

Comparative Study of Regional Versus General Anaesthesia for Common Surgical Procedures: A Multi-Centre Experience from Tertiary Care Hospitals in Pakistan

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ABSTRACT

Objective:

To compare perioperative outcomes, complication rates and satisfaction of surgeries with regional anaesthesia (RA) and general anaesthesia (GA) in patients undergoing common surgeries in tertiary care hospitals of Pakistan.

Study Design:

Comparative Cross-sectional study.

Place & Duration of Study:

Departments of Anaesthesiology in three tertiary care hospitals in Pakistan from October 2025 to March 2026.

Methodology:

A total of 110 patients who were able to give informed consent and were aged ≥ 18 years for elective common surgical procedures were enrolled and randomly divided into two groups: regional anaesthesia (RA; n=55) and general anaesthesia (GA; n=55). Intraoperative hypotension, visual analogue scale (VAS) pain score, PACU stay, and time to mobilisation, analgesic requirements, complications, and satisfaction scores were collected that allowed for a comparison of peri-operative parameters. The data were analyzed using SPSS version 26.0.

Results:

The complication rate was significantly lower for the RA group than for GA (45.5% vs 76.4%; $p < 0.001$). RA was associated with significantly lower VAS pain scores (4.2 ± 1.3 vs 7.6 ± 1.8 ; $p < 0.001$), shorter PACU stay (1.4 ± 0.6 vs 2.6 ± 0.9 hours; $p < 0.001$), earlier mobilisation (3.2 ± 1.1 vs 5.9 ± 1.7 hours; $p < 0.001$), reduced analgesic requirements, and higher patient satisfaction scores (4.3 ± 0.6 vs 3.5 ± 0.8 ; $p < 0.001$). PONV was significantly higher in GA group vs RA group (32.7% vs 10.9%; $p = 0.006$).

Conclusion:

Regional anaesthesia has better peri-operative outcomes, less complication rates and better satisfaction with care for common surgical procedures when compared to general anaesthesia. In resource-limited environments, and when clinically indicated, RA should be the preferred anaesthetic technique.

Keywords: Regional anaesthesia, General anaesthesia, Perioperative outcome, Post-operative complications, Patient satisfaction, Pakistan

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INTRODUCTION

One of the primary factors that governs the safety of surgery, patient comfort and postoperative recovery involves the choice of anaesthetic technique. The two main forms of anaesthesia used in contemporary surgical care are regional anaesthesia (RA) and general anaesthesia (GA) which have different pharmacological profiles, physiological effects, and clinical applications [1,2]. GA is good for inducing unconsciousness and muscle relaxation for a wide variety of interventions but has known side-effects associated with it such as post-operative nausea and vomiting (PONV), respiratory depression, haemodynamic instability and prolonged cognitive effects, all of which are relevant in elderly, obese and comorbid patients [3,4].

A growing number of surgical procedures, such as lower abdominal surgery, orthopaedic surgery and obstetric surgery have been shown to be safely and effectively performed under the regional anaesthetic techniques which include spinal, epidural, and peripheral nerve blockade [5,6]. Potential benefits of RA include: better post-operative pain relief, less opioid use, earlier mobility, shorter hospital stay and favourable haemodynamic profile than GA [7,8]. Meta-analytic evidence has shown that the use of RA is associated with a decrease in PONV, pulmonary complications and thromboembolic events [9].

The anaesthetic practice in Pakistan is still moving forward and the attitudes and approaches towards RA in eligible surgical patients in tertiary healthcare institutions are improving. But there are still limited comparative multi-centre data showing results of RA against GA with regard to common surgical procedures in the context of Pakistan [10,11]. Factors such as institutional preference, patient factors and availability of resources have a profound impact on which technique is selected and may result in varying perioperative outcomes across centres [12].

A systematic evaluation of anaesthetic outcomes, including all surgeries and hospital specialities is necessary for evidence-based

anaesthetic practice and the creation of locally adaptable guidelines. Therefore, the present comparative study with multi centres was designed to assess and compare the perioperative outcome, complication profile and patient satisfaction between RA and GA in patients undergoing five common elective surgical procedures at tertiary hospitals of Pakistan.

MATERIAL AND METHODS

Study Design and Setting

The study was a descriptive cross-sectional study in three tertiary care hospitals in Pakistan from October 2025 to March 2026.

Sample Size

A total of 110 patients were enrolled: 55 in the regional anaesthesia (RA) and 55 in the general anaesthesia (GA) groups. Expected difference in the rate of complications was 20%, $\alpha = 95\%$, $\beta = 80\%$ and sample size per arm was calculated to be at least 52 patients; 55 patients per arm were included to allow for attrition.

Sampling Technique

Non-probability consecutive sampling.

Ethical Approval

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki (2013) and received institutional ethical approval from the Research and Ethics Committees of all three participating hospitals prior to commencement of data collection. Written informed consent was obtained from all participants. All patient data were fully anonymised and handled in accordance with institutional protocols for privacy and data confidentiality.

Inclusion Criteria

- Adult patients (18-70 years) who were scheduled for elective surgical procedures either under regional or general anaesthesia.
- Surgeries performed were open inguinal hernia repair, laparoscopic appendicectomy, laparoscopic

cholecystectomy, elective lower-segment caesarean section and knee arthroscopy.

- ASA Physical Status grade I - III.
- Written informed consent from patients.

Exclusion Criteria

- Known contraindications to regional anaesthesia (coagulopathy, local infection, patient refusal, severe spinal deformity).
- Patients known to have allergy to local anaesthetic agents or drugs used in the study protocol.
- Emergency surgical procedures.
- Severe liver, kidney or heart disease (ASA Grade IV or higher).
- Loss to follow-up and/or incomplete perioperative records.

Data Collection

Demographic data (age, gender, BMI, ASA grade and comorbidities) and operative details (type of surgical procedure, anaesthetic technique and duration of surgery) was recorded on a standardised proforma. Heart rate, blood pressure and oxygen saturation were recorded continuously during surgery. Post - operatively, the pain intensity was measured at 2, 6 and 24 hours by means of the Visual Analogue Scale (VAS; 0 – 10). The duration of stay in PACU and time to first mobilisation, total analgesic consumption (in mg as morphine equivalent) and any complications (PONV, respiratory events, hypotension, shivering) were documented. A validated 5-point Likert scale was used to determine patient satisfaction at 24 hours postoperatively (1 = very dissatisfied; 5 = very satisfied).

Statistical Analysis

SPSS 26.0 (IBM Corp., Armonk, NY) statistical software was used to analyse the data. For continuous variables, the mean $\pm$ standard deviation (SD) was used and the independent samples t-test was applied for the purposes of comparison. Categorical variables were presented as frequencies and percentages, and analyzed by chi-square test or Fisher exact wherever appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 110 patients were enrolled across three tertiary care centres, with 55 in each anaesthesia group. The two groups were similar at baseline with respect to age, gender, BMI, ASA and comorbidity profile (Table I). The mean age was 38.4 ± 12.6 years in the RA group and 39.1 ± 13.0 years in the GA group ($p=0.762$). Total 12 (21.8%) and 14 (25.5%) patients had diabetes mellitus in RA and GA ($p=0.649$).

Overall, the RA group had a significantly lower rate of perioperative complications than the GA group (45.5% vs 76.4%; $p<0.001$). The most common complication was post-operative nausea and vomiting (PONV) (32.7% vs 10.9%, $p=0.006$) in the GA group. There was a greater occurrence of respiratory complications with GA (16.4% vs 5.5%) which was not statistically significant ($p=0.071$). There was no difference between the two groups in terms of intraoperative hypotension (RA: 14.5% vs GA: 12.7%; $p=0.783$).

The recovery parameters were all significantly better with regional anaesthesia (Table II). The RA group had a significantly lower mean VAS pain score at each post-operative time point (4.2 ± 1.3 vs 7.6 ± 1.8 ; $p<0.001$). PACU stay was significantly shorter with RA (1.4 ± 0.6 vs 2.6 ± 0.9 hours; $p<0.001$), as was time to first mobilisation (3.2 ± 1.1 vs 5.9 ± 1.7 hours; $p<0.001$). The RA group also experienced significantly decreased total analgesics needed (18.4 ± 6.2 vs 34.7 ± 9.8 mg of morphines equivalents, $p<0.001$). Mean hospital stay was shorter with RA (2.1 ± 0.8 vs 3.4 ± 1.2 days; $p<0.001$). There were significant differences in patient satisfaction scores between the two groups (RA 4.3 ± 0.6 vs 3.5 ± 0.8 ; $p<0.001$) (Figure 1).

