(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

Comparison of spinal anesthesia versus general anesthesia for vaginal hysterectomy: postoperative pain, PONV, and discharge readiness

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ABSTRACT:
Background: Vaginal hysterectomy is a commonly performed gynecological procedure for benign uterine conditions and is associated with favorable surgical outcomes. However, postoperative recovery can be significantly influenced by the choice of anesthetic technique. Spinal anesthesia and general anesthesia are the two most frequently used modalities for vaginal hysterectomy, each with distinct physiological effects that may impact postoperative pain, postoperative nausea and vomiting (PONV), and readiness for discharge from the post-anesthesia care unit (PACU). Optimizing anesthetic technique is essential to enhance patient comfort, minimize complications, and facilitate early recovery, especially in tertiary care hospitals adopting recovery-oriented perioperative protocols. **Aim:**To compare spinal anesthesia and general anesthesia in patients undergoing vaginal hysterectomy with respect to postoperative pain, incidence of postoperative nausea and vomiting, and discharge readiness from the PACU. **Materials and Methods:**This comparative observational study was conducted in a tertiary care hospital and included 84 female patients aged 30–65 years, belonging to American Society of Anesthesiologists (ASA) physical status I or II, scheduled for elective vaginal hysterectomy. Patients were allocated into two groups of 42 each based on the anesthetic technique used: spinal anesthesia (SA group) and general anesthesia (GA group). Postoperative pain was assessed using the Visual Analog Scale (VAS) at 2, 6, 12, and 24 hours. The requirement for rescue analgesia was recorded. The incidence of postoperative nausea and vomiting and the need for rescue antiemetics were noted. Readiness for discharge from the PACU was evaluated using a standardized discharge scoring system. Appropriate statistical tests were applied, and a p-value <0.05 was considered statistically significant. **Results:**Patients in the SA group had significantly lower VAS pain scores during the early postoperative period (2–12 hours) compared to the GA group (p <0.001). Fewer patients in the SA group required rescue analgesia (33.33% vs 73.81%; p <0.001), and the mean number of rescue doses was significantly lower. The incidence of PONV was significantly higher in the GA group, with greater need for rescue antiemetics (p <0.01). Discharge readiness from the PACU was achieved earlier in the SA group, with a significantly shorter mean discharge time and a higher proportion of patients discharge-ready within 2 hours (p <0.001). **Conclusion:**Spinal anesthesia offers significant advantages over general anesthesia for vaginal hysterectomy by providing better early postoperative analgesia, reducing PONV, and facilitating earlier discharge readiness. It may be considered the preferred anesthetic technique in suitable patients.

Keywords: Vaginal hysterectomy; spinal anesthesia; general anesthesia; postoperative pain; postoperative nausea and vomiting

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This article may be cited as: Dhadich S, Arya A. Comparison of spinal anesthesia versus general anesthesia for vaginal hysterectomy: postoperative pain, PONV, and discharge readiness. J Adv Med Dent Scie Res 2015;3(1):488-493.

