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Original Article

Comparative Effectiveness of Regional versus General Anesthesia on Early Postoperative Recovery in Adult Surgical Patients: Study in a Tertiary Care Hospital in Bangladesh

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ABSTRACT

Introduction: Regional and general anesthesia are the two most commonly used anesthetic techniques for surgical procedures, and each may influence the quality and speed of postoperative recovery. Therefore, the present study was conducted to compare the effectiveness of regional versus general anesthesia on early postoperative recovery among adult surgical patients treated at a tertiary care hospital in Bangladesh. **Methods & Materials:** This prospective comparative observational study was conducted in the Department of Anesthesiology of Mymensingh Medical College & Hospital, Mymensingh, Bangladesh, from January 2025 to December 2025 to compare the effectiveness of regional versus general anesthesia on early postoperative recovery among adult surgical patients. A total of 104 patients were enrolled using non-random consecutive sampling, comprising 52 patients who received regional anesthesia and 52 who received general anesthesia. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. **Result:** Regional anesthesia was associated with significantly better early postoperative recovery. Mild or no pain at 6 hours was observed in 73.1% of patients compared with 46.2% in the general anesthesia group (p=0.009). The requirement for rescue analgesia was also lower (23.1% vs. 51.9%, p=0.005). Patients receiving regional anesthesia also had less postoperative nausea and vomiting (17.3% vs. 36.5%, p=0.047), earlier ambulation (65.4% vs. 34.6%, p=0.003), higher mean QoR-15 scores at 24 hours (128.7±7.6 vs. 119.2±8.9, p<0.001), and a shorter hospital stay (2.6±0.8 vs. 3.4±1.0 days, p<0.001). Overall, good recovery at 24 hours was observed in 76.9% of patients in the regional anesthesia group compared with 44.2% in the general anesthesia group (p=0.002). **Conclusion:** The present study found that regional anesthesia was associated with significantly superior early postoperative recovery compared with general anesthesia in adult patients undergoing similar surgical procedures. Compared with those receiving general anesthesia, patients in the regional anesthesia group experienced better pain control, decreased need for rescue analgesics, lower incidence of postoperative nausea and vomiting, earlier mobilization and resumption of oral intake, improved recovery scores, reduced length of hospital stay, and a higher rate of good overall recovery within the first 24 hours after surgery.

Keywords: Regional Anesthesia, General Anesthesia, Early Postoperative Recovery

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INTRODUCTION

Early postoperative recovery has become a major endpoint in modern perioperative care because it reflects how quickly a patient regains comfort, function, and independence after surgery rather than simply whether the operation was completed safely [1]. In parallel, Enhanced Recovery After Surgery (ERAS) pathways have shifted perioperative practice toward strategies that reduce surgical stress, facilitate mobilization, and shorten convalescence; a major review reported that ERAS protocols were associated with a 30%–50% reduction in hospital stay and similar reductions in complications in many surgical settings [2]. Regional anesthesia is often preferred because it can block nociceptive input at the surgical site, reduce the neuroendocrine stress response, and lessen the need for systemic opioids. This is important because postoperative nausea and vomiting (PONV) remain one of the most common and distressing early complications after anesthesia, and the 2020 fourth consensus guidelines emphasized risk reduction, multimodal prophylaxis, and integration of PONV control into enhanced recovery pathways [3]. Comparative studies have produced important but mixed findings. In the REGAIN randomized trial of 1,600 older adults undergoing hip-fracture surgery, the composite outcome of death or inability to walk independently at 60 days occurred in 18.5% of patients receiving spinal anesthesia versus 18.0% receiving GA, while postoperative delirium occurred in 20.5% versus 19.7%, respectively, showing no clear superiority of spinal anesthesia for these longer-term recovery outcomes [4]. In contrast, a large propensity-matched cohort of 96,880 elective total hip arthroplasty patients found that spinal anesthesia was associated with lower unplanned resource utilization (3.1% vs. 3.7%), fewer transfusion-requiring bleeding events (2.3% vs. 4.9%), and a slightly shorter mean hospital stay (2.15 vs. 2.24 days) than GA [5]. These findings show that the benefit of anesthetic technique may be more evident in early recovery and resource use than in distant outcomes [4,5]. General anesthesia remains indispensable for many operations because it provides unconsciousness, airway control, and reliable operative conditions, but it may still be associated with delayed emergence, opioid-related adverse effects, and slower early recovery [3,6]. Evidence from orthopedic pain and recovery studies further supports this pattern. In the PAIN OUT registry analysis of total knee and hip replacement, regional anesthesia was associated with less pain and lower opioid consumption in total knee arthroplasty, while in total hip arthroplasty it was associated with lower opioid consumption but comparable pain scores [6]. A randomized clinical trial in bilateral total hip arthroplasty reported that spinal anesthesia preserved postoperative respiratory and peripheral muscle strength better than GA,

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and it also attenuated stress biomarkers such as ACTH, cortisol, and IL-6 in the immediate postoperative period [7]. More recently, a matched-cohort study in outpatient total hip and knee arthroplasty found that both spinal and GA allowed reliable same-day discharge with similar 90-day complication rates, although GA facilitated faster discharge from the ambulatory center while spinal anesthesia was associated with less pain and less nausea after surgery [8]. Newer mechanistic evidence also suggests that anesthetic technique may influence early recovery biology. A 2025 matched-cohort study comparing GA and spinal anesthesia in total hip arthroplasty found that postoperative innate immune dysregulation could be influenced by anesthetic choice, although differences were not seen by postoperative day 1, suggesting that any biologic advantage of one technique over the other may be transient [9]. In addition, a 2025 retrospective register analysis continued to examine postoperative pain and outcomes in primary hip and knee arthroplasty, underscoring that this clinical question remains active and relevant in modern fast-track practice [10]. Therefore, the present study compared regional versus general anesthesia with respect to early postoperative recovery in adult surgical patients in a tertiary care hospital in Bangladesh.

METHODS & MATERIALS

This comparative observational study was conducted in the Department of Anesthesiology of Mymensingh Medical College & Hospital, Mymensingh, Bangladesh over one year from January 2025 to December 2025 to compare the effectiveness of regional versus general anesthesia on early postoperative recovery among adult surgical patients. A total of 104 patients were enrolled by consecutive sampling, comprising 52 patients who received regional anesthesia and 52 who received general anesthesia. Adult patients (≥18 years) with American Society of Anesthesiologists (ASA) physical status I–III undergoing elective or emergency surgery under either regional or general anesthesia were included. Patients receiving combined anesthesia, requiring postoperative intensive care, having chronic pain or opioid dependence, severe cognitive or psychiatric disorders, incomplete data, or refusing consent were excluded. Baseline demographic and clinical characteristics, including age, sex, ASA physical status, type of surgery, and surgical urgency, were recorded using a structured data collection form. The choice of anesthetic technique was determined by the attending anesthesiologist according to the patient's clinical condition and surgical requirements. Early postoperative recovery was assessed during the first 24 hours using postoperative pain, postoperative nausea and vomiting, rescue analgesia requirement, early ambulation and oral intake were operationalized (e.g., walking with assistance vs. independently, tolerating liquids vs. solids). Quality of Recovery-15 (QoR-15) scores at 6 and 24 hours, Modified Aldrete Score at 30 minutes, time to first ambulation, time to first oral intake, length of hospital stay, postoperative complications, and overall recovery status. Data were collected from patient interviews, anesthesia records, operative notes, and postoperative assessments. After checking for completeness, data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables were expressed as mean ± standard deviation and compared using the independent Student's *t*-test, whereas categorical variables were presented as frequencies and percentages and compared using the Chi-square test. A *p*-value of <0.05 was considered statistically significant. Ethical approval was obtained from the Institutional Review Board of the study institution, and written informed consent was obtained from all participants before enrollment.

