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ORIGINAL ARTICLE

Comparison of Spinal and Epidural Anaesthesia for Hysterectomy Post Operative Pain and Complications

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ABSTRACT

Background: *The choice of an aesthetic technique significantly influences postoperative pain control and recovery following hysterectomy. Spinal and epidural anesthesia are widely used regional techniques, yet comparative evidence regarding their postoperative analgesic efficacy and complications remains inconsistent.* ***Objective:*** *To compare spinal and epidural anesthesia in terms of postoperative pain, analgesic requirement, and complications in patients undergoing hysterectomy.* ***Methods & Materials:*** *This prospective comparative study was conducted at Uttara Adhunik Medical College and Hospital, Dhaka, Bangladesh, from July to December 2024. Forty adult female patients scheduled for elective hysterectomy were allocated into two groups: spinal anesthesia (Group S, n = 20) and epidural anesthesia (Group E, n = 20). Postoperative pain was assessed using the Visual Analog Scale (VAS) at 2, 6, 12, and 24 hours. Time to first rescue analgesia, total analgesic consumption within 24 hours, and postoperative complications were recorded and analyzed.* ***Results:*** *Baseline demographic and perioperative variables were comparable between groups. VAS pain scores were significantly lower in the epidural group at 6, 12, and 24 hours postoperatively (p < 0.001). Time to first rescue analgesia was significantly longer in the epidural group (7.8 ± 1.5 hours) compared to the spinal group (3.4 ± 1.1 hours; p < 0.001). Total analgesic consumption within 24 hours was lower in the epidural group (1.6 ± 0.7 vs. 3.2 ± 0.9 doses; p < 0.001). Post-dural puncture headache and hypotension occurred more frequently in the spinal group, while no serious adverse events were observed.* ***Conclusion:*** *Epidural anesthesia provides superior and sustained postoperative analgesia with reduced analgesic requirements compared to spinal anesthesia in hysterectomy patients.*

Keywords: *Spinal anesthesia; Epidural anesthesia; Hysterectomy; Postoperative pain; Analgesic requirement; Complications*

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INTRODUCTION

Postoperative recovery following abdominal hysterectomy is influenced by multiple perioperative factors, among which the mode of anaesthesia plays a critical role [1]. Optimal anaesthetic management plays a pivotal role in ensuring adequate surgical conditions, effective postoperative pain relief, early ambulation, and reduction of perioperative complications. Regional anaesthesia techniques have gained widespread acceptance for hysterectomy due to their advantages over general anaesthesia, including improved postoperative analgesia and reduced systemic opioid requirement [2,3].

Among regional anaesthetic techniques, spinal and epidural anaesthesia are frequently employed for hysterectomy. Spinal anaesthesia is favored for its rapid onset, technical simplicity, and reliable sensory and motor blockade, whereas epidural anaesthesia allows titration of anaesthetic depth, prolonged postoperative analgesia, and greater flexibility through catheter-based drug administration [4,5]. Despite these advantages, the optimal choice between spinal and epidural anaesthesia remains controversial.

Previous studies have demonstrated that spinal anaesthesia may result in lower postoperative pain scores and reduced opioid consumption following hysterectomy, particularly in minimally invasive surgical approaches [3]. Conversely, epidural anaesthesia has been associated with superior prolonged postoperative analgesia, although it may increase the risk of complications such as hypotension, urinary retention, and catheter-related issues [5,6]. Comparative studies evaluating epidural versus spinal anaesthesia for abdominal hysterectomy have reported variable outcomes, with no definitive consensus regarding superiority of either technique [7,8]. Nevertheless, postoperative pain and anaesthesia-related

complications remain significant concerns following hysterectomy.
Although several international studies have addressed anaesthetic techniques for hysterectomy, direct comparisons focusing specifically on postoperative pain and complications between spinal and epidural anaesthesia remain limited. Furthermore, hysterectomy continues to be a commonly performed gynecological surgery in South Asian and low- and middle-income countries, including Bangladesh, where variations in surgical approach and perioperative care have been reported [1]. In this context, evaluating spinal and epidural anaesthesia in a tertiary care hospital setting in Bangladesh may provide locally relevant evidence to guide anaesthetic practice and optimize postoperative outcomes. Therefore, the present study was designed to compare spinal and epidural anaesthesia in patients undergoing hysterectomy, with particular emphasis on postoperative pain control and associated complications.