INTRODUCTION

Vaginal hysterectomy remains a key definitive surgical treatment for a wide range of benign uterine conditions such as abnormal uterine bleeding, symptomatic fibroids, adenomyosis, and uterovaginal prolapse. Among the available routes of hysterectomy, the vaginal approach is widely valued because it avoids an abdominal incision, is generally associated with fewer perioperative complications, and supports earlier return to routine activity when compared with more invasive approaches. Clinical guidance has consistently emphasized that, whenever feasible, the vaginal route should be preferred for benign disease because it aligns well with the goals of modern perioperative care—reduced surgical stress, improved patient comfort, and earlier recovery.[1] Evidence syntheses comparing routes of hysterectomy have similarly highlighted the practical recovery advantages of the vaginal approach, reinforcing its importance in routine gynecologic practice and supporting its continued use in tertiary care settings where standardized perioperative pathways can be implemented.[2]Anesthetic management is an integral component of vaginal hysterectomy because the chosen technique can influence intraoperative stability as well as postoperative recovery endpoints that matter to patients and healthcare systems. General anesthesia is familiar and broadly applicable, but it may contribute to early postoperative discomfort through airway irritation, higher systemic opioid exposure, and greater risk of postoperative nausea and vomiting. Spinal anesthesia, in contrast, provides dense intraoperative analgesia and sympathetic blockade that can reduce nociceptive input, potentially translating into improved early postoperative pain control and a reduced need for systemic opioids. In hysterectomy populations, comparative studies have demonstrated clinically meaningful reductions in postoperative opioid requirements and pain scores when spinal techniques are used rather than general anesthesia, suggesting that neuraxial approaches may offer recovery advantages beyond the operating room.[3]Postoperative pain after vaginal hysterectomy is not only an immediate comfort concern; it is a determinant of mobilization, ability to tolerate oral intake, and readiness for discharge from post-anesthesia care. Early pain that is inadequately controlled often leads to increased rescue analgesic dosing and greater opioid exposure, which can further compound adverse effects such as sedation, dizziness, ileus, and nausea. Neuraxial strategies—including intrathecal adjuvants—have been explored to optimize early analgesia and decrease postoperative opioid consumption. Randomized evidence in hysterectomy patients has shown that adding intrathecal morphine to bupivacaine can significantly reduce patient-controlled opioid requirements during the first postoperative day, underscoring how neuraxial analgesia can shift pain management away from systemic opioids and potentially improve overall recovery quality.[4]Even within the context of vaginal hysterectomy specifically, targeted techniques aimed at minimizing pain have shown measurable benefits that support the broader concept of reducing systemic analgesic burden. Local infiltration analgesia delivered systematically to tissues manipulated during vaginal hysterectomy has been shown to lower early postoperative pain and reduce opioid requirements, while also decreasing time spent in the post-anesthesia care unit and accelerating first mobilization. Such findings emphasize that early postoperative recovery after vaginal hysterectomy is modifiable and that analgesic approaches—whether neuraxial, local, or multimodalcan influence endpoints closely aligned with discharge readiness.[5] Postoperative nausea and vomiting is another pivotal recovery endpoint in gynecologic surgery because it directly affects patient satisfaction, oral intake, hydration, ambulation, and discharge timing. Female sex and gynecologic procedures are recognized contributors to a higher baseline risk of PONV, and anesthetic exposures—especially volatile agents and opioids—can further increase incidence and severity. Observational hospital-based evaluations have shown that PONV remains a frequent postoperative complication and is influenced by patient factors, surgical category, and perioperative medication patterns, indicating that it is not a trivial event but rather a recurring barrier to smooth recovery pathways.[6]

MATERIALS AND METHODS

This comparative, observational study was conducted at a tertiary care hospital to evaluate the effects of spinal anesthesia versus general anesthesia in patients undergoing vaginal hysterectomy. The study focused on postoperative outcomes, specifically postoperative pain, postoperative nausea and vomiting (PONV), and readiness for discharge from the post-anesthesia care unit (PACU).A total of 84 female patients scheduled for elective vaginal hysterectomy were included in the study. Patients were aged between 30 and 65 years and belonged to American Society of Anesthesiologists (ASA) physical status I or II. Patients with known contraindications to spinal anesthesia, allergy to study drugs, significant cardiopulmonary disease, neurological disorders, coagulation abnormalities, chronic opioid use, or those requiring conversion to another surgical or anesthetic technique were excluded from the study.

Methodology

Patients were divided into two groups of 42 each based on the type of anesthesia administered. Group SA received spinal anesthesia, while Group GA received general anesthesia. The choice of anesthetic technique was made by the attending anesthesiologist based on clinical suitability and patient preference.

In the spinal anesthesia group, subarachnoid block was performed under aseptic precautions at the L3–L4 or L4–L5 intervertebral space using a 25- or 26-gauge spinal needle. Hyperbaric bupivacaine was administered to achieve an adequate sensory block up to the T6 dermatome. Patients were monitored for hemodynamic changes, and hypotension or bradycardia was managed according to standard institutional protocols.

In the general anesthesia group, anesthesia was induced with intravenous agents followed by endotracheal intubation. Anesthesia was maintained using inhalational agents along with muscle relaxants and analgesics as per standard practice. At the end of surgery, neuromuscular blockade was reversed and patients were extubated after fulfilling standard extubation criteria.

All patients were monitored intraoperatively for heart rate, non-invasive blood pressure, oxygen saturation, and electrocardiography. Intravenous fluids were administered according to body weight and intraoperative requirements. Any intraoperative complications were noted and managed promptly.

Postoperative pain was assessed using the Visual Analog Scale (VAS), where 0 indicated no pain and 10 indicated the worst possible pain. Pain scores were recorded at regular intervals in the postoperative period. Rescue analgesia was administered when the VAS score exceeded 4, and the total analgesic requirement within the postoperative period was documented.

Postoperative nausea and vomiting were assessed using a standardized scoring system. The incidence and severity of nausea and vomiting were recorded in the postoperative period. Patients experiencing PONV were treated with appropriate antiemetic medications, and the need for rescue antiemetics was documented.

Readiness for discharge from the PACU was evaluated using a modified discharge scoring system, which included assessment of vital signs stability, pain control, level of consciousness, presence of nausea or vomiting, and ability to ambulate where applicable. The time taken to achieve discharge readiness criteria was recorded for each patient.

All data were collected using a structured proforma. Quantitative variables such as pain scores and discharge readiness time were expressed as mean and standard deviation, while qualitative variables such as incidence of PONV were expressed as frequencies and percentages. Statistical analysis was performed using appropriate statistical tests, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

Demographic and Baseline Characteristics

The demographic and baseline characteristics of the patients in both groups are presented in Table 1. The mean age of patients in the spinal anesthesia (SA) group was 49.62 ± 7.18 years, while that in the general anesthesia (GA) group was 50.14 ± 6.95 years. This difference was not statistically significant (p = 0.71), indicating age comparability between the groups. With regard to ASA physical status, 61.90% of patients in the SA group and 57.14% in the GA group belonged to ASA I, while 38.10% and 42.86% respectively were classified as ASA II. The distribution of ASA grades was similar in both groups (p = 0.65). Mean body mass index was also comparable, with values of 24.88 ± 2.41 kg/m² in the SA group and 25.12 ± 2.56 kg/m² in the GA group (p = 0.58).

Postoperative Pain Scores

Postoperative pain assessment using the Visual Analog Scale (VAS) revealed significant differences between the two groups during the early postoperative period, as shown in Table 2. At 2 hours postoperatively, the mean VAS score was significantly lower in the SA group (2.14 ± 0.82) compared to the GA group (4.68 ± 1.06), with a p-value of <0.001. Similar trends were observed at 6 hours (2.89 ± 0.91 vs. 5.21 ± 1.12) and 12 hours (3.62 ± 1.03 vs. 4.94 ± 1.09), both demonstrating statistically significant differences (p < 0.001). However, by 24 hours postoperatively, pain scores between the SA and GA groups were comparable (3.95 ± 0.98 vs. 4.22 ± 1.01), with no statistically significant difference (p = 0.21).

Requirement of Rescue Analgesia

The requirement for rescue analgesia is summarized in Table 3. Only 14 patients (33.33%) in the SA group required rescue analgesia, compared to 31 patients (73.81%) in the GA group, a difference that was statistically significant (p < 0.001). Additionally, the mean number of rescue analgesic doses required was significantly lower in the SA group (1.26 ± 0.44) than in the GA group (2.41 ± 0.68), with a p-value of <0.001.

Postoperative Nausea and Vomiting

The incidence of postoperative nausea and vomiting is detailed in Table 4. Nausea was observed in 19.05% of patients in the SA group compared to 50.00% in the GA group, which was statistically significant (p = 0.003). Vomiting occurred in 11.90% of patients receiving spinal anesthesia, whereas 42.86% of patients in the general anesthesia group experienced vomiting (p = 0.002). Furthermore, the requirement for rescue antiemetic therapy was significantly lower in the SA group (14.29%) compared to the GA group (45.24%), with a p-value of 0.002.

Discharge Readiness from PACU

Table 5 illustrates the parameters related to discharge readiness from the post-anesthesia care unit. The mean time to achieve discharge readiness was significantly shorter in the SA group (118.52 ± 24.36 minutes) compared to the GA group (156.78 ± 28.91 minutes), with a p-value of <0.001. Additionally, a significantly higher proportion of patients in the SA group (66.67%) were discharge-ready within 2 hours compared to the GA group (28.57%), again showing statistical significance (p < 0.001).

