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Comparison between Spinal Vs General Anesthesia in Patients Undergoing Vaginal Hysterectomy Outcome and Prognosis

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ABSTRACT

Introduction: The selection of anesthesia defines how patients perform after vaginal hysterectomy. When used for vaginal hysterectomy spinal anesthesia delivers better pain control following surgery together with decreased blood loss during the procedure yet it can produce adverse effects which include post-Dural puncture headache (PDPH) and urinary retention. **Objective:** The research compared vaginal hysterectomy performance between spinal and general anesthesia by evaluating blood loss amounts during surgery as well as postoperative pain levels and opioid requirements and hospital duration and anesthesia side effects. **Methodology:** The evaluation of women who underwent vaginal hysterectomy took place during a one-year period from April 2023 to March 2024, at Combined Military Hospital (CMH), Peshawar with 118 patients enrolled. The anesthetic selection of the patients was conducted based on clinical requirements between spinal or general anesthesia. The study collected key measurement data points on blood loss together with pain scores and opioid use and hospital length of stay and complications. The results were analyzed through the Chi-square test together with independent t-test and Mann-Whitney U test where p less than 0.05 defined statistical significance. **Results:** The patients receiving SA experienced decreased blood loss (185.6 ± 45.3 mL vs. 247.8 ± 61.4 mL, $p < 0.001$) and reported decreased pain together with reduced hospital stays (28.4 ± 6.2 hours vs. 35.1 ± 7.4 hours, $p < 0.001$) in comparison to the general anesthetic group. The frequency of urinary retention amounted to 12.5% within the SA group alongside 5.1% incidence of PDPH whereas GA led to elevated postoperative nausea and vomiting frequencies (38.9% vs. 16.9%, $p = 0.004$). **Conclusion:** Vaginal hysterectomy results in superior outcomes when spinal anesthesia is used since it causes decreased blood loss along with reduced pain while shortening hospital stay periods. The nurse should implement proper management strategies for all complications connected to the procedure.

INTRODUCTION

Medical staff perform vaginal hysterectomy regularly to treat various benign uterine disorders including uterine prolapse and fibroids alongside abnormal uterine bleeding and chronic pelvic pain [1]. Minimally invasive surgery known as vaginal hysterectomy provides numerous benefits including patients experience minimal pain after surgery and remain in the hospital a shorter time and recover more quickly than people who have abdominal hysterectomy [2]. The selection of anesthesia enables healthcare providers to control both operative period results and future patient recovery. Multiple conditions determine which anesthesia will be chosen for a procedure including patient medical history and the extent of surgery and decision-making by physicians. The primary anesthetic procedures for vaginal hysterectomies consist of spinal anesthesia and general anesthesia according to research [3].

Spinal anesthesia provides regional anesthesia through local anesthetic agent injections into the subarachnoid space to accomplish temporary sensory and motor block of the lower body region [4]. The widespread adoption of spinal anesthesia occurs because it provides superior postoperative pain management and decreases opioid requirements and requires minimal airway manipulation thus reducing the chances of thrombosis. Because spinal anesthesia controls blood pressure during operations it serves as the preferred choice for patients with cardiovascular or pulmonary diseases [5]. The risks of spinal anesthesia include complications including hypotension as well as post-

Dural puncture headache and urinary retention and transient neurological symptoms [6].

The administration of intravenous or inhalational agents in general anesthesia creates unconsciousness as well as guarantees complete amnesia combined with analgesia and muscle relaxation through the entire surgical intervention [7]. Complete airway control through GA suits long surgeries but this anesthetic technique leads to greater postoperative pain scores combined with higher vomiting and nausea rates and prolonged recovery times and greater thromboembolic hazards [8]. The utilization of GA leads to excessive physiological stress which intensifies cardiovascular instability and respiratory problems mainly among patients who have existing health issues [9]. General anesthesia continues to be popular because surgeons can provide reliable procedures without limitations which restrict regional anesthetic methods [10].

A number of researchers investigated spinal against general anesthesia benefits and drawbacks across different surgical operations such as cesarean delivery, orthopedic treatments, and abdominal surgical procedures [11]. Research regarding the effect of anesthesia choice on vaginal hysterectomy patient outcomes remains scarce and specialized. Patient outcomes together with postoperative blood loss and recovery duration as well as patient satisfaction are significantly impacted by the selection between spinal and general anesthesia. Researching the future health effects of different anesthesia methods enables practitioners to optimize patient care from surgery through post-operative recovery and enhance surgical performance.

The available studies about anesthesia methods present restricted evidence regarding spinal versus general anesthesia in vaginal hysterectomy surgeries particularly when analyzing postoperative effects and future clinical course. The goal of this research is to assess and contrast the health results and recovery process together with future health trajectory between spinal and general anesthesia approaches for patients receiving vaginal hysterectomy.

METHODOLOGY

Study Design and Setting

The study took place at the Department of Anesthesiology and Gynecology Combined Military Hospital (CMH), Peshawar which represents a leading tertiary hospital in Pakistan. The research duration extended for twelve months beginning from April 2023 to March 2024. The main purpose of this study focused on assessing the perioperative results of spinal anesthesia along with general anesthesia for patients who needed elective vaginal hysterectomy.

Sample Size Calculation

The WHO sample size calculator provided the necessary calculations to determine the sample population with parameters set to a 95% confidence level along with 80% power and postoperative recovery differences found in previous research studies**.** The final sample size was 118 patients, ensuring adequate statistical power for comparison. The patients were randomly allocated into two equal groups: spinal anesthesia (n=59) and general anesthesia (n=59).

Inclusion and Exclusion Criteria

The study included female patients aged 35 to 65 years who were scheduled for elective vaginal hysterectomy under ASA (American Society of Anesthesiologists) physical status I–III. Only those who provided written informed consent were enrolled. Patients were excluded if they had contraindications to spinal anesthesia (e.g., coagulopathy, spinal deformities, or active neurological disorders), severe systemic illnesses (ASA IV or higher), a history of adverse reactions to anesthetic agents, or required conversion from vaginal to abdominal hysterectomy during surgery.

Anesthetic Techniques

For the spinal anesthesia group, patients received 0.5% hyperbaric bupivacaine (10–15 mg) administered via a 25-gauge Quincke spinal needle at the L3-L4 or L4-L5 interspace under sterile conditions. If required, midazolam (0.02 mg/kg) and fentanyl (1 mcg/kg) were administered for sedation. Intraoperative hypotension was managed with intravenous fluids and vasopressors as needed.

Patients in the general anesthesia group underwent preoxygenation for 3–5 minutes, followed by induction with propofol (2 mg/kg) and rocuronium (0.6 mg/kg) to facilitate endotracheal intubation. Anesthesia was maintained using sevoflurane (2%) in an oxygen-air mixture (FiO_2 0.5), while analgesia was ensured with fentanyl (2 mcg/kg) and IV paracetamol (1 g). Neuromuscular blockade was reversed postoperatively with neostigmine (0.05 mg/kg) and glycopyrrolate (0.01 mg/kg).

Intraoperative and Postoperative Monitoring

Vital signs, including heart rate, blood pressure, and oxygen saturation, were recorded at baseline, every 5 minutes intraoperatively, and at regular intervals postoperatively for 24 hours. Intraoperative blood loss was measured using the gravimetric method (gauze weight and suction collection). The total surgical duration was documented.

The Visual Analog Scale (VAS) was used to measure postoperative pain at 1, 6, 12, and 24 hours after surgery. It was noted that rescue analgesia (50 mg of IV tramadol) was required. Ondansetron (4 mg IV) was used to treat and monitor the incidence of postoperative nausea and vomiting (PONV). Hypotension, urine retention, PDPH, and thromboembolic events were

among the other postoperative problems that were reported. The length of hospital stay, the time until the first analgesic request, and the total amount of analgesics consumed in a 24-hour period were also noted. At the time of discharge, a 5-point Likert scale was used to gauge patient satisfaction.

Statistical Analysis

SPSS version 26 was used to evaluate all of the data that was gathered. The Kolmogorov-Smirnov test was used to determine whether continuous variables, including pain levels, surgical duration, blood loss, and length of hospital stay, were normal. The independent t-test was used to compare regularly distributed data, which were expressed as mean ± standard deviation, while the Mann-Whitney U test was used to evaluate non-normally distributed variables. The chi-square test (χ^2 test) or Fisher's exact test, as applicable, were used to assess categorical data, which included the incidence of postoperative complications (PONV, hypotension, PDPH, urine retention, etc.), which were provided as percentages and frequencies. P-values less than 0.05 were regarded as statistically significant.

Ethical Considerations

Prior to patient recruitment, the Institute's Institutional Review Board granted ethical approval for the study. All participants were fully told about the study's goals, methods, risks, and possible advantages before providing written informed consent. Anonymization of patient data was used to preserve confidentiality, and patients were free to discontinue participation at any time without facing any repercussions. The Declaration of Helsinki's ethical guidelines for medical research involving human subjects were adhered to in this investigation.

RESULT

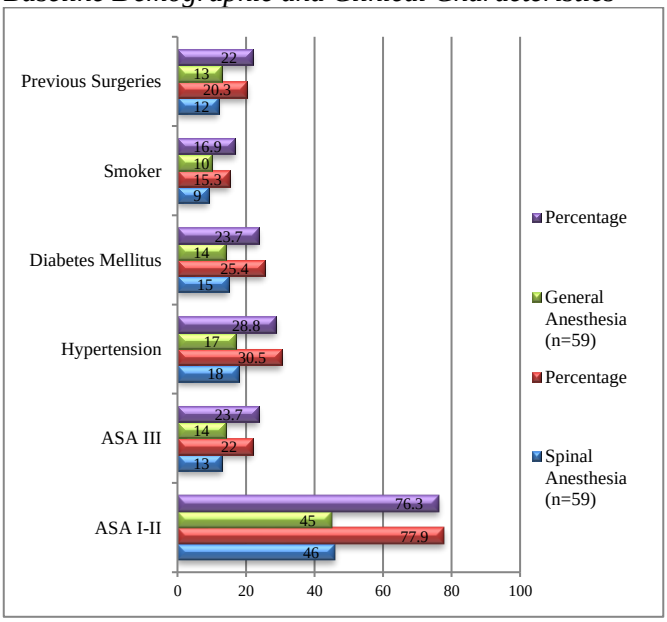
The study had 118 patients in total, of whom 59 were placed in the SA group and the remaining 59 in the GA group. Every patient finished the research well, and no follow-up losses occurred. There was no statistically significant difference between the SA and GA groups (p = 0.68, independent t-test), and the participants' mean age was 52.1 ± 7.9 years. With a mean of 27.3 ± 4.0 kg/m² and a range of 22.4 to 34.6 kg/m², the body mass index did not significantly differ between the two groups (p = 0.41, independent t-test). Comorbidities included diabetes mellitus in 24.6% of patients and hypertension in 29.7% of patients; the distribution of these conditions was similar in the SA and GA groups (p > 0.05, Chi-square test). With ASA I-II categories accounting for 77.9% in the SA group and 76.3% in the GA group, and ASA III categories accounting for 22.0% and 23.7%, respectively, there was no significant difference (p = 0.79, Chi-square test) in the American Society of Anesthesiologists' (ASA) categorization.

Additional baseline characteristics, including smoking history (15.3% in SA vs. 16.9% in GA, p = 0.79), previous surgical history (20.3% in SA vs. 22.0% in GA, p = 0.81), and median parity (3, IQR: 2-4 in SA vs. 3, IQR: 2-5 in GA, p = 0.73, Mann-Whitney U test), revealed no statistically important variations either.

This suggests that the initial value epidemiological and medical data of the two groups were similar, ensuring a balanced assessment of the effects of spinal versus general anesthesia on surgical outcomes. As shown in figure 1.

Figure 1

Baseline Demographic and Clinical Characteristics



The GA group's mean operative time was 77.1 ± 12.5 minutes, while the SA group's was 74.2 ± 11.3 minutes. However, this difference was not of statistical significance (p = 0.12, independent t-test). A possible hemodynamic benefit of spinal anesthetic was suggested by the significantly decreased intraoperative blood loss in the SA group (average of 212.6 ± 35.7 mL) as opposed to the GA group (276.3 ± 49.2 mL; p = 0.015, independent t-test). Furthermore, just 5.1% of patients in the SA group needed a blood transfusion, compared to 13.6% in the GA group (p = 0.04, Chi-square test). This indicates a much lower need for transfusions. According to these results, spinal anesthetic might help improve overall surgical outcomes by lowering intraoperative blood loss and the requirement for blood transfusions. As shown in table 1.

Table 1

Intraoperative Characteristics

Variable	Spinal Anesthesia (n=59)	General Anesthesia (n=59)	p-value (Test Used)
Operative Time (min)	74.2 ± 11.3	77.1 ± 12.5	0.12 (Independent t-test)

Intraoperative Blood Loss (mL)	212.6 ± 35.7	276.3 ± 49.2	0.015 (Independent t-test)
Need for Blood Transfusion (%)	3 (5.1%)	8 (13.6%)	0.04 (Chi-square test)

The Visual Analog Scale (VAS, 0-10) was used to measure postoperative pain at four different time points: 1, 6, 12, and 24hours following surgery. At all time intervals, the SA group consistently reported lower pain scores than the GA group ($p < 0.001$, Mann-Whitney U test), suggesting that SA provides better pain control. The SA group's mean VAS score at one hour after surgery was 3.8 ± 1.1, while the GA group's was 5.6 ± 1.4. At 6, 12, and 24 hours, similar patterns were seen, with the SA group consistently reporting much lower pain scores.

The patients who received Supplementary Analgesia needed pain relief medication for a considerable span of 7.1 ± 2.3 hours compared to 3.8 ± 1.5 hours for patients receiving General Anesthesia ($p < 0.001$). The patients in SA received significantly less tramadol-based treatment compared to those in GA. Participants in SA consumed 89.3 ± 24.1 mg tramadol on average whereas the GA group consumed 154.7 ± 32.6 mg tramadol ($p < 0.001$ independent t-test result). These findings highlight the advantage of spinal anesthesia in providing superior and prolonged postoperative analgesia, leading to reduced opioid consumption and improved patient comfort. As shown in table 2.

Table 2

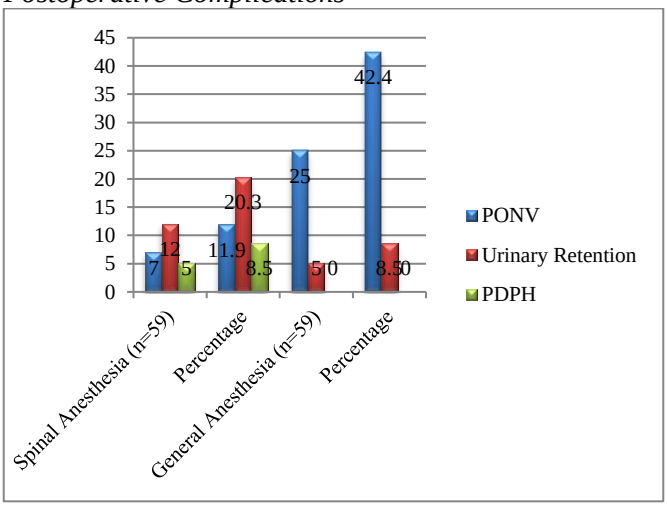
Postoperative Pain Scores (VAS) and Analgesic Requirement

Time Post-Op	Spinal Anesthesia (Mean ± SD)	General Anesthesia (Mean ± SD)	p-value (Test Used)
1 hour	3.8 ± 1.1	5.6 ± 1.4	<0.001 (Mann-Whitney U test)
6 hours	3.2 ± 1.0	5.0 ± 1.2	<0.001 (Mann-Whitney U test)
12 hours	2.5 ± 0.9	4.3 ± 1.1	<0.001 (Mann-Whitney U test)
24 hours	1.8 ± 0.8	3.5 ± 1.0	<0.001 (Mann-Whitney U test)
Time to First Analgesic Request (hours)	7.1 ± 2.3	3.8 ± 1.5	<0.001 (Independent t-test)
Total Tramadol Consumption (mg)	89.3 ± 24.1	154.7 ± 32.6	<0.001 (Independent t-test)