METHODS & MATERIALS

A prospective comparative study was conducted in the Department of Anesthesiology at Uttara Adhunik Medical College and Hospital, Dhaka, Bangladesh, from July 2024 to December 2024. The study included a total of 40 patients scheduled for elective hysterectomy, who were allocated into two equal groups: Group S (Spinal Anesthesia, n = 20) and Group E (Epidural Anesthesia, n = 20).
Adult female patients aged 30–65 years with American Society of Anesthesiologists (ASA) physical status I–II were included. Patients with contraindications to regional anesthesia, coagulation disorders, spinal deformities, local infection at the injection site, allergy to study drugs, or refusal to participate were excluded.
Pre-anesthetic evaluation was performed for all participants. Standard fasting guidelines were followed, and baseline vital parameters were recorded. Spinal anesthesia was administered in Group S using a standard dose of hyperbaric bupivacaine at the L3–L4 or L4–L5 interspace. In Group E, epidural anesthesia was administered using a catheter placed at the lumbar level, and anesthesia was achieved with incremental doses of local anesthetic as per institutional protocol.
Intraoperative monitoring included heart rate, blood pressure, respiratory rate, and oxygen saturation. Postoperative pain was assessed using the Visual Analog Scale (VAS) at predefined intervals (e.g., 2, 6, 12, and 24 hours). The time to first rescue analgesia and total analgesic requirement within the first 24 hours were recorded. Postoperative complications such as hypotension, nausea and vomiting, urinary retention, post-dural puncture headache, and backache were documented.
After obtaining written consent, data were collected using a structured data collection sheet and analyzed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation and compared using the student's *t*-test, while categorical variables were expressed as frequency and percentage and compared using the Chi-square or Fisher's exact test. A p-value < 0.05 was considered statistically significant.

RESULTS

A total of 40 patients undergoing elective hysterectomy were included in the study, with 20 patients receiving spinal anesthesia (Group S) and 20 receiving epidural anesthesia (Group E). All enrolled patients completed the study, and no cases were excluded from final analysis.

Baseline Characteristics

Table I shows the two groups were comparable with respect to age, body mass index (BMI), ASA physical status, and duration of surgery. No statistically significant differences were observed between the groups, indicating adequate baseline homogeneity.

Table – I: Baseline and Perioperative Characteristics of the Study Participants

Variable	Spinal (n = 20)	Epidural (n = 20)	*p*-value
Age (years), mean ± SD	47.3 ± 6.2	46.8 ± 5.9	0.78
BMI (kg/m^2), mean ± SD	25.1 ± 2.4	24.7 ± 2.6	0.62
ASA I / II, n (%)	12 (60) / 8 (40)	11 (55) / 9 (45)	0.75
Duration of surgery (min), mean ± SD	94.5 ± 12.8	97.2 ± 13.1	0.48

Postoperative Pain Assessment

Table II shows Postoperative pain scores measured using the Visual Analog Scale (VAS) were significantly lower in the epidural group at 6, 12, and 24 hours postoperatively. Although pain scores at 2 hours were lower in the spinal group, the difference was not statistically significant. Overall, epidural anesthesia provided superior postoperative analgesia during the later postoperative period.

Table – II: Comparison of Postoperative VAS Pain Scores

Time after surgery	Spinal (mean ± SD)	Epidural (mean ± SD)	*p*-value
2 hours	3.2 ± 0.8	3.6 ± 0.7	0.09
6 hours	4.6 ± 0.9	3.1 ± 0.8	<0.001
12 hours	5.1 ± 1.0	3.4 ± 0.9	<0.001
24 hours	4.3 ± 0.8	2.9 ± 0.7	<0.001

Analgesic Requirement

Table III shows the time to first rescue analgesia was significantly shorter in the spinal anesthesia group compared to the epidural group. Additionally, total postoperative analgesic consumption within the first 24 hours was significantly higher among patients receiving spinal anesthesia.

Table – III: Postoperative Analgesic Requirement

Variable	Spinal (n = 20)	Epidural (n = 20)	*p*-value
Time to first rescue analgesia (hours), mean ± SD	3.4 ± 1.1	7.8 ± 1.5	<0.001
Total analgesic doses in 24 hours, mean ± SD	3.2 ± 0.9	1.6 ± 0.7	<0.001

Postoperative Complications

Table IV shows postoperative complications were more frequent in the spinal anesthesia group. Hypotension and post-dural puncture headache were observed predominantly in patients receiving spinal anesthesia, whereas nausea and vomiting were slightly more common in the epidural group; however, this difference was not statistically significant. No serious adverse events were reported in either group.