RESULTS

Baseline characteristics were comparable between the two groups. The largest age category was 41–60 years, comprising 49 (47.1%) patients, followed by 18–40 years in 34 (32.7%) and >60 years in 21 (20.2%). Male patients slightly predominated overall, accounting for 59 (56.7%) cases. ASA II was the most common grade in both groups, and elective surgery was more frequent than emergency surgery. None of the baseline variables showed a statistically significant difference between the two anesthesia groups (*Table I*).

Table I
Baseline characteristics of the study patients (*n* = 104).

Baseline characteristic	Regional anesthesia (n=52)	General anesthesia (n=52)	Total (N=104)	p-value*
Age group				0.911
18–40 years	18 (34.6%)	16 (30.8%)	34 (32.7%)	
41–60 years	24 (46.2%)	25 (48.1%)	49 (47.1%)	
>60 years	10 (19.2%)	11 (21.1%)	21 (20.2%)	
Sex				1.000
Male	30 (57.7%)	29 (55.8%)	59 (56.7%)	
Female	22 (42.3%)	23 (44.2%)	45 (43.3%)	
ASA physical status				0.911
ASA I	20 (38.5%)	18 (34.6%)	38 (36.5%)	
ASA II	24 (46.2%)	25 (48.1%)	49 (47.1%)	
ASA III	8 (15.4%)	9 (17.3%)	17 (16.3%)	
Type of surgery				0.825
Elective	39 (75.0%)	37 (71.2%)	76 (73.1%)	
Emergency	13 (25.0%)	15 (28.8%)	28 (26.9%)	
Total	52 (100.0%)	52 (100.0%)	-	52 (100.0%)

**Chi-square test was done.*

Orthopedic surgery was the most common procedure (29.8%), followed by lower abdominal (26.0%) and gynecologic surgery (20.2%). The distribution of surgical categories was almost identical in the two anesthesia groups, and no significant difference was observed (*Table II*).

Table II
Distribution of surgical procedures according to anesthesia type (*n* = 104).

Type of surgery	Regional anesthesia (n=52)	General anesthesia (n=52)	p-value*	Total
Lower abdominal surgery	14 (26.9%)	13 (25.0%)	0.996	27 (26.0%)
Orthopedic surgery	16 (30.8%)	15 (28.8%)		31 (29.8%)
Urologic surgery	8 (15.4%)	9 (17.3%)		17 (16.3%)
Gynecologic surgery	10 (19.2%)	11 (21.1%)		21 (20.2%)
Other minor surgeries	4 (7.7%)	4 (7.7%)		8 (7.7%)
Total	52 (50.0%)	52 (50.0%)		104 (100.0%)

**Chi-square test was done.*

Early recovery outcomes were better in the regional anesthesia group. Mild or no pain at 6 hours was observed in 38 (73.1%) patients with regional anesthesia compared with 24 (46.2%) with general anesthesia. Postoperative nausea and vomiting occurred less frequently in the regional group, and the need for rescue analgesia was also lower. Early ambulation and oral intake were both achieved more often after regional anesthesia. All of these outcomes showed statistically significant differences in favor of regional anesthesia (*Table III*).

Table III
Early recovery outcomes, consider grouping outcomes into pain-related, functional recovery, and complications for easier interpretation. (*n* = 104).

Early recovery outcome	Regional anesthesia (n=52)	General anesthesia (n=52)	Total	p-value*
Mild or no pain at 6 hours	38 (73.1%)	24 (46.2%)	62 (59.6%)	0.009
Moderate to severe pain at 6 hours	14 (26.9%)	28 (53.8%)	42 (40.4%)	
Postoperative nausea/vomiting present	9 (17.3%)	19 (36.5%)	28 (26.9%)	0.047
Required rescue analgesia within 6 hours	12 (23.1%)	27 (51.9%)	39 (37.5%)	0.005
Able to ambulate within 6 hours	34 (65.4%)	18 (34.6%)	52 (50.0%)	0.003
Able to tolerate oral intake within 6 hours	41 (78.8%)	29 (55.8%)	70 (67.3%)	0.021

**Chi-square test was done.*

The recovery scores and functional recovery times were also better with regional anesthesia. The mean QoR-15 score at both 6 hours and 24 hours was significantly higher in the regional group. Patients receiving regional anesthesia achieved a higher Aldrete score at 30 minutes, ambulated earlier, resumed oral intake sooner, and had a shorter hospital stay than those receiving general anesthesia. All continuous recovery variables showed statistically significant differences between the two groups (*Table IV*).

Table IV
Recovery scores and time-related recovery parameters (*n* = 104).

Recovery parameter	Regional anesthesia (n=52)	General anesthesia (n=52)	p-value*	Total
QoR-15 score at 6 hours, mean ± SD	112.4 ± 8.1	101.8 ± 9.4	<0.001	107.1 ± 10.1
QoR-15 score at 24 hours, mean ± SD	128.7 ± 7.6	119.2 ± 8.9	<0.001	124.0 ± 9.2
Aldrete score at 30 minutes, mean ± SD	8.9 ± 0.7	8.1 ± 0.8	<0.001	8.5 ± 0.9
Time to first ambulation, hours, mean ± SD	5.1 ± 1.4	7.8 ± 1.9	<0.001	6.4 ± 2.0
Time to first oral intake, hours, mean ± SD	3.9 ± 1.2	5.6 ± 1.5	<0.001	4.8 ± 1.5
Length of hospital stay, days, mean ± SD	2.6 ± 0.8	3.4 ± 1.0	<0.001	3.0 ± 1.0

Student's t-test was done.

Postoperative complications were generally less frequent in the regional anesthesia group. Nausea and vomiting were the most common adverse events overall, and their rates were numerically higher after general anesthesia. Respiratory complications were uncommon in both groups but were also more frequent following general anesthesia. Although the trend favored regional anesthesia across most complications, not all of these differences reached statistical significance (*Table V*).

Table V
Postoperative complications and adverse events according to anesthesia type (*n* = 104).

Complication	Regional anesthesia (n=52)	General anesthesia (n=52)	Total	p-value*
Minor complications				
Nausea	7 (13.5%)	16 (30.8%)	23 (22.1%)	0.059
Vomiting	3 (5.8%)	8 (15.4%)	11 (10.6%)	0.202
Dizziness	4 (7.7%)	9 (17.3%)	13 (12.5%)	0.236
Urinary retention	5 (9.6%)	4 (7.7%)	9 (8.7%)	1.000
Headache/back pain	2 (3.8%)	1 (1.9%)	3 (2.9%)	1.000
Major complications				
Respiratory complication	1 (1.9%)	4 (7.7%)	5 (4.8%)	0.359

**Chi-square test was done.*

At 24 hours, good overall recovery was achieved by 40 (76.9%) patients in the regional anesthesia group compared with 23 (44.2%) in the general anesthesia group. Moderate and poor recovery were more common after general anesthesia (*Table VI*).

Table VI
Overall early postoperative recovery status at 24 hours (n = 104).

Overall recovery status	Regional anesthesia (n=52)	General anesthesia (n=52)	p-value*	Total
Good recovery	40 (76.9%)	23 (44.2%)	0.002	63 (60.6%)
Moderate recovery	10 (19.2%)	20 (38.5%)		30 (28.8%)
Poor recovery	2 (3.8%)	9 (17.3%)		11 (10.6%)
Total	52 (50.0%)	52 (50.0%)		104 (100.0%)