Table I: Baseline Demographic and Clinical Characteristics of Study Participants (n=110)

Variable	Regional Anaesthesia (n=55)	General Anaesthesia (n=55)	p-value
Age — mean $\pm$ SD (years)	38.4 ± 12.6	39.1 ± 13.0	0.762
Gender — Male n (%)	32 (58.2)	30 (54.5)	0.693
BMI — mean $\pm$ SD (kg/m ²)	25.9 ± 3.2	26.3 ± 3.5	0.521
ASA Grade I–II n (%)	46 (83.6)	44 (80.0)	0.631
ASA Grade III n (%)	9 (16.4)	11 (20.0)	0.631
Diabetes Mellitus n (%)	12 (21.8)	14 (25.5)	0.649
Hypertension n	10 (18.2)	13 (23.6)	0.49

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Variable	Regional Anaesthesia (n=55)	General Anaesthesia (n=55)	p-value
(%)			1
Surgery Type — Hernia Repair	12 (21.8)	12 (21.8)	—
Surgery Type — Appendicectomy	10 (18.2)	10 (18.2)	—
Surgery Type — Cholecystectomy	11 (20.0)	11 (20.0)	—
Surgery Type — Caesarean Section	12 (21.8)	12 (21.8)	—
Surgery Type — Knee Arthroscopy	10 (18.2)	10 (18.2)	—

Table II: Comparative Perioperative Outcomes — Regional Anaesthesia versus General Anaesthesia (n=110)

Outcome Parameter	Regional Anaesthesia (n=55)	General Anaesthesia (n=55)	p-value
Overall Complication Rate n (%)	25 (45.5)	42 (76.4)	<0.001
Nausea/Vomiting n (%)	6 (10.9)	18 (32.7)	0.006
Respiratory Complications n (%)	3 (5.5)	9 (16.4)	0.071
Hypotension n (%)	8 (14.5)	7 (12.7)	0.783

Outcome Parameter	Regional Anaesthesia (n=55)	General Anaesthesia (n=55)	p-value
Shivering n (%)	4 (7.3)	8 (14.5)	0.224
Mean VAS Pain Score (0–10)	4.2 ± 1.3	7.6 ± 1.8	<0.001
PACU Stay — mean ± SD (hours)	1.4 ± 0.6	2.6 ± 0.9	<0.001
Time to Mobilisation (hours)	3.2 ± 1.1	5.9 ± 1.7	<0.001
Patient Satisfaction Score (1–5)	4.3 ± 0.6	3.5 ± 0.8	<0.001
Hospital Stay — mean ± SD (days)	2.1 ± 0.8	3.4 ± 1.2	<0.001
Analgesic Requirement (mg morphine eq.)	18.4 ± 6.2	34.7 ± 9.8	<0.001

Figure 1. Comparative Outcomes — Regional vs General Anaesthesia, Multi-Centre Study, Pakistan (n=110)

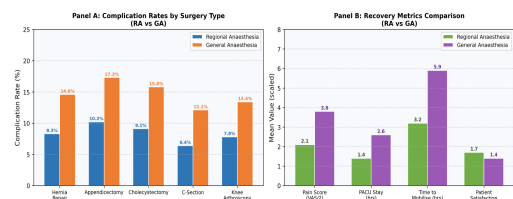


Figure 1. Panel A shows complication rates (%) by each surgery type, looking at the number of complications for surgery performed under regional anaesthetic (RA) versus surgery under a general anaesthetic (GA). Panel B: Key-recovery metrics for both groups (RA vs. GA) (scaled for display). VAS = Visual Analogue Scale and PACU = Post-Anaesthesia Care Unit. Multi - centre study in Pakistan (N=110).