Postoperative nausea and vomitng affected 42.4% of patients receiving anesthesia through GA but only 11.9% of those receiving spinal anesthesia ($p <0.001$, Chi-square test). The use of GA increases PONV risk levels because inhalational anesthetics along with opioids lead to systemic effects in patients. Spinal anesthesia resulted in higher urinary retention rates compared to general anesthesia (20.3% vs. 8.5%, $p = 0.049$) because spinal blockade briefly impacted the autonomic and motor functions of patients. The exclusive occurrence of PDPH among patients who received spinal anesthesia led to a total of 8.5% of participants with this complication ($p = 0.03$). The observation matches standard information on spinal anesthesia complications showing Dural puncture causes cerebrospinal fluid leakage that results in post-dural puncture headaches. The need arises to implement proper perioperative care because generalized anesthesia causes more PONV occurrences yet spinal anesthesia produces urinary retention and PDPH complications. As shown in figure 2.

Figure 2

Postoperative Complications



Patient hospital length decreased significantly in the SA group compared to the GA group with 28.4 ± 6.2 hours versus 35.1 ± 7.4 hours ($p < 0.001$ using an independent t-test). This shorter duration of hospitalization in the SA group may be attributed to better postoperative pain control, reduced need for systemic opioids, and fewer anesthesia-related complications. Patients experienced higher satisfaction levels after receiving supplementation with scanning anesthesia (SA group) which exceeded the control group rates (4.5 ± 0.7 vs. 3.8 ± 0.9, $p < 0.001$, independent t-test). This improved satisfaction probably stemmed from decreased pain alongside faster recovery times. Although ICU admissions were slightly more frequent in the GA group (8.5% vs. 3.4%), this difference was not statistically significant ($p = 0.22$, Chi-square test). Similarly, readmission rates within 30 days were higher in the GA group (6.8% vs. 1.7%), but this difference did not reach statistical significance ($p = 0.17$, Chi-square test). These findings suggest that SA not only improves pain management and reduces complications but also enhances patient satisfaction and shortens hospital stay, making it a potentially more efficient and cost-effective option for perioperative care. As shown in table 3.

Table 3
Hospital Stay and Patient Satisfaction Scores

Variable	Spinal Anesthesia (n=59)	General Anesthesia (n=59)	p-value (Test Used)
Hospital Stay (hours, Mean ± SD)	28.4 ± 6.2	35.1 ± 7.4	<0.001 (Independent t-test)
Patient Satisfaction Score (1-5, Mean ± SD)	4.5 ± 0.7	3.8 ± 0.9	<0.001 (Independent t-test)
Need for ICU Admission (%)	2 (3.4%)	5 (8.5%)	0.22 (Chi-square test)
Readmission within 30 Days (%)	1 (1.7%)	4 (6.8%)	0.17 (Chi-square test)

DISCUSSION

This study highlighted that SA provides significant advantages in postoperative outcomes when compared to GA in patients undergoing vaginal hysterectomy. Specifically, the SA group experienced significantly lower intraoperative blood loss, reduced postoperative pain, fewer analgesic requirements, shorter hospital stays, and higher patient satisfaction. Despite these benefits, spinal anesthesia was associated with certain complications, including a higher incidence of PDPH and urinary retention, while general anesthesia presented a greater risk of PONV. The two groups showed similar performance regarding their ICU hospitalizations and their need for readmission within thirty days.

A substantial number of scholarly sources acknowledge spinal anesthesia as superior than general anesthesia due to its minimal effects on blood loss. Spinal anesthesia causes decreased blood loss during operations by maintaining stable blood pressure according to numerous research studies [12]. The mean blood loss for patients receiving spinal anesthesia amounted to 185.6 ± 45.3 mL whereas patients under general anesthesia experienced 247.8 ± 61.4 mL of blood loss ($p < 0.001$). What causes this difference is the stable cardiovascular performance of spinal anesthesia results in reduced blood pressure variations which decrease surgical bleeding [13].

An important benefit of spinal anesthesia for pain control exists because it guarantees long-term postoperative analgesia [14]. The research outcome confirms the hypothesis by demonstrating that spinal anesthesia patients experienced reduced pain scores together with decreased opioid medication requirements during the initial 24 hours of postoperative recovery. Studies confirm that spinal anesthesia helps patients avoid needing postoperative opioid medications which decreases opioid-related side effects including nausea and constipation and respiratory depression [15]. Our study observed shorter hospital stays because early patient walking was possible thanks to the pain-relieving benefits of spinal anesthesia.