**Chi-square test was done.*

DISCUSSION

The present study demonstrated comparable baseline characteristics between the regional and general anesthesia groups, with no statistically significant differences in age, sex, ASA physical status, or surgical urgency. Patients aged 41–60 years constituted the largest proportion (47.1%), males accounted for 56.7%, ASA II represented 47.1%, and elective surgery comprised 73.1% of cases. Similarly, Basques et al. reported no significant differences in age (mean 53.4 vs 54.1 years), sex (54.2% vs 55.8% males), or ASA status between spinal and general anaesthesia groups before lumbar discectomy [11]. Memtsoudis et al. also found balanced baseline characteristics in over 380,000 orthopedic patients, with comparable demographic and clinical profiles between neuraxial and general anesthesia groups [12]. In the present study, orthopedic surgery was the most common procedure (29.8%), followed by lower abdominal surgery (26.0%), and the distribution of surgical procedures was similar between the two groups (p=0.996). Likewise, Memtsoudis et al. included predominantly orthopedic procedures and reported similar surgical distributions across anesthesia techniques, ensuring valid comparison of postoperative outcomes [12]. Early postoperative recovery was significantly better following regional anesthesia. Mild or no pain at 6 hours was observed in 73.1% versus 46.2% of patients, postoperative nausea and vomiting occurred in 17.3% versus 36.5%, rescue analgesia was required in 23.1% versus 51.9%, early ambulation was achieved in 65.4% versus 34.6%, and early oral intake in 78.8% versus 55.8% of patients receiving regional and general anesthesia, respectively. Rodgers et al. reported that neuraxial anesthesia reduced postoperative pain and opioid consumption by approximately 30%, while postoperative pulmonary complications decreased by about one-third compared with general anesthesia [13]. Recovery scores demonstrated significant advantages with regional anesthesia. The mean QoR-15 score at 24 hours was 128.7±7.6 compared with 119.2±8.9, Aldrete score at 30 minutes was 8.9±0.7 versus 8.1±0.8, time to first ambulation was 5.1±1.4 versus 7.8±1.9 hours, and hospital stay was 2.6±0.8 versus 3.4±1.0 days in the regional and general anesthesia groups, respectively. Myles et al. further demonstrated that higher QoR-15 scores were associated with faster postoperative recovery and shorter hospital stay [14]. In the present study postoperative complications were less frequent after regional anesthesia. Nausea occurred in 13.5% versus 30.8%, vomiting in 5.8% versus 15.4%, dizziness in 7.7% versus 17.3%, and respiratory complications in 1.9% versus 7.7% of patients receiving regional and general anesthesia, respectively, although some differences were not statistically significant. Johnson et al. reported postoperative nausea in approximately 15–20% of neuraxial anesthesia patients compared with 30–35% after general anesthesia, together with significantly fewer pulmonary complications [15]. Overall recovery at 24 hours was significantly better following regional anesthesia, with 76.9% achieving good recovery compared with 44.2% after general anesthesia, while poor recovery occurred in only 3.8% versus 17.3% of patients. Similarly, Liu and Wu reported that enhanced recovery protocols using regional anesthesia achieved earlier functional recovery, reduced hospital stay by approximately 1 day, and improved overall patient recovery compared with general anesthesia [16].

LIMITATIONS

The study was conducted in a single hospital with a small sample size Therefore, the results may not be generalizable to the wider population.

CONCLUSION

The present study demonstrated that regional anesthesia provided significantly better early postoperative recovery than general anesthesia among adult surgical patients undergoing comparable procedures. Patients receiving regional anesthesia experienced less postoperative pain, required fewer analgesics, had reduced postoperative nausea and vomiting, achieved earlier ambulation and oral intake, demonstrated higher recovery scores, had shorter hospital stays, and showed a greater proportion of good overall recovery at 24 hours.

RECOMMENDATION

Regional anesthesia should be considered the preferred anesthetic technique for eligible adult surgical patients whenever clinically feasible, as it is associated with improved early postoperative recovery and reduced postoperative morbidity. Hospitals should promote its appropriate use through standardized perioperative protocols and comprehensive training of anesthesia providers. Further multicenter studies with larger sample sizes and longer follow-up are recommended to evaluate long-term recovery, patient satisfaction, and cost-effectiveness across different surgical specialties.

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CONFLICT OF INTEREST

None declared

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