Table 1: Demographic and Baseline Characteristics

Parameter	Spinal Anesthesia (SA) n=42	General Anesthesia (GA) n=42	p-value
Mean age (years)	49.62 ± 7.18	50.14 ± 6.95	0.71
ASA I	26 (61.90%)	24 (57.14%)	0.65
ASA II	16 (38.10%)	18 (42.86%)	0.65
Mean BMI (kg/m²)	24.88 ± 2.41	25.12 ± 2.56	0.58

Table 2: Postoperative Pain Scores (VAS)

Time Interval	SA Group (Mean ± SD)	GA Group (Mean ± SD)	p-value
2 hours	2.14 ± 0.82	4.68 ± 1.06	<0.001
6 hours	2.89 ± 0.91	5.21 ± 1.12	<0.001
12 hours	3.62 ± 1.03	4.94 ± 1.09	<0.001
24 hours	3.95 ± 0.98	4.22 ± 1.01	0.21

Table 3: Requirement of Rescue Analgesia

Parameter	SA Group (n=42)	GA Group (n=42)	p-value
Patients requiring rescue analgesia	14 (33.33%)	31 (73.81%)	<0.001
Mean number of rescue doses	1.26 ± 0.44	2.41 ± 0.68	<0.001

Table 4: Incidence of Postoperative Nausea and Vomiting (PONV)

Parameter	SA Group (n=42)	GA Group (n=42)	p-value
Nausea	8 (19.05%)	21 (50.00%)	0.003
Vomiting	5 (11.90%)	18 (42.86%)	0.002
Need for rescue antiemetic	6 (14.29%)	19 (45.24%)	0.002

Table 5: Discharge Readiness from PACU

Parameter	SA Group	GA Group	p-value
Mean time to discharge readiness (minutes)	118.52 ± 24.36	156.78 ± 28.91	<0.001
Patients discharge-ready within 2 hours	28 (66.67%)	12 (28.57%)	<0.001