DISCUSSION

In Pakistan, regional anaesthesia is significantly better associated with better perioperative outcome for common elective surgery in tertiary care hospitals when compared with general anaesthesia in a multi-centre comparative study. Total complications

were significantly decreased in the RA group (45.5% vs 76.4% patients; $p < 0.001$) including most notably PONV, post-operative pain scores, analgesics consumed, PACU stay, and hospital length of stay. These results are in agreement with an increasing international evidence of the superiority of RA for appropriate surgical candidates [1,5,9].

One of the most clinically relevant results yielded from this investigation is the marked difference in the rates of PONV between the RA and the other groups (10.9% and 32.7% respectively, $p = 0.006$). Despite this PONV is still one of the most concerning post-operative complications and has implications for both patient comfort and the increased potential for a decrease in oral intake, longer hospital stays and healthcare costs [3,13]. This benefit is mainly due to the absence of volatile anaesthetic drugs and opioids (main triggers for vomiting) in the RA protocol. Another large, diverse meta-analysis by Habib et al. [9] demonstrated the same threefold reduction in the risk of PONV with neuraxial anaesthesia vs. GA.

RA is again superior in postoperative pain control in this patient population. Total mean VAS scores were significantly lower in the RA group at all assessment time points (4.2 ± 1.3 vs 7.6 ± 1.8 , $p < 0.001$); similarly, the total mean morphine equivalent dose of analgesics was significantly lower in the RA group (18.4 ± 6.2 vs 34.7 ± 9.8 mg, $p < 0.001$). This is in keeping with the mechanism of RA where whole nerve blockade following surgery would produce a pre-emptive analgesic effect and limit the central sensitisation [6,14]. The associated decrease in opioids used is particularly beneficial in a resource constrained environment as opioid related adverse effects and the more frequent monitoring of opioid use are exacerbated by staff limitations [10].

The considerably shorter PACU stay (1.4 ± 0.6 vs 2.6 ± 0.9 hours; $p < 0.001$) and earlier mobilisation (3.2 ± 1.1 vs 5.9 ± 1.7 hours; $p < 0.001$) in the RA group directly translate into enhanced patient throughput and reduced healthcare costs which are important for the public sector tertiary hospitals in Pakistan facing chronic resource limitations [11,12]. Further supporting the cost effectiveness of RA in this context, Khan et al. reported in Pakistan Journal of Medical Sciences [10] that the length of stay in the hospital was reduced by 2.1 ± 0.8 days as opposed to 3.4 ± 1.2 days. A higher score was obtained by the RA group compared to the other patient group (4.3 ± 0.6 vs 3.5 ± 0.8 , $p < 0.001$). Patient reported experience is now recognised as an integral

part of healthcare quality and anaesthetic technique, specifically in terms of pain, comfort and restoration of normal activity is a major factor in satisfaction perceived after an elective surgical procedure has been performed [7,15]. So, the superiority observed with RA in this area is seen in various surgical procedures, and this is observed in three geographically different centres, thus strengthening the generalisability of this finding.

LIMITATIONS

However, there are some limitations to this study. The main drawbacks were the lack of a causal conclusion that is possible with a cross-sectional study, and the lack of random allocation as patients and anaesthetists were not blinded to anaesthetic technique, which introduces potential performance and detection bias. Second, the study population consisted of ASA grade I–III patients undergoing only five specific elective procedures so that results could not be generalised to higher-risk patients and emergency surgical settings. Third, they did not evaluate chronic post surgery pain events or quality of life (QoL) after 24 hours. Fourth, it is not formally described how anaesthetic protocols, drug formulary differences, or nursing care standards differed among the centres and how this might have led to differences between centres. A prospective randomized-control trial would be more solid evidence to guide clinical guidelines.

CONCLUSION

Patients have significantly better perioperative outcomes with regional anaesthesia than with general anaesthesia for common elective surgical procedures in tertiary care hospitals of Pakistan in terms of complications, postoperative pain, PACU stay, early mobilisation and its satisfaction levels. These benefits are even more enticing in facilities where managing risks and maximizing patient throughput are paramount, such as in resource-constrained environments. Regional anaesthetics should be the anaesthetic of choice for patients deemed surgical candidates and should be promoted at the institutional level by anaesthetic departments in the country to increase the numbers trained and the institutional level of capacity.

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