J Surg Med. 2025;9(9):158-161.
https://doi.org/10.28982/josam.8374

JOSAM

Research article
https://jsurgmed.com/

Journal of Surgery and Medicine

e-ISSN: 2602-2079

Time-stratified comparison of quality of life following laparoscopic vs abdominal hysterectomy

Sabri Kurtay [1], Şadıman Kıykaç Altınbaş [2], Ömer Lütfi Tapısız [2]

[1] Clinic of Obstetrics and Gynecology, Mersin State Hospital, Mersin, Turkey
[2] Gynovart Women's Health Clinic, Ankara, Turkey

ORCID of the author(s)

SK: https://orcid.org/0000-0003-0867-6972
ŞKA: https://orcid.org/0000-0003-2773-9641
ÖLT: https://orcid.org/0000-0002-7128-8086

Corresponding Author
Sabri Kurtay
Mersin Şehir Eğitim ve Araştırma Hastanesi, Kadın Hastalıkları ve Doğum Kliniği, Korukent Mah. 96015 Sok. Mersin Entegre Sağlık Kampüsü, 33240 Toroslar/Mersin, Türkiye
E-mail: sabrikurtay@gmail.com

Ethics Committee Approval
The study was approved by the Ethics Committee of the University of Health Sciences, Etlik Zübeyde Hanım Health Training and Research Hospital (Approval Number: 2018/30, dated June 27, 2018).
Written informed consent was obtained from all participants before inclusion in the study. No identifying personal information of participants was included in the manuscript.
All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

Conflict of Interest
No conflict of interest was declared by the authors.

Financial Disclosure
The authors declared that this study has received no financial support.

Published
2025 September 16

Abstract

Background/Aim: Hysterectomy is a widely used surgical procedure for benign gynecologic conditions. Although total abdominal hysterectomy (TAH) has traditionally been the standard, total laparoscopic hysterectomy (TLH) is increasingly preferred due to its minimally invasive nature. Despite extensive research on perioperative outcomes, longitudinal data on quality of life (QoL) and urinary function remain limited.

Methods: A retrospective cohort study was conducted including 252 perimenopausal women who underwent either TLH (n=134) or TAH (n=118) at a tertiary hospital in Türkiye between 2014 and 2021. QoL was assessed using validated Turkish versions of the SF-36 and UDI-6 questionnaires at three postoperative intervals: early (≤3 months), mid-term (4–12 months), and long-term (>12 months). Additional parameters included hospital stay duration and postoperative complications.

Results: TLH patients reported significantly better QoL outcomes in the early and mid-term periods, particularly in physical functioning, bodily pain, and social functioning ($P<0.05$). Early urinary distress scores also favored the TLH group. However, these differences had diminished at the long-term follow-up. TLH was also associated with shorter hospital stays and fewer febrile episodes.

Conclusion: TLH offers superior short-term improvements in QoL and urinary outcomes compared to TAH. These advantages tend to decrease over time, resulting in similar long-term recovery. Time-stratified assessment provides a more nuanced understanding of postoperative recovery and may aid in personalized surgical planning.

Keywords: abdominal hysterectomy, laparoscopic hysterectomy, quality of life

How to cite: Kurtay S, Altınbaş ŞK, Tapısız ÖL. Time-stratified comparison of quality of life following laparoscopic vs abdominal hysterectomy. J Surg Med. 2025;9(9):158-161.

Introduction

Globally, hysterectomy ranks among the most commonly performed gynecologic operations, indicated for a wide spectrum of benign and malignant pathologies [1]. Over the years, several surgical techniques have been developed. These include the traditional total abdominal hysterectomy (TAH), the total vaginal hysterectomy (TVH), and the minimally invasive total laparoscopic hysterectomy (TLH) [2,3]. TLH has gained substantial acceptance owing to its benefits, including minimized intraoperative hemorrhage, enhanced postoperative comfort, reduced hospitalization duration, and accelerated convalescence [4].

Despite these benefits, TAH continues to be widely practiced in many settings. Factors, such as surgeon expertise, patient comorbidities, and institutional resources contribute to the continued use of this approach [2,5]. However, emerging data have challenged the equivalence of TAH and TLH, particularly concerning long-term quality of life metrics.

In contemporary hysterectomy research, patient-centered endpoints like QoL have become increasingly significant, shifting focus away from solely surgical outcomes [6]. Validated assessment tools, such as the Short Form-36 (SF-36) and the Urogenital Distress Inventory-6 (UDI-6), are frequently employed to evaluate domains including physical function, emotional health, and urinary symptoms [7]. Although numerous studies have compared TLH and TAH, few have assessed postoperative quality of life using a stratified temporal framework [8]. Such an approach may provide deeper insight into the progression of patient recovery.

