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Spinal versus General Anesthesia in Vaginal Hysterectomy: A Retrospective Multicenter Study on Postoperative Recovery and Pain Outcomes

Vajinal Histerektomide Spinal ve Genel Anestezinin Karşılaştırılması: Postoperatif İyileşme ve Ağrı Üzerine Retrospektif Çok Merkezli Çalışma

Abdurrahman Sengi[1], Mayıs Jinda Pekgül[1], Mehmet Nuri Duran[2]

[1]Diyarbakır Gazi Yaşargil Training and Research Hospital, Clinic of Obstetrics and Gynecology, Diyarbakır, TÜRKİYE
[2]Çanakkale Onsekiz Mart University Faculty of Medicine, Department of Obstetrics and Gynecology, Çanakkale, TÜRKİYE

Abstract

Background: Vaginal hysterectomy is a commonly performed procedure, and the choice of anesthesia may influence postoperative recovery. This study aimed to compare the effects of spinal and general anesthesia on postoperative pain and recovery outcomes.

Materials and Methods: This retrospective multicenter study included patients who underwent vaginal hysterectomy between January 2022 and January 2026 at three hospitals. Patients were divided into a spinal anesthesia group (Group S, n = 100) and a general anesthesia group (Group G, n = 100). Demographic characteristics, intraoperative parameters, and postoperative outcomes were analyzed. Postoperative pain was assessed using a 10-point visual analog scale (VAS). Recovery parameters included mobilization time and time to first gas passage.

Results: A total of 200 patients were analyzed. Baseline characteristics were similar between groups (p>0.05). Operation time and hemoglobin changes did not differ significantly (p>0.05). Postoperative pain scores at 1, 12, and 24 hours were comparable (p=0.505, p=0.417, and p = 0.511, respectively). Mobilization time was significantly shorter in the spinal anesthesia group (4.00 vs. 6.14 hours, p<0.001). Time to first gas passage was also shorter (24.91 vs. 28.39 hours, p=0.028). Complication rates were similar between the groups (9.0% vs. 9.0%, p=1.000).

Conclusion: Spinal and general anesthesia provided similar postoperative pain control. However, spinal anesthesia was associated with faster postoperative recovery, including earlier mobilization and quicker gastrointestinal recovery, without increasing complications.

Keywords: Vaginal Hysterectomy, Spinal Anesthesia, General Anesthesia, Postoperative Recovery, Pain, Early Mobilization

Öz

Amaç: Vajinal histerektomi sık uygulanan bir cerrahi olup, anestezi yöntemi postoperatif iyileşmeyi etkileyebilir. Bu çalışmada spinal ve genel anestezinin postoperatif ağrı ve iyileşme üzerine etkileri karşılaştırıldı.

Materyal ve Metod: Bu retrospektif çok merkezli çalışmaya Ocak 2022–Ocak 2026 tarihleri arasında vajinal histerektomi yapılan hastalar dahil edildi. Hastalar spinal anestezi (Grup S, n=100) ve genel anestezi (Grup G, n=100) olarak iki gruba ayrıldı. Demografik veriler, intraoperatif parametreler ve postoperatif sonuçlar analiz edildi. Postoperatif ağrı 10 puanlık görsel analog skala (VAS) ile değerlendirildi. İyileşme parametreleri mobilizasyon zamanı ve ilk gaz çıkarma süresini içermekteydi.

Bulgular: Toplam 200 hasta değerlendirildi. Gruplar arasında demografik özellikler benzerdi (p>0,05). Operasyon süresi ve hemoglobin değişimleri açısından fark yoktu (p>0,05). Postoperatif 1., 12. ve 24. saat ağrı skorları benzer bulundu (p=0,505, p=0,417, p=0,511). Spinal anestezi grubunda mobilizasyon süresi daha kısa idi (4,00 vs. 6,14 saat, p<0,001). İlk gaz çıkarma süresi de daha kısa bulundu (24,91 vs. 28,39 saat, p=0,028). Komplikasyon oranları benzerdi (%9,0 vs. %9,0, p=1,000).

Sonuç: Spinal ve genel anestezi benzer ağrı kontrolü sağlar. Ancak spinal anestezi daha hızlı iyileşme, erken mobilizasyon ve gastrointestinal fonksiyonların daha hızlı geri dönüşü ile ilişkilidir ve komplikasyon oranlarını artırmamaktadır.

Anahtar Kelimeler: Vajinal Histerektomi, Spinal Anestezi, Genel Anestezi, Postoperatif İyileşme, Ağrı, Erken Mobilizasyon

Corresponding Author: Abdurrahman Sengi, Diyarbakır Gazi Yaşargil Training and Research Hospital, Clinic of Obstetrics and Gynecology, Diyarbakır, TÜRKİYE
E-mail: sengi_21@hotmail.com / **ORCID ID:** 0000-0001-7513-8205

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Introduction

Vaginal hysterectomy is a commonly performed gynecological procedure for the treatment of various benign uterine conditions, including uterine prolapse, abnormal uterine bleeding, and leiomyomas. Compared with abdominal and laparoscopic approaches, vaginal hysterectomy is associated with shorter operative time, reduced postoperative pain, lower complication rates, and faster recovery. Therefore, it is generally considered the preferred surgical route when feasible. Despite its advantages, perioperative management, particularly the choice of anesthetic technique, remains a critical determinant of patient outcomes (1,2).

Both general anesthesia and spinal anesthesia are widely used for vaginal hysterectomy. General anesthesia provides optimal airway control, amnesia, and muscle relaxation, making it a reliable and commonly preferred method. However, it is also associated with certain disadvantages, such as postoperative nausea and vomiting, respiratory complications, and increased opioid consumption. In contrast, spinal anesthesia offers several potential benefits, including effective intraoperative analgesia, reduced stress response, decreased blood loss, and a lower incidence of thromboembolic events. Additionally, it may provide superior early postoperative pain control and reduce the need for systemic analgesics (3,4).

Despite these theoretical advantages, spinal anesthesia is not without limitations. It may be associated with intraoperative hypotension, bradycardia, urinary retention, and post-dural puncture headache. Furthermore, concerns regarding an inadequate block level or prolonged surgery may limit its use in certain clinical settings. Consequently, the optimal anesthetic technique for vaginal hysterectomy remains a matter of ongoing debate, and the choice is often influenced by patient characteristics, surgical factors, and clinician preference (5,6).

Previous studies comparing spinal and general anesthesia in gynecological surgery have reported conflicting results. Although some studies suggest that spinal anesthesia provides better postoperative pain control and a shorter hospital stay, others have found no significant differences in major perioperative outcomes. Moreover, many of these studies included heterogeneous surgical populations or had limited sample sizes, which may affect the generalizability of their findings. Therefore, further studies focusing specifically on vaginal hysterectomy are needed to clarify the comparative effects of these anesthetic techniques (7,8).

The aim of this study was to compare the effects of spinal and general anesthesia on postoperative pain and recovery outcomes in patients undergoing vaginal hysterectomy, with a particular focus on early postoperative recovery. We hypothesized that spinal anesthesia would be associated with improved postoperative recovery, including earlier mobilization and faster return of gastrointestinal function, without a significant difference in postoperative pain compared with general anesthesia.

Materials and Methods

This retrospective multicenter study was based on a chart review of patients who underwent vaginal hysterectomy at three hospitals, including two tertiary care centers and one secondary care center, from January 2022 and January 2026. All surgical procedures were performed by the same experienced surgeon to minimize inter-operator variability and ensure procedural standardization. The study protocol was approved by the Clinical Research Ethics Committee of Gazi Yaşargil Training and Research Hospital (approval no. 65, date: February 12, 2026), and the study was conducted in accordance with the principles of the Declaration of Helsinki. Due to the retrospective design, the requirement for informed consent was waived. Ethical approval was obtained from a single institutional review board, and all participating centers adhered to this approval and the same study protocol, data were obtained through a retrospective chart review, and standardized data collection was applied across participating centers where available. Given the retrospective design and non-randomized allocation of anesthesia type, selection bias cannot be excluded.

Patients who underwent elective vaginal hysterectomy for benign gynecological indications were included in the study. Exclusion criteria included malignant disease, emergency surgery, conversion to abdominal or laparoscopic procedures, concomitant major surgical interventions, incomplete medical records, and contraindications to spinal anesthesia. Eligible patients were categorized into two groups according to the type of anesthesia administered: spinal anesthesia (Group S) and general anesthesia (Group G). The choice of anesthetic technique was determined by the attending anesthesiologist based on clinical judgment and patient characteristics. Spinal anesthesia was preferred in the absence of contraindications, whereas general anesthesia was selected in cases of anticipated difficult airway, contraindications to spinal anesthesia (including coagulopathy, patient refusal, or anatomical difficulties), or significant patient anxiety.

All patients were monitored intraoperatively using standard

monitoring techniques, including electrocardiography, non-invasive blood pressure measurement, and pulse oximetry. Spinal anesthesia was administered at the L3–L4 or L4–L5 interspace under sterile conditions using hyperbaric bupivacaine at a dose of 14–15 mg. In patients with poor general condition or low body weight, intrathecal fentanyl was added, and the bupivacaine dose was reduced accordingly. General anesthesia was induced with intravenous fentanyl (100 mcg; 150 mcg in patients with higher body weight), followed by propofol and a neuromuscular blocking agent, and was maintained with inhalational or total intravenous anesthetics. Postoperative analgesia was managed uniformly in both groups with dexketoprofen 50 mg three times daily, with tramadol administered as rescue analgesia when required. Although no formal Enhanced Recovery After Surgery (ERAS) protocol was prospectively implemented, perioperative management, including early mobilization and standardized analgesia was applied in accordance with general enhanced recovery principles at all participating centers.

Demographic and clinical data, including age, body mass index (BMI), gravidity, comorbidities, previous surgical history, surgical indications, and type of surgical procedure, were recorded. Intraoperative variables included duration of surgery, perioperative hemoglobin levels, and additional surgical procedures. Postoperative outcomes included pain scores assessed using a 10-point visual analog scale (VAS) at the 1st, 12th, and 24th postoperative hours, time to mobilization, time to first gas passage, and postoperative complications. The primary outcome of the study was postoperative pain intensity within the first 24 hours. Secondary outcomes included recovery-related parameters (mobilization time and time to first gas passage), intraoperative variables, and postoperative complications.

Statistical analysis was performed using SPSS software (version 27; IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean±standard deviation, while categorical variables were presented as frequencies and percentages. The normality of distribution was assessed using the Shapiro–Wilk test. Comparisons between groups were performed using the independent-samples t-test for continuous variables and the chi-square test or Fisher's exact test for categorical variables, as appropriate. A p-value <0.05 was considered statistically significant. A post hoc power analysis was performed using G*Power (version 3.1). Assuming a minimum clinically important difference of 1.0 point on the VAS and a pooled standard deviation of 1.07 (effect size, d = 0.93), the achieved power with 100 patients per group was 0.9999 (one-tailed $\alpha = 0.05$), confirming adequate statistical power.

Results

Table 1. Demographic and baseline clinical characteristics of the study groups

Variable	Spinal anesthesia (n=100)	General anesthesia (n=100)	p-value
Age (years), mean±SD	60.47±9.32	61.23±9.50	0.569
Body mass index (kg/m²), mean±SD	30.10±2.55	29.67±2.93	0.270
Gravidity, mean±SD	5.51±2.42	5.22±1.85	0.342
Comorbidity present, n (%)	57 (57.0)	57 (57.0)	1.000
Previous operation history, n (%)	21 (21.0)	21 (21.0)	1.000
Type of operation: VAHBSO, n (%)	85 (85.0)	92 (92.0)	0.184
Type of operation: VAHBS, n (%)	15 (15.0)	8 (8.0)	0.184
Indication: prolapse, n (%)	56 (56.0)	57 (57.0)	0.862
Indication: PMNK, n (%)	28 (28.0)	25 (25.0)	0.862

Table 1. Continued			
Indication: AUK, n (%)	16 (16.0)	18 (18.0)	0.862
Hospital 1, n (%)	84 (84.0)	75 (75.0)	0.211
Hospital 2, n (%)	16 (16.0)	24 (24.0)	0.211
Hospital 3, n (%)	0 (0.0)	1 (1.0)	0.211
Values are presented as mean±standard deviation or n (%). Continuous variables were compared using the independent-samples t-test. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate. A p-value <0.05 was considered statistically significant.			