Table – IV: Comparison of Postoperative Complications

Complication	Spinal n (%)	Epidural n (%)	*p*-value
Hypotension	6 (30.0)	2 (10.0)	0.11
Nausea & vomiting	4 (20.0)	5 (25.0)	0.71
Urinary retention	3 (15.0)	2 (10.0)	0.63
Post-dural puncture headache	5 (25.0)	0 (0.0)	0.018
Backache	2 (10.0)	3 (15.0)	0.63

DISCUSSION

In this study, epidural anaesthesia provided superior postoperative analgesia compared to spinal anaesthesia. The mean VAS pain scores at 6, 12, and 24 hours were significantly lower in the epidural group (3.1 ± 0.8, 3.4 ± 0.9, 2.9 ± 0.7) than in the spinal group (4.6 ± 0.9, 5.1 ± 1.0, 4.3 ± 0.8; $p < 0.001$ for all). This finding is consistent with Jørgensen et al., who reported lower postoperative pain scores in patients receiving epidural anaesthesia (VAS 3–4) compared with non-epidural techniques (VAS 5–6) at 12 hours postoperatively [9,10]. Similarly, Aouad et al. observed that epidural analgesia reduced both early and late postoperative pain scores after abdominal hysterectomy [11].

Time to first rescue analgesia was significantly longer in the epidural group (7.8 ± 1.5 hours) compared to the spinal group (3.4 ± 1.1 hours; $p < 0.001$). Total postoperative analgesic consumption within 24 hours was also lower in the epidural group (1.6 ± 0.7 doses) versus the spinal group (3.2 ± 0.9 doses; $p < 0.001$). These results align with Aziz et al., who reported reduced analgesic requirements in patients receiving epidural compared with spinal anaesthesia (mean morphine consumption 10 mg vs. 18 mg over 24 hours) [8]. Schewe et al. also demonstrated that spinal anaesthesia is associated with higher postoperative opioid consumption than epidural anaesthesia in abdominal and caesarean surgeries [12].

Regarding complications, post-dural puncture headache occurred in 25% of spinal patients and none in the epidural group ($p = 0.018$). Hypotension was more frequent in the spinal group (30% vs. 10%), whereas nausea and vomiting were slightly higher in the epidural group (25% vs. 20%), although not statistically significant. These patterns are comparable to Massicotte et al., who observed increased hypotension and post-dural puncture headache in spinal anaesthesia patients, while epidural groups experienced mild nausea without serious adverse events [13]. These complications are important to consider when choosing an aesthetic technique, especially in patients at risk for hemodynamic instability. The studies by Bosat Elwany et al. and Ali et al. also highlight that combined or multimodal anesthesia approaches may offer balanced benefits, though direct comparisons between pure spinal and pure epidural techniques remain limited [14,15]. Bosat Elwany et al. observed that different anesthetic techniques can influence postoperative pain and immune response, suggesting a complex interplay between an aesthetic choice and physiological outcomes [14]. Ali et al. further emphasized that regional techniques, when combined with general anesthesia, may impact pain outcomes—highlighting the need for tailored anesthetic planning in hysterectomy patients [15]. Overall, our findings suggest that while both spinal and epidural anesthesia are viable options for hysterectomy, epidural anesthesia may provide more sustained and effective postoperative analgesia with reduced analgesic requirements. The choice of technique should consider patient comorbidities, surgical duration, and the need for prolonged analgesia.

CONCLUSION

Epidural anesthesia provided superior and more sustained postoperative analgesia compared to spinal anesthesia in patients undergoing hysterectomy. Patients receiving epidural anesthesia experienced significantly lower postoperative pain scores beyond the early postoperative period, a longer duration before requiring first rescue analgesia, and reduced overall analgesic consumption within the first 24 hours. Although spinal anesthesia was associated with a quicker onset of analgesia, it demonstrated higher rates of post-dural puncture headache and hypotension. Both techniques were generally safe; however, epidural anesthesia appeared to offer a more favorable postoperative pain profile with fewer clinically relevant complications. These findings support the preferential use of epidural anesthesia for hysterectomy when prolonged postoperative analgesia is a priority.

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