DISCUSSION

The two groups in the present study were well matched at baseline (SA: 49.62 ± 7.18 vs GA: 50.14 ± 6.95 years; ASA I 61.90% vs 57.14%; BMI 24.88 ± 2.41 vs 25.12 ± 2.56; all p > 0.05), which strengthens the internal validity of the observed postoperative differences. Similar baseline comparability has been reported in gynecologic hysterectomy cohorts comparing neuraxial-based techniques and GA—for example, Ghodki et al. (2014) reported closely comparable age (47.5 ± 11.8 vs 47.8 ± 11.2 years) and ASA distribution (ASA I/II: 27/3 vs 26/4) between groups, supporting that outcome differences are less likely due to preoperative imbalance.[7] Early postoperative pain was markedly lower with spinal anesthesia in this study (VAS at 2 h: 2.14 ± 0.82 vs 4.68 ± 1.06; 6 h: 2.89 ± 0.91 vs 5.21 ± 1.12; 12 h: 3.62 ± 1.03 vs 4.94 ± 1.09; all p < 0.001), while by 24 h the difference narrowed (3.95 ± 0.98 vs 4.22 ± 1.01; p = 0.21), suggesting the main benefit is in the immediate recovery window. A comparable pattern has been described after vaginal hysterectomy by Sprung et al. (2006), where the intrathecal group had better immediate postoperative analgesia with reduced morphine use in PACU and during the first 12 h (p < 0.001), and a higher proportion were pain-free at two weeks (69% vs 48%; p = 0.044), reinforcing that neuraxial techniques can improve early pain trajectories beyond the operating room.[8] The lower pain scores in our SA group translated into substantially reduced rescue analgesic needs (33.33% vs 73.81% requiring rescue analgesia; mean rescue doses 1.26 ± 0.44 vs 2.41 ± 0.68; both p < 0.001). This aligns with fast-track hysterectomy evidence showing major opioid sparing with spinal-based strategies: Wodlin et al. (2011) reported that on the day of surgery, the spinal group (with intrathecal morphine) had a median equivalent i.v. morphine dose of 0.4 mg versus 18.5 mg with GA (p < 0.0001), illustrating the same direction and magnitude of opioid reduction that likely underpins improved comfort and fewer opioid-related adverse effects.[9] In our study, PONV was significantly higher after GA (nausea: 50.00% vs 19.05%, p = 0.003; vomiting: 42.86% vs 11.90%, p = 0.002; rescue antiemetic: 45.24% vs 14.29%, p = 0.002), consistent with the clinical expectation that greater systemic anesthetic and opioid exposure increases emetogenic burden. However, it is important to recognize that spinal techniques can still be associated with high PONV when postoperative opioid delivery is substantial: Kontrimaviciute et al. (2005) studied total abdominal hysterectomy under spinal anesthesia with i.v. PCA morphine and found overall nausea/vomiting of 88.2% without prophylaxis, reduced to 52.9% with ondansetron prophylaxis (p < 0.05). This contrast suggests the low PONV rates in our SA group are plausibly linked to lower opioid requirement plus structured antiemetic/rescue strategies, rather than spinal anesthesia alone being universally antiemetic.[10] Readiness for discharge from PACU was faster with spinal anesthesia in this cohort (118.52 ± 24.36 vs 156.78 ± 28.91 minutes; p < 0.001), and a greater proportion achieved discharge criteria within 2 h (66.67% vs 28.57%; p < 0.001). Earlier work focusing on perioperative time efficiency in vaginal hysterectomy similarly emphasizes the recovery-phase contribution: Tessler et al. (1995) reported longer total perioperative time with spinal anesthesia (278.3 ± 72.0 vs 245.9 ± 23.1 minutes; p < 0.01), and noted this difference was "accounted for mainly by the stay in the PACU." The direction differs from our findings, which may reflect modern discharge criteria, improved spinal dosing/management, and more proactive symptom control that can shift neuraxial anesthesia from a "longer PACU stay" profile to earlier discharge readiness.[11] Beyond individual endpoints, the combined pattern in our results—better early pain control, reduced rescue analgesia, lower PONV, and earlier discharge readiness—suggests an overall enhanced recovery profile with spinal anesthesia for vaginal hysterectomy. This is consistent with broader hysterectomy trials assessing quality of recovery: Castro-Alves et al. (2011) found neuraxial anesthesia produced better postoperative recovery after abdominal hysterectomy, with a median improvement in global QoR-40 score at 24 h of 17 points versus GA (p < 0.001), alongside lower pain scores and opioid consumption in the neuraxial group. While our study did not measure QoR-40, the clinically meaningful reductions in VAS (2–12 h) and PACU discharge time are directionally compatible with the improved recovery quality reported in that randomized evidence.[12] Mechanistically, the analgesic advantage of spinal anesthesia observed here (VAS 2 h: 2.14 vs 4.68; $p < 0.001$) is consistent with the concept that blocking afferent nociceptive input early reduces central sensitization and the need for systemic opioids. When neuraxial techniques are augmented with intrathecal opioids, the opioid-sparing effect can be even more pronounced: Sarma et al. (1993) demonstrated a dose–response benefit of intrathecal morphine in hysterectomy patients under GA, with 0.3 mg providing long-lasting pain relief and significantly reducing supplementary analgesic needs ($p < 0.05$), without added benefit at 0.5 mg. Although our SA protocol did not require intrathecal opioids, these data help explain why neuraxial strategies (with or without intrathecal opioid adjuncts) consistently reduce postoperative analgesic burden across hysterectomy populations.[13] Finally, while spinal anesthesia reduced PONV and analgesic rescue in our cohort, neuraxial approaches can introduce technique-related adverse effects depending on drug choice and adjuncts, which should be balanced against benefits when developing institutional pathways. Singh et al. (2013) reported that adding intrathecal morphine (200 µg) to hyperbaric bupivacaine in abdominal/vaginal hysterectomy prolonged analgesia substantially (mean duration 492.0 ± 153.2 minutes) but was associated with side effects in a minority (nausea/vomiting/itching in 8%; urinary retention 12%). In our study, the SA group had nausea in 19.05% and vomiting in 11.90%, but still far lower than GA; this highlights that careful selection of intrathecal adjuncts (or avoiding them), plus proactive symptom monitoring, can preserve the recovery advantages of spinal anesthesia while minimizing neuraxial-related complications.[14]

CONCLUSION

Spinal anesthesia provided superior early postoperative analgesia compared to general anesthesia in patients undergoing vaginal hysterectomy, with significantly lower pain scores and reduced rescue analgesic requirements. The incidence of postoperative nausea and vomiting was also markedly lower in the spinal anesthesia group. Additionally, patients receiving spinal anesthesia achieved discharge readiness earlier, facilitating faster recovery from the post-anesthesia care unit. These findings support spinal anesthesia as an effective and recovery-friendly anesthetic technique for vaginal hysterectomy in a tertiary care setting.

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