Table 1 shows that the spinal and general anesthesia groups were broadly comparable with respect to baseline demographic and clinical characteristics. No statistically significant differences were observed in age, body mass index, gravidity, comorbidity status, or previous surgical history (all p>0.05). Similarly, the distribution of surgical indications and hospital centers did not differ significantly between the groups. Although the proportion of patients undergoing vaginal abdominal hysterectomy with bilateral salpingo-oophorectomy (VAHBSO) was numerically higher in the general anesthesia group, this difference was not statistically significant (p=0.184). Overall, these findings indicate satisfactory baseline homogeneity between groups and suggest that subsequent postoperative differences are less likely to be explained by major preoperative imbalance.

Table 2 summarizes the intraoperative and surgery-related findings. Preoperative hemoglobin levels, postoperative hemoglobin levels, and hemoglobin decrease were comparable between the groups, with no statistically significant differences detected (all p>0.05), suggesting that perioperative blood loss was similar under both anesthesia techniques. Likewise, operation time did not differ significantly between the spinal and general anesthesia groups (p=0.720), indicating that anesthesia modality did not influence operative time. The overall frequency of additional procedures was nearly identical between groups (59.0% vs. 58.0%, p=1.000). However, a marked and statistically significant difference was observed in the type of additional pelvic reconstructive procedure performed (p<0.001). Sacrospinous ligament suspension-related procedures were more common in the spinal anesthesia group, whereas uterosacral ligament suspension-related procedures were more frequent in the general anesthesia group. This procedural heterogeneity is clinically relevant and should be taken into consideration when interpreting postoperative recovery outcomes.

Table 2. Intraoperative and surgery-related characteristics			
Variable	**Spinal anesthesia (n=100)**	**General anesthesia (n=100)**	**p-value**
Preoperative hemoglobin (g/dL), mean±SD	11.38±1.26	11.57±1.29	0.304
Postoperative hemoglobin (g/dL), mean±SD	10.08±1.30	10.06±1.21	0.893
Hemoglobin decrease (g/dL), mean±SD	1.30±1.12	1.51±1.14	0.194
Operation time (min), mean±SD	98.47±7.59	98.85±7.39	0.720
Any additional procedure, n (%)	59 (59.0)	58 (58.0)	1.000
Additional procedure distribution, n (%)			<0.001
None	41 (41.0)	42 (42.0)	
SSLP	28 (28.0)	1 (1.0)	
USLP	4 (4.0)	30 (30.0)	
Rectocele repair	5 (5.0)	5 (5.0)	
Rectocele + SSLP	13 (13.0)	0 (0.0)	
Rectocele + USLP	0 (0.0)	13 (13.0)	
TVT	4 (4.0)	4 (4.0)	
TVT + rectocele repair	5 (5.0)	5 (5.0)	
SD: Standard deviation, SSLP: Sacrospinous ligament suspension, USLP: uterosacral ligament suspension, TVT: Tension-free Vaginal Tape			

Table 3 presents the postoperative recovery and safety outcomes of the two anesthesia techniques. Pain scores measured at the 1st, 12th, and 24th postoperative hours did not differ significantly between the spinal and general anesthesia groups (all p>0.05), indicating that postoperative pain control was comparable in this cohort. In contrast, recovery-related endpoints favored spinal anesthesia. Patients in the spinal anesthesia group mobilized significantly earlier than those in the general anesthesia group (4.00 vs. 6.14 hours, p<0.001). Similarly, the time to first gas passage was significantly shorter in the spinal anesthesia group (24.91 vs. 28.39 hours, p=0.028), suggesting a more rapid restoration of gastrointestinal function and enhanced early postoperative recovery. Regarding safety outcomes, the overall complication rate was identical between the groups (9.0% in each group, p=1.000). Furthermore, the distribution of specific complications, including cuff infection, retroperitoneal hematoma, bladder perforation, and postoperative bleeding, was not significantly different (p=0.987). Collectively, these findings indicate that spinal anesthesia was associated with improved functional recovery without an accompanying increase in postoperative morbidity.

