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Original Research Article

Post-Operative Complications in Patients Undergoing Laparoscopic Cholecystectomy under Regional anesthesia

Ajitgopal Samal[1], Prativa Kumari Behera[2], Abhijit Samal[3], Doddigarla Zephy[4]

[1]Associate Professor, Department of Surgery, Hi-Tech Medical & Hospital, Rourkela
[2]Assistant Professor, Department of Pathology, Hi-Tech Medical College & Hospital, Rourkela
[3]M.Ch Urology, Apollo Hospital, Rourkela
[4]Professor, Department of Biochemistry, Hi-Tech Medical College & Hospital, Rourkela

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Corresponding author: Dr. Ajitgopal Samal
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Abstract

Background: Laparoscopic cholecystectomy is usually done with general anesthesia, but regional anesthesia has become a possible alternative, especially for certain groups of patients. Evidence concerning early postoperative adverse events associated with regional anesthesia is still scarce and inconsistