least one year postoperatively were questioned. Preoperative pelvic organ prolapse - Q (POP-Q) examination and LUTS were obtained from the file records. Patients with stress urinary incontinence, morbid obesity, hysterectomy due to malignancy, and Stage 3 and 4 pelvic organ prolapse, and those who underwent TAH operation without sacrouterine ligament-cuff suturing were excluded from the study.

LUTS

Urgency, urge incontinence, frequency, abnormal emptying, hesitancy, nocturia, overflow, interrupted stream and are considered LUTS symptoms [6].

FSFI

FSFI features six domains including, 1. Desire (q1 and q2), 2. Arousal (q3, q4, q5, and q6), 3. Lubrication (q7, q8, q9, and q10), 4. Orgasm (q11, q12, and q13), 5. Satisfaction (q14, q15, and q16), 6. Pain (q17, q18, and q19). The total score ranges from 2, indicating severe sexual dysfunction, to 36, indicating full sexual function [7].

EQ-5D

It is a self-report scale developed by the EuroQoL group, the Western European quality of life research community. It has five basic parameters: Mobility, self-care, usual daily activities, pain/ discomfort, anxiety/depression. These five parameters are calculated with an index score ranging from -0.59 to 1 [8].

Surgical procedure

The type of hysterectomy to be applied to the patients is determined by the surgical team. VH is usually offered and administered as an option to patients with grade I and II urogenital prolapses. Anterior and posterior colporrhaphy are also performed to patients with anterior and posterior compartment defects. TLH is performed to patients with no large myomas and previous operative complications due to severe adhesion. TAH is performed as a standard for other cases. In our clinic, in addition to the standard TAH operation, where applicable, cuff fixation of uterosacral ligaments has been performed since 2017. This procedure is illustrated in Figure 1.

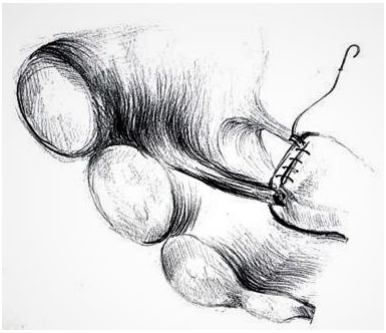

Figure 1: The illustration of the uterosacral ligament-cuff suturing applied in total abdominal hysterectomy

Statistical analysis

The statistical package software SPSS version 20 (IBM Co., Armonk, NY) was used for statistical evaluations. The obtained results were presented as mean (standard deviation) and in percentages. Continuous variables were analyzed by the Kolmogorov-Smirnov and Shapiro-Wilk's tests to evaluate whether the distribution was normal. For non-parametric and parametric data, Kruskal Wallis and One-way ANOVA tests were performed, respectively. Bonferroni correction was used for post-hoc tests. Since the continuous variables were non-normally distributed in pre-postoperative comparisons, Wilcoxon's signed-rank tests were used. Relationships between categorical variables were evaluated by the Chi-square test. $P<0.05$ were considered statistically significant.

Results

A total of 375 women underwent hysterectomy for benign reasons in the gynecology clinic of our hospital between the indicated periods; 303 of these cases met the inclusion criteria and underwent TAH (n=213), TLH (n=60) and VH (n=30) (Figure 2).

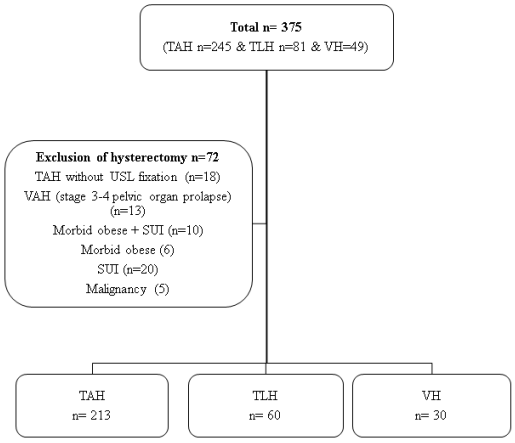

Figure 2: Details of sample size distribution (Flowchart)

There were no significant differences between the groups in terms of age, body mass index (BMI), smoking, and menopausal status (P>0.05). However, gravidity and the number of vaginal deliveries were significantly higher in the VH group than those in the other groups (P<0.05). Operation indications and demographic characteristics of the patients are given in Table 1.

A statistically significant improvement was detected in Aa, Ba, C, Ap, Bp, and D values and shortening in total vaginal length (TVL) in patients who underwent VH (P<0.05). In patients with TAH, statistically significant improvements were determined in C, Ap, Bp, and D values and TVL shortened (P<0.05). In patients who underwent TLH, there were no significant changes in any of the post-operative values compared to the pre-operative period (P>0.05) (Table 2).

Table 1: Demographic characteristics of patients

	TAH n=213	TLH n=60	VAH n=30	*P*-value
Age (years)	51.2 (4.9)	49.4 (5.8)	50.9 (4.1)	0.055
BMI (kg/m^2)	26.9 (14.2)	26.2 (2.2)	25.4 (3.6)	0.111
Gravidity	2.7 (1)	2.7 (1)	3.9 (1.8)	0.001
Parity	2.6 (1)	2.5 (0.9)	3.5 (1.5)	0.002
Smoking status, n (%)	27 (12.7)	13 (21.7)	7 (23.3)	0.109
Menopausal condition, n (%)				0.526
Premenopausal	125 (58.7)	39 (65.0)	16 (53.3)	
Postmenopausal	88 (41.3)	21 (35.0)	14 (46.7)	
Indications, n (%)				0.010
Meno/metrorrhagia	62 (29.1)	17 (28.3)	11 (36.7)	
Leiomyoma	102 (47.9)	20 (33.3)	9 (30.0)	
Adnexal mass	40 (18.8)	13 (21.7)	5 (16.7)	
Endometriosis / pelvic pain	9 (4.2)	10 (16.7)	5 (16.7)	

Unless otherwise specified, results are presented as mean (SD), BMI: body mass index, TVL: total vaginal length, TAH: total abdominal hysterectomy, TLH: total laparoscopic hysterectomy, VH: vaginal hysterectomy

Table 2: Mean distribution of Aa, Ba, C, D, Ap and Bp points/Gh, TVL and Pb changes of POP-Q of cases between pre and postoperative periods

	TAH n=213			TLH n=60			VAH n=30		
	Preop	Postop	*P*	Preop	Postop	*P*	Preop	Postop	*P*
Aa	-2.5 (0.7)	-2.6 (0.6)	0.059	-2.5 (0.6)	-2.6 (0.5)	0.066	-0.3 (0.8)	-1.9 (0.7)	<0.001
Ba	-2.9 (0.8)	-3 (0.7)	0.059	-3 (0.7)	-3 (0.6)	0.317	-0.5 (1.1)	-2.3 (0.7)	<0.001
Ap	-2.4 (0.8)	-2.6 (0.6)	<0.001	-2.5 (0.6)	-2.6 (0.5)	0.317	-0.3 (0.8)	-1.4 (0.6)	<0.001
Bp	-2.9 (0.9)	-3 (0.7)	0.003	-3 (0.7)	-3.1 (0.6)	0.180	-0.6 (1.1)	-2.4 (1)	<0.001
C	-4.9 (3)	-5.1 (2.6)	0.001	-5.2 (2.4)	-5.3 (2.4)	0.083	-0.1 (0.9)	-2.1 (1.3)	<0.001
D	-6 (3.2)	-6.3 (2.8)	0.002	-6.3 (2.6)	-6.4 (2.6)	0.102	0.1 (0.7)	-2.5 (2)	<0.001
TVL	9.5 (1.1)	8.9 (1.3)	<0.001	9.6 (0.7)	9.5 (0.7)	0.059	9.6 (1.1)	8.8 (1.1)	0.001
GH	4.5 (1.1)	4.5 (1.1)	0.568	4.5 (1.2)	4.6 (1)	0.705	4.2 (1.1)	4.3 (1)	0.157
PB	2.6 (0.9)	2.7 (0.8)	0.274	2.6 (1)	2.6 (0.9)	0.782	2.7 (0.9)	2.6 (0.8)	0.480

Data presented as mean (SD), Gh: genital hiatus, Pb: perineal body, TVL: total vaginal length, TAH: total abdominal hysterectomy, TLH: total laparoscopic hysterectomy, VH: vaginal hysterectomy

The changes in LUTS are given in Table 3. Accordingly, it was found that there were significant improvements in the complaints of post-operative urge and urge incontinence in patients with TAH (P<0.05) whereas no significant changes were found in other symptoms (P>0.05). There were no significant changes in the symptoms in the TLH group (P>0.05). In the VH group, there was a statistically significant improvement in symptoms other than hesitancy and overflow (P<0.05).

The FSFI scores of the groups are given in Table 4. The patients in the TLH group were significantly higher than those in TAH and VH in terms of lubrication, satisfaction, pain, orgasm, and total score (P<0.05). There were no significant differences between the groups in desire and arousal scores (P=0.461, P=0.840, respectively).

Table 3: Pre and postoperative LUTS of cases

	AH			TLH			VAH		
	Preop	Postop	*P*	Preop	Postop	*P*	Preop	Postop	*P*
Urgency	50 (23.5)	32 (15.0)	<0.001	8 (13.3)	10 (16.7)	0.500	12 (40.0)	3 (10.0)	0.004
Urge incontinence	31 (14.6)	15 (7.0)	<0.001	3 (5.0)	6 (10.0)	0.250	10 (33.3)	3 (10.0)	0.016
Frequency	24 (11.3)	30 (14.1)	0.109	7 (11.7)	10 (16.7)	0.250	14 (46.7)	6 (20.0)	0.021
Nocturia	25 (11.7)	28 (13.1)	0.250	9 (15)	7 (11.7)	0.500	10 (33.3)	3 (10)	0.016
Overflow	13 (6.1)	11 (5.2)	0.625	3 (5.0)	1 (1.7)	0.500	6 (20.0)	2 (6.7)	0.125
Hesitancy	15 (7.0)	13 (6.1)	0.625	5 (8.3)	3 (5.0)	0.500	7 (23.3)	3 (10.0)	0.125
Interrupted stream	31 (14.6)	34 (16.0)	0.375	8 (13.3)	4 (6.7)	0.125	12 (40.0)	3 (10.0)	0.004
Abnormal emptying	16 (7.5)	12 (5.6)	0.125	5 (8.3)	3 (5.0)	0.500	7 (23.3)	1 (3.3)	0.031

Data presented as n (%), TAH: total abdominal hysterectomy, TLH: total laparoscopic hysterectomy, VH: vaginal hysterectomy, LUTS: lower urinary tract symptoms

Table 4: Postoperative FSFI scores of cases

FSFI Domain	TAH n=213	TLH n=60	VAH n=30	*P*-value
Desire	4.0 (0.8)	3.9 (0.7)	3.8 (0.7)	0.461
Arousal	4.0 (1.1)	4.0 (1.2)	4.0 (1.3)	0.840
Lubrication	3.9 (1)	4.4 (1.1)[a,c]	4.0 (0.7)	<0.001
Orgasm	3.9 (0.9)	4.1 (0.8)[a]	4.0 (0.8)	0.008
Satısfactıon	3.9 (0.9)	4.4 (0.9)[a,c]	4.3 (0.9)	<0.001
Pain	4 (1)	4.6 (0.9)[a,c]	3.7 (1.6)	<0.001
Total	23.7 (4)	25.5 (4.3)[a,c]	23.8 (2.8)	<0.001

Results are presented as mean (SD), FSFI: female sexual function index, TAH: total abdominal hysterectomy, TLH: total laparoscopic hysterectomy, VH: vaginal hysterectomy

The mean values of EQ-5D scores in the TAH, TLH, and VH groups were 0.83 (0.56), 0.89 (0.47), and 0.95 (0.39), respectively. The EQ-5D score was statistically higher in the VH group compared to those of the other groups (P<0.001) (Figure 3).

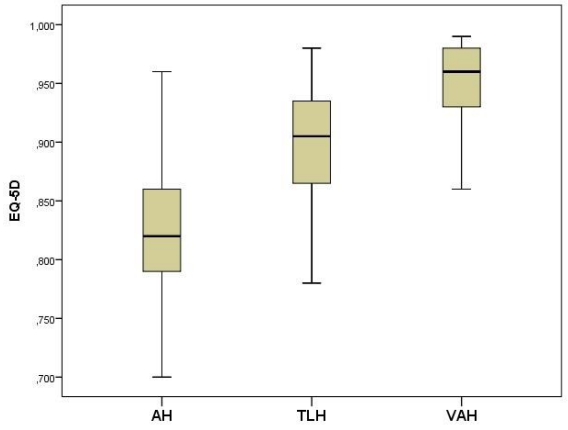

Figure 3: EQ-5D scores according to the groups

Discussion

Usually, hysterectomy does not adversely affect pelvic floor functions. The most significant improvement in LUTS is seen in the vaginal hysterectomy group. In patients undergoing abdominal hysterectomy, cuff suturing of USLs can yield improvement in urge and urge incontinence. It was seen that

sexual functions were better in patients who underwent laparoscopic surgery.

The most valid theory that fully explains the female urinary functions is the Integral Theory [9], according to which, even a minimal change in one of the parts can lead to disruption of harmony. Some studies have indicated that hysterectomy may also be a risk factor for genital prolapse and urinary incontinence by disrupting the pelvic floor [10-12]. In these studies, it has been reported that there was an increase in postoperative urinary incontinence and this result was based on temporary changes in bladder capacity, increased intravesical pressure, and impaired sensory innervation of the bladder during the operation [13]. On the contrary, many randomized controlled prospective studies have reported an improvement in lower urinary tract complaints of hysterectomy [14, 15]. However, which of the hysterectomy types has a stronger effect on LUTS is controversial [16]. In their studies evaluating the effects of TAH and VH on the lower urinary system, Altman et al. have reported that frequencies decreased and urgency and dysuria did not change in both groups [17]. In another study, de novo urinary incontinence and its affecting factors after hysterectomy were evaluated, and a higher decrease was observed in the rate of urinary incontinence remission after VH compared to TAH [18]. The current study group consisted of patients without pre-operative stress urinary incontinence and apparent pelvic organ prolapse. Evaluating the data, it was seen that lower urinary tract symptoms improved significantly in the VH group. While there was a significant improvement in urge incontinence in patients who underwent TAH, no significant improvement was observed among TLH cases. This result was associated with the significant improvement in lower urinary tract symptoms in accordance with the integral theory of pelvic floor repair in patients undergoing VH. Improvement in TAH cases, especially in urge, may be related to the involvement of uterosacral ligaments in these patients and subsequent attachment to the cuff. This procedure preserves the supportive function of the anterior vagina wall and ensures that the apical vagina is raised to support the bladder base and bladder neck. Providing upper anterior vaginal wall tension may inhibit the early stimulation of receptors in the bladder floor, preventing the formation of urge [19]. Uterosacral ligaments (USL) are the major attachment structures in the small pelvis. Proper anatomic fixation of USL with polyvinylidene fluoride bands of the same length and shape, elevating the anterior vaginal wall to support the bladder base and bladder neck may improve the mix and urge incontinence. It has been reported that vaginosacropexy (VASA) operation, which is performed in addition to hysterectomy, provides a higher reduction in urge and urge incontinence compared to drug treatments [20]. Another continence mechanism in TAH can be associated with the disappearance of vesical hyperactivity caused by these structures due to the intake of fibroids, large uterus, or adnexal masses [21]. In our clinic, TLH is often applied to patients with a relatively small uterus. This may explain the absence of a significant improvement in patients' post-operative period LUTS.

Female sexuality is a complex issue that can be affected by many factors. Various anatomical factors such as the presence/absence of the uterus and cervix, cuff suturing, the length of the vagina, the presence of ovaries, and patients' beliefs and attitudes affect sexual functions. In 1966, Master and Jonhsan reported that the uterus did not affect the orgasm, whereas Fox claimed that uterine contractions played an active role in the orgasm in the following years [22,23]. The results of the study evaluating the effect of hysterectomy on sexual functions show variations. In the studies evaluating the effect of hysterectomy on libido and genital sexual sensitivity at the end of 1900s, it was reported that there was no change in these parameters regardless of the type of operation, while the studies in the following years showed that there was a significant improvement in sexual functions, especially in the late period [24,25]. The improvement of hysterectomy in sexual functions is related to the decrease of dyspareunia, the absence of fear of pregnancy, and the relief caused by the disappearance of the pathology with the operation indication [26,27]. However, each of the hysterectomy modalities can affect sexual functions, causing different injuries in the pelvic floor, including vessels, innervations, and support structures [28-30].

Evaluating the hysterectomy techniques in the present study, it was seen that the highest post-operative FSFI scores were in the TLH group. It was found that there were no significant changes in desire and arousal scores. Pain in VH patients was higher than those in other groups. All other scores were found to be significantly higher in TLH patients. It was thought that good sexual functions in TLH may be related to the technique. Pelvic autonomic nerves innervate the vaginal wall for lubrication. The risk of injury to these nerves is higher in laparotomy cases and even higher in radical surgeries. This leads to decreased lubrication and vaginal vasocongestion during sexual arousal [31]. The risk of injury was much lower in minimally invasive procedures. Therefore, it was thought that the lubrication and satisfaction scores were higher in TLH cases. A higher postoperative comfort compared to TAH in these patients and good psychological effects due to better cosmetic results also affect the improvement in sexual functions [32]. Another factor we deem important was that the length of the vagina was longer in TLH compared to those in other groups. The shortening of the vagina was considered as a factor that negatively affects sexual function by some researchers [33].

In the present study in which the quality of life was evaluated according to EQ-5D, it was seen that VH patients had a significantly better quality of life score compared to other types of operations. This result can also be associated with the appropriate surgical method chosen for patients. As also stated by Radosa et al. [26], it was thought that the improvement in LUTS obtained by hysterectomy in patients with early-stage uterine prolapse has a greater effect on the quality of life. LUTS are a multifactorial group of heterogeneous symptoms that can change in severity over time, and these symptoms can negatively affect the quality of life. The surgical method that provided the second-best quality of life was laparoscopic hysterectomy due to being a minimal invasive surgery.

Limitations

It is difficult to fully evaluate the dysfunctions of the pelvic floor. The most important limitation of the present study was the lack of pre-operative evaluation of the quality of life and sexual functions. However, presenting the effects of three

hysterectomy techniques on quality of life and urinary symptoms together provided a strong analysis opportunity.

Conclusion

Comparing the effects of these alternative treatment modalities on the quality of life and female sexuality appears to be an important aspect for further research to improve the treatment of benign uterine disorders. At this point, it should be considered that the decisions regarding the surgical approach in hysterectomy should be made by the patient based on discussions that will be made with the surgeon about the relative benefits and harms of the operations.

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References

1. Clarke-Pearson DL, Geller EJ. Complications of hysterectomy. Obstet Gynecol. 2013;121(3):654-73.
2. Agrawal S, Chen L, Tergas AI, Hou JY, Clair CMS, Ananth CV, et al. Characteristics associated with prolonged length of stay after hysterectomy for benign gynecologic conditions. Am J Obstet Gynecol. 2018;219(1):89. e81-9.
3. Obstetricians ACo, Gynecologists. Choosing the route of hysterectomy for benign disease. Acog committee opinion no. 444. Obstet Gynecol. 2009;114:1156-58.
4. Wright JD, Herzog TJ, Tsui J, Ananth CV, Lewin SN, Lu Y-S, et al. Nationwide trends in the performance of inpatient hysterectomy in the united states. Obstet Gynecol. 2013;122:233-41.
5. Lethaby A, Mukhopadhyay A, Naik R. Total versus subtotal hysterectomy for benign gynaecological conditions. Cochrane database of systematic reviews. 2012
6. Turgal M, Sivaslioglu A, Yildiz A, Dolen I. Anatomical and functional assessment of anterior colporrhaphy versus polypropylene mesh surgery in cystocele treatment. Eur J Obstet Gynecol Reprod Biol. 2013;170(2):555-8.
7. Rosen CB, Heiman J, Leiblum S, Meston C, Shabsigh R, Ferguson D, D'Agostino R. The female sexual function index (fsfi): A multidimensional self-report instrument for the assessment of female sexual function. J Sex Marital Ther. 2000;26(2):191-208.
8. Group TE. Euroqol-a new facility for the measurement of health-related quality of life. Health policy. 1990;16(3):199-208.
9. Petros P. A ligamentous explanation for overactive bladder symptoms as defined by international continence society in the female. Central European journal of urology. 2018;71(1):105-7.
10. Milsom I, Ekelund P, Molander U, Arvidsson L, Areskoug B. The influence of age, parity, oral contraception, hysterectomy and menopause on the prevalence of urinary incontinence in women. J Urol. 1993;149(6):1459-62.
11. Parys B, Woolfenden K, Parsons K. Bladder dysfunction after simple hysterectomy: Urodynamic and neurological evaluation. Eur Urol. 1990;17(2):129-33.
12. Van der Vaart C, Van der Bom J, De Leeuw J, Roovers J, Heintz A. The contribution of hysterectomy to the occurrence of urge and stress urinary incontinence symptoms. BJOG. 2002;109(2):149-54.
13. Smith P, Ballantyne B. The neuroanatomical basis for denervation of the urinary bladder following major pelvic surgery. Br J Surg. 1968;55(12):929-33.
14. Thakar R, Ayers S, Clarkson P, Stanton S, Manyonda I. Outcomes after total versus subtotal abdominal hysterectomy. N Engl J Med. 2002;347(17):1318-25.
15. Gimbel H, Zobbe V, Andersen BM, Filtenborg T, Gluud C, Tabor A, et al. Randomised controlled trial of total compared with subtotal hysterectomy with one-year follow up results. BJOG. 2003;110(12):1088-98.
16. Virtanen H, Mäkinen J, Tenho T, Kiilholma P, Pitkänen Y, Hirvonen T. Effects of abdominal hysterectomy on urinary and sexual symptoms. B J Urol. 1993;72:868-72.
17. Altman D, Lopez A, Falconer C, Zetterström J. The impact of hysterectomy on lower urinary tract symptoms. Int Urogynecol. J 2003;14(6):418-23.
18. Bohlin KS, Ankardal M, Lindkvist H, Milsom I. Factors influencing the incidence and remission of urinary incontinence after hysterectomy. Am J Obstet Gynecol. 2017;216(1):53.e1-53.e9.
19. Petros PE, Ulmsten U. Bladder instability in women: A premature activation of the micturition reflex. Neurourol Urodyn. 1993;12(3):235-9.
20. Ludwig S, Becker I, Mallmann P, Jager W. Comparison of solifenacin and bilateral apical fixation in the treatment of mixed and urgency urinary incontinence in women: Urge 1 study, a randomized clinical trial. In vivo (Athens, Greece). 2019;33(6):1949-57.
21. Andrada AO, De Vicente JMG, Cidre MÁJ. Pelvic plexus compression due to a uterine leiomyoma in a woman with acute urinary retention: A new hypothesis. Int Urogynecol J. 2014;25(3):429-31.
22. Masters W, Johnson V. Human sexual response, boston (little, brown and company) 1966.
23. Fox C, Fox B. A comparative study of coital physiology, with special reference to the sexual climax. Reprod. 1971;24(3):319-36.
24. Wierrani F, Huber M, Grin W, Henry M, Grünberger W. Postoperative libido and genital sexual sensitivity following various forms of hysterectomy. J Gynecol Surg. 1995;11(3):127-32.
25. Galyer KT, Conaglen HM, Hare A, Conaglen JV. The effect of gynecological surgery on sexual desire. J Sex Marital Ther. 1999;25(2):81-8.
26. Radosa JC, Meyberg-Solomayer G, Kastl C, Radosa CG, Mavrova R, Gräber S, et al. Influences of different hysterectomy techniques on patients' postoperative sexual function and quality of life. J Sex Med. 2014;11(9):2342-50.
27. He H, Yang Z, Zeng D, Fan J, Hu X, Ye Y, et al. Comparison of the short-term and long-term outcomes of laparoscopic hysterectomies and of abdominal hysterectomies: A case study of 4,895 patients in the guangxi zhuang autonomous region, china. Chinese J Cancer Res. 2016;28(2):187-96.
28. Kilkku P. Supra vaginal uterine amputation vs. Hysterectomy: Effects on coital frequency and dyspareunia. Acta Obstet Gynecol Scand. 1983;62(2):141-5.
29. Roovers J-PW, van der Bom JG, van der Vaart CH, Heintz APM. Hysterectomy and sexual wellbeing: Prospective observational study of vaginal hysterectomy, subtotal abdominal hysterectomy, and total abdominal hysterectomy. BMJ. 2003;327(7418):774-8.
30. Tunuguntla HS, Gousse AE. Female sexual dysfunction following vaginal surgery: A review. J Urol. 2006;175(2):439-46.
31. Maas CP, Weijenborg PTM, Ter Kuile MM. The effect of hysterectomy on sexual functioning. Annu Rev Sex Res 2003;14:83-113.
32. Ayoubi J, Fanchin R, Monrozies X, Imbert P, Reme J, Pons J. Respective consequences of abdominal, vaginal, and laparoscopic hysterectomies on women's sexuality. Eur J Obstet Gynecol Reprod Biol. 2003;111(2):179-82.
33. Ercan Ö, Özer A, Köstü B, Bakacak M, Kıran G, Avcı F. Comparison of postoperative vaginal length and sexual function after abdominal, vaginal, and laparoscopic hysterectomy. Int J Gynaecol Obstet. 2016;132(1):39-41.

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