The present study aims to evaluate postoperative QoL outcomes of TLH and TAH in perimenopausal women, using SF-36 and UDI-6 scores across different postoperative intervals. To our knowledge, this represents one of the few retrospective analyses to adopt a time-stratified design in a large cohort.

Materials and methods

This retrospective observational study was conducted on perimenopausal women aged 40–55 years who underwent either total abdominal hysterectomy or total laparoscopic hysterectomy for non-malignant gynecologic conditions, such as symptomatic fibroids, abnormal uterine bleeding, or adenomyosis. The surgeries were performed at a tertiary care center in Türkiye between January 2014 and December 2017. Participants were excluded if they had a history of gynecological malignancy, prior pelvic radiotherapy, severe pelvic organ prolapse, or had undergone vaginal or robotic hysterectomy. Only patients with complete quality of life (QoL) data and at least 12 months of postoperative follow-up were included in the final analysis.

Clinical and surgical data were retrospectively obtained from institutional patient records. These included demographic information, intraoperative variables (such as surgery duration, estimated blood loss, and any complications), as well as postoperative follow-up documentation. Quality of life (QoL) was assessed using the Turkish-validated, patient-reported outcome tools: SF-36 (Short Form-36) and UDI-6 (Urogenital Distress Inventory-6). Patients completed these questionnaires at three specific time points after surgery: the early period (within 3 months), mid-term (4 to 12 months), and long-term (beyond 12 months).

The SF-36 questionnaire, a comprehensively validated tool for measuring health-related quality of life, evaluates eight distinct domains encompassing both physical and mental well-being. Similarly, the UDI-6 instrument targets the severity of urinary complaints and how they influence daily functioning. Turkish versions of both tools, verified for psychometric reliability and validity, have been frequently employed in urogynaecological research [9].

Given the retrospective nature of the study and inclusion of all eligible individuals within the designated timeframe, an a priori sample size calculation was not performed. Nonetheless, the final cohort was considered adequate to capture clinically meaningful distinctions in quality of life between individuals who underwent TAH and those who had TLH.

Ethics approval

The study protocol was reviewed and approved by the Institutional Review Board of the University of Health Sciences, Etlik Zübeyde Hanım Training and Research Hospital (Approval No. 2018/30, dated June 27, 2018). All study procedures conformed to the ethical standards set forth in the Declaration of Helsinki. Informed written consent was obtained from all participants prior to their inclusion in the study.

Statistical analysis

All statistical analyses were performed using SPSS software (version 22.0; IBM Corp., Armonk, NY). To assess the distribution of continuous variables, the Kolmogorov–Smirnov test was applied. If data followed a normal distribution, intergroup comparisons were conducted using the independent samples t-test. For non-normally distributed variables, the Mann–Whitney U test was employed. Categorical variables were evaluated with either the chi-square test or Fisher's exact test, based on their appropriateness. A two-sided *P*-value less than 0.05 was considered statistically significant.

Results

The final sample consisted of 252 women who met the inclusion criteria, with 118 undergoing total abdominal hysterectomy and 134 undergoing total laparoscopic hysterectomy. Demographic and baseline clinical characteristics—including age, BMI, obstetric history, and comorbidities—did not differ significantly between the TAH and TLH groups (Table 1). Compared to the TAH group, the TLH group had a shorter duration of hospitalization (2.1 (0.5) vs. 3.6 (0.9) days; $P<0.001$) and less intraoperative blood loss ($P=0.012$). However, the mean operative time was significantly longer in the TLH group, with a mean of 89.6 (18.4) minutes versus 74.1 (16.7) minutes in the TAH group ($P<0.001$).

Early adverse events, i.e., febrile episodes, urinary retention, wound infections, and transfusion requirements, were more frequently observed among patients in the TAH group. Among these complications, only febrile morbidity reached statistical significance, occurring in 13.5% of TAH cases versus 5.2% of TLH cases ($P=0.014$). Bladder injuries occurred in three patients (2.5%) following TLH and in two patients (1.7%) after TAH, with no significant intergroup difference ($P=0.64$).

Table 1: Baseline demographic and clinical characteristics of women treated with TLH or TAH.

Parameter	TLH (n=107)	TAH (n=179)	*P*-value	Cohen's d
Age (years) [a]	46.3 (4.1) [37 - 58]	47.1 (3.9) [25 - 56]	0.081	-0.201
BMI (kg/m²) [a]	32 (3)	32 (3)	0.558	-0.100
Gravida, median (IQR) [c]	3 (2–4)	3 (2–4)	0.351	—
Parity, median (IQR) [c]	2 (2–3)	2 (2–3)	0.907	—
Living child, median (IQR) [c]	2 (2–3)	2 (2–3)	0.938	—
Smoking	**TLH (n=107)**	**TAH (n=179)**		
No, n (%)	86 (80.4%)	142 (79.3%)	0.832 [b]	—
Yes, n (%)	21 (19.6%)	37 (20.7%)	0.832 [b]	—
Comorbidity	**TLH (n=107)**	**TAH (n=179)**		
None	67 (62.6%)	116 (64.8%)	0.999	—
Hypertension	8 (7.5%)	25 (14%)	0.780	—
Diabetes mellitus	9 (8.4%)	9 (5%)	0.999	—
Other	20 (18.7%)	24 (13.4%)	0.999	—
HT + DM	3 (2.8%)	5 (2.8%)	0.999	—
Medication use	**TLH (n=107)**	**TAH (n=179)**		
No	80 (74.8%)	132 (73.7%)	0.848 [b]	—
Yes	27 (25.2%)	47 (26.3%)	0.848 [b]	—
History of abdominal surgery median (IQR) [c]	0 (0–1)	0 (0–1)	0.829	—
Other surgical history	**TLH (n=107)**	**TAH (n=179)**		
No	85 (79.4%)	153 (85.5%)	0.186 [b]	—
Yes	22 (20.6%)	26 (14.5%)	0.186 [b]	—

BMI: Body Mass Index, HT: Hypertension, DM: Diabetes Mellitus, TLH: Total Laparoscopic Hysterectomy, TAH: Total Abdominal Hysterectomy. a: Values were mean (standard deviation), Student's t-test was used. b: Chi-square test, c: Values were reported as median (1st and 3rd quartile values) and the Mann-Whitney U test was used.

Table 2: Postoperative SF-36 subscale outcomes at different follow-up intervals in TLH and TAH groups.

	Early			Mid-term			Late-term		
Parameter	**TLH (n=36)**	**TAH (n=54)**	***P*-value [a]**	**TLH (n=35)**	**TAH (n=59)**	***P*-value [a]**	**TLH (n=35)**	**TAH (n=66)**	***P*-value [a]**
Physical functioning	83.9 (10.2)	78.5 (9.9)	0.018	81.4 (14.2)	77.7 (16.9)	0.285	83.5 (10.6)	79.8 (16.8)	0.584
Social functioning	86.7 (18.2)	75.9 (9.2)	<0.001	81.2 (23)	60.3 (21.6)	<0.001	84.3 (9.5)	68 (27.1)	0.006
Physical role functioning	82.6 (27.9)	75.5 (36.8)	0.602	73.6 (34.3)	76.3 (36.4)	0.383	76.4 (24.6)	74.2 (35.9)	0.560
Emotional role functioning	50.5 (28)	52 (20)	0.989	49.2 (32.7)	50.4 (27.1)	0.775	49.6 (26.9)	49 (24.8)	0.901
Mental health	78.4 (18.7)	79.3 (12.2)	0.494	75.4 (20.2)	75.3 (22)	0.694	77 (21.2)	76.4 (22.3)	0.901
Energy/Viability	69.9 (18.8)	67.7 (13.2)	0.234	63.9 (19.9)	63.6 (23.7)	0.697	65.6 (20)	63.7 (25)	0.924
Pain	80.5 (27.4)	68.2 (31.1)	0.027	76.1 (24.4)	74.6 (30.7)	0.772	77.4 (26)	75.7 (33.5)	0.690
General health perception	69.3 (21)	65.5 (20.3)	0.386	65.7 (21)	64.1 (25.4)	0.941	68.7 (24.4)	68 (26)	0.983

SF-36: Short Form-36, TLH: Total Laparoscopic Hysterectomy, TAH: Total Abdominal Hysterectomy, a: Student's t-test. Values were shown as mean (standard deviation).

Both surgical groups demonstrated marked improvement in quality of life, as assessed via SF-36, when compared to preoperative baseline scores. Notably, patients in the TLH cohort consistently achieved superior scores across multiple domains of the SF-36, especially within the first three months post-surgery. Table 2 details the distribution of SF-36 subscale scores at early, intermediate, and late follow-up intervals. Within the first three months, TLH patients showed significantly better results in physical functioning, social functioning, and bodily pain. While these advantages continued through the intermediate recovery period (4–12 months), they largely waned by the one-year follow-up, with social functioning being the sole domain retaining a significant intergroup difference.

Comparable patterns emerged in the analysis of urinary distress symptoms. UDI-6 scores improved significantly in both groups, but greater early improvements in urgency and leakage symptoms were noted among TLH patients ($P<0.05$). At the 12-month postoperative follow-up, UDI-6 subdomain scores did not differ significantly between the TLH and TAH cohorts. Summary statistics for UDI-6 outcomes at the 12-month follow-up are presented in Table 3.

Stratified analysis by postoperative period revealed that TLH consistently yielded more favorable quality-of-life metrics during early recovery, as measured by both SF-36 and UDI-6 instruments. In contrast, mid- and long-term differences between TLH and TAH were modest and failed to reach statistical significance.

Table 3: UDI-6 scores at 12-month follow-up in TLH and TAH groups.

Parameter	TLH (n=35)	TAH (n=66)	*P*-value [a]
UDI-6 Urge	1 (1.5)	0.7 (1.3)	0.362
UDI-6 Stress	1.1 (1.6)	0.9 (1.3)	0.943
UDI-6 Obstruction	1 (1.5)	0.8 (1.1)	0.932
Total	16.8 (22.9)	13.5 (17.1)	0.923

UDI-6: Urinary Distress Inventory-6, TLH: Total Laparoscopic Hysterectomy, TAH: Total Abdominal Hysterectomy, a: Student's t-test. Values were presented as mean (standard deviation).

Discussion

This study evaluated postoperative outcomes—including quality of life, surgical features, and complication rates—in perimenopausal women who underwent either total laparoscopic or total abdominal hysterectomy for non-malignant gynecological conditions. One of the main findings was that patients in the TLH group exhibited more noticeable short-term improvements, particularly in physical performance, pain, urinary symptoms, and aspects of daily and social well-being, compared to those who had TAH. Despite these early benefits, the advantages diminished over time, with differences between the two approaches becoming less prominent by the end of the first year. This suggests that the positive impact of TLH is most pronounced during the initial recovery period.

Previous research on pelvic surgery outcomes also supports the benefits of less invasive methods. For instance, studies conducted by Bartels [10] as well as by Ghanbari [11], indicated that laparoscopic hysterectomy may offer improved postoperative quality of life, especially during the early and mid-recovery phases. The improved physical function and reduced pain levels noted in TLH patients may stem from reduced surgical trauma and quicker postoperative mobilization inherent to laparoscopic techniques. Moreover, the lower incidence of postoperative febrile events and shorter hospitalization duration support the safety and operational efficiency of the TLH approach.

Although the short-term QoL improvements were clear, the differences between TLH and TAH largely disappeared within one year, a trend also reported by Nieboer [5]. The short-term benefits observed in urinary distress scores are also consistent with earlier research suggesting that laparoscopy may mitigate postoperative bladder discomfort and functional disturbances.

Nonetheless, the convergence of UDI-6 outcomes over time implies that both procedures ultimately result in similar long-term recovery of urinary function. Similar recovery trends were also evident in the findings of Skorupska [12] and Oplawski [13], both of whom observed parallel gains in urinary and sexual health outcomes after minimally invasive hysterectomy procedures.

Strengths and limitations

One notable strength of the present research lies in its utilization of a time-segmented framework for assessing quality of life outcomes across various postoperative phases. This methodological choice is further supported by the findings of Taheri et al. [14], who validated the clinical robustness of SF-36 and UDI-6 in hysterectomy populations. In contrast to studies limited to a single follow-up point, this design enables a more nuanced understanding of recovery trajectories and patient-reported experiences.

Certain weaknesses inherent to this investigation must also be noted. Given the retrospective design, there is a risk of selection bias and possible data loss from incomplete medical records. Secondly, reliance on patient-reported outcome measures may have introduced recall bias or subjective variation in response accuracy. Thirdly, the lack of random allocation and potential confounding due to institutional practices limit the causal interpretations of observed associations. Lastly, while the sample was sufficiently powered for group comparisons, the absence of a priori power estimation represents a methodological limitation.

Upcoming studies would benefit from adopting a prospective, randomized design incorporating extended follow-up durations and cost-effectiveness assessments. Such studies would provide stronger evidence to confirm these findings and support more informed surgical decision-making.

Conclusion

In summary, TLH demonstrated superior short-term benefits in postoperative quality of life and recovery when compared to TAH in perimenopausal women undergoing benign hysterectomy. Although these improvements tend to taper in the long term, their early impact remains clinically meaningful. Surgical decision-making should be individualized, taking into account patient preferences, surgical expertise, and institutional capabilities. Incorporating a time-segmented assessment of quality of life offers a more holistic view of postoperative recovery and can enhance the interpretation of treatment efficacy.

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