Table 3. Postoperative outcomes and complications

Variable	Spinal anesthesia (n=100)	General anesthesia (n=100)	p-value
Pain score at postoperative 1st hour, mean±SD	6.49±1.65	6.65±1.73	0.505
Pain score at postoperative 12th hour, mean±SD	3.66±1.15	3.54±0.93	0.417
Pain score at postoperative 24th hour, mean±SD	3.11±1.04	3.21±1.10	0.511
Mobilization time (h), mean±SD	4.00±0.00	6.14±0.51	<0.001
Time to first gas passage (h), mean±SD	24.91±10.48	28.39±11.66	0.028
Any complication, n (%)	9 (9.0)	9 (9.0)	1.000
Complication distribution, n (%)			0.987
None	91 (91.0)	91 (91.0)	
Cuff infection	1 (1.0)	1 (1.0)	
Retroperitoneal hematoma	2 (2.0)	2 (2.0)	
Bladder perforation	3 (3.0)	2 (2.0)	
Postoperative bleeding	3 (3.0)	4 (4.0)	

SD: Standard deviation

Discussion

In this retrospective multicenter study, we evaluated the impact of spinal versus general anesthesia on intraoperative and postoperative outcomes in patients undergoing vaginal hysterectomy. The principal findings showed that while postoperative pain scores were comparable between the two anesthesia techniques, spinal anesthesia was associated with significantly earlier mobilization and faster recovery of gastrointestinal function, without an increase in perioperative complications.

Postoperative pain control is traditionally considered one of the main advantages of neuraxial anesthesia. Several previous studies have reported lower postoperative pain scores and reduced opioid consumption in patients receiving spinal or combined neuraxial techniques compared with general anesthesia (9,10). However, in the present study, no statistically significant differences were observed in pain scores at the 1st, 12th, and 24th postoperative hours. This finding is consistent with more recent evidence suggesting that the analgesic advantage of spinal anesthesia may be attenuated in the setting of standardized multimodal analgesia protocols and enhanced recovery pathways (6,11). Therefore, our results support the notion that, under optimized perioperative analgesic management, the type of anesthesia alone may not be the primary determinant of postoperative pain outcomes.

In contrast, recovery-related parameters clearly favored spinal anesthesia in our cohort. Patients who received spinal anesthesia demonstrated significantly earlier mobilization and shorter time to first gas passage. These findings are clinically important, as early mobilization is a cornerstone of enhanced recovery after surgery (ERAS) protocols and is associated with

reduced postoperative morbidity, improved pulmonary function, and shorter hospital stay (12). Similarly, early return of bowel function reflects improved gastrointestinal motility and reduced postoperative ileus. Recent studies have consistently shown that neuraxial anesthesia is associated with improved postoperative recovery profiles, including faster functional recovery and improved patient outcomes (13). The mechanisms underlying these benefits likely include reduced systemic opioid exposure, attenuation of the surgical stress response, and preservation of autonomic and gastrointestinal function (4,11).

Importantly, our study demonstrated that spinal anesthesia did not increase postoperative complication rates. The overall complication rate and distribution of specific complications were similar between the two groups. This finding aligns with current literature indicating that neuraxial anesthesia is a safe alternative to general anesthesia in gynecological surgery when applied in appropriately selected patients (14). Moreover, recent large-scale analyses suggest that regional anesthesia may reduce certain postoperative complications, including thromboembolic events and respiratory complications, although these effects may vary depending on the patient population and surgical context (15). Although our study did not demonstrate a reduction in complication rates, the absence of increased risk further supports the safety profile of spinal anesthesia.

Interestingly, although previous studies have reported reduced intraoperative blood loss and improved perioperative stability with spinal anesthesia, our study did not demonstrate significant differences in hemoglobin levels or operative time between groups. This discrepancy may be explained by the standardized surgical technique, the use of a single experienced surgeon, and the relatively homogeneous patient population in our study, which may have minimized variability in intraoperative outcomes.

Another notable finding was the significant difference in the distribution of concomitant pelvic reconstructive procedures between the groups. Sacrospinous ligament suspension (SSLP) predominated in the spinal anesthesia group, whereas uterosacral ligament suspension (USLP) was more common in the general anesthesia group. These procedures differ in their anatomical approach and extent of tissue dissection, which may independently influence early postoperative recovery parameters such as mobilization time and return of gastrointestinal function. Therefore, we acknowledge that the observed recovery differences cannot be attributed exclusively to the anesthetic technique, and the differential distribution of surgical procedures represents a significant confounding factor that limits the interpretability of our findings. Future studies should control for the type of concomitant pelvic reconstructive procedure, ideally through randomization or propensity score matching, to isolate the independent effect of anesthesia on postoperative recovery.

Stduy Limitations

The present study has several strengths. The multicenter design enhances external validity, while the relatively large sample size increases statistical power. In ad dition, all procedures were performed by a single experienced surgeon, minimizing variability related to surgical technique. However, several limitations should be acknowledged. First, the primary limitation is the retrospective and non-randomized design. The anesthesia technique was selected at the discretion o f t he attending anesthesiologist, introducing an inherent risk of selection bias that cannot be fully eliminated. Although baseline demographic and clinical characteristics were statistically comparable between the two groups, the possibility of residual or unmeasured confounding cannot be excluded. Future prospective randomized controlled trials are warranted to confirm these findings. Second, detailed data on intraoperative hemodynamic parameters, opioid consumption, a nd adherence to ERAS protocols were not available, which may limit the interpretation of some outcomes. Furthermore, the significant difference in the distribution of concomitant pelvic reconstructive procedures ($p<0.001$) represents an important potential confounding factor. A multivariate regression analysis could n ot b e performed due to limitations of the retrospective dataset; future studies should employ propensity score-matched or multivariate analyses to isolate the independent effect o f anesthesia t ype. Third, postoperative analgesic consumption data, in cluding th e total dose and frequency of rescue tramadol administration, were not systematically recorded. Although a standardized analgesic protocol (dexketoprofen 50 mg three times daily with tramadol as rescue) was applied in both groups, the absence of detailed consumption data l imits t he interpretation of th e comparable VAS scores observed between the groups. The criteria guiding anesthesia selection — i ncluding anticipated di fficult airway, contraindications to s pinal anesthesia, a nd patient anxiety — may have introduced unmeasured differences between groups that cannot be fully accounted for in the present analysis.

Conclusion

In this retrospective multicenter study, spinal and general anesthesia provided comparable postoperative pain control in patients undergoing vaginal hysterectomy. Spinal anesthesia was

associated with significantly earlier mobilization and faster return of gastrointestinal function, without an increase in complication rates. However, these findings should be interpreted with caution given the retrospective non-randomized design and the significant difference in the distribution of concomitant pelvic reconstructive procedures between the groups, which may have independently influenced recovery outcomes. Spinal anesthesia appears to be a safe and feasible alternative to general anesthesia in this setting; however, prospective randomized controlled trials with appropriate control for surgical heterogeneity are needed to confirm these conclusions.

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Author Contributions:
Concept: A.S., M.J.P, M.N.D.
Literature Review: A.S., M.J.P, M.N.D.
Design: A.S., M.J.P, M.N.D.
Data acquisition: A.S., M.J.P, M.N.D.
Analysis and interpretation: A.S., M.J.P, M.N.D.
Writing manuscript: A.S., M.J.P, M.N.D.
Critical revision of manuscript: A.S., M.J.P, M.N.D.
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