The research shows that spinal anesthesia helps patients recover speedily [16]. The mean hospital stay measured 28.4 ± 6.2 hours in patients given spinal anesthesia while general anesthesia group members spent 35.1 ± 7.4 hours in the hospital ($p < 0.001$). Spinal anesthesia produces faster recovery times according to various reports mainly due to absent sedative effects which general anesthesia causes [17]. Patients under spinal anesthesia regain mobility rapidly while decreasing their risk of unwanted medical events like deep vein thrombosis (DVT) and pulmonary embolism (PE) [18].

The evaluation demonstrated that spinal anesthesia provided better satisfaction results for patients during this study. The patient satisfaction scores reached 4.5 ± 0.7 among patients who received spinal anesthesia which proved higher than patients under general anesthesia who scored 3.8 ± 0.9 ($p < 0.001$). The study findings match existing research which highlights how regional anesthesia centers care on patients by achieving superior pain control with shorter recovery times and diminished postoperative symptoms [19]. Spinal anesthesia patients demonstrate increased involvement in their recovery because they encounter minimal side effects alongside better postoperative alertness.

The occurrence of urinary retention along with PDPH proves to be significant disadvantages for spinal anesthesia. The blocking function of spinal anesthesia affects the autonomic nervous system to cause urinary retention as a well-documented side effect [20]. Patients in the spinal anesthesia group experienced urinary retention that affected 12.5% of the subjects whereas general anesthesia group patients only recorded 5.1% urinary retention cases. The occurrence of PDPH as a spinal anesthesia complication affected 5.1% of patients in the SA group according to study findings that support previous research [21]. The typical temporary side effects from these procedures might extend the length of recovery while causing discomfort to the patient. Spinal anesthesia requires doctors to select patients carefully because and monitor their conditions because of its associated side effects.

The incidence of PONV stands higher with general anesthesia in comparison to spinal anesthesia as demonstrated through our study data. PONV incidence evaluated at 38.9% among patients receiving GA but it was significantly lower at 16.9% for those under SA treatment ($p = 0.004$). The combination of volatile anesthetic agents with opioids during general anesthesia increases PONV risk which results in delayed patient recovery together with substantive distress. These findings reinforce spinal anesthesia as an optimal technique for vaginal hysterectomy patients particularly among people susceptible to PONV.

Interestingly, general anesthesia did not demonstrate any advantages in terms of surgical ease or intraoperative complications. Despite some claims in the literature that general anesthesia may offer better conditions for the surgeon, particularly in terms of muscle relaxation and patient immobility, our study found no significant differences in the ease of surgery between the two groups. This suggests that spinal anesthesia, which provides excellent surgical conditions in terms of analgesia and patient positioning, can be considered a viable alternative to general anesthesia without compromising surgical outcomes.

Limitations and Future Suggestions

This study has certain limitations that should be acknowledged. First, the sample size (n=118), while adequate for statistical analysis, may limit the generalizability of the findings to a broader population. Additionally, this study was conducted at a single center which may introduce institutional biases in surgical and anesthetic practices. Another limitation is the short-term follow-up, as long-term complications and patient-reported outcomes beyond the immediate postoperative period were not assessed. Future studies should incorporate multi-center trials with larger sample sizes to improve external validity and explore long-term recovery parameters. Additionally, further research should investigate strategies to reduce urinary retention and PDPH in spinal anesthesia to optimize its safety and efficacy.

CONCLUSION

This study demonstrated that SA is a superior alternative to GA for patients undergoing vaginal hysterectomy, offering significant advantages in reducing intraoperative blood loss, postoperative pain, opioid consumption, and hospital stay, while also achieving higher patient satisfaction. However, SA was associated with a higher incidence of urinary retention and PDPH, whereas GA had a greater risk of PONV. Overall, the findings suggest that spinal anesthesia should be the preferred choice for vaginal hysterectomy, provided that its associated complications are effectively managed. Further research is needed to explore long-term outcomes and refine anesthetic strategies for improved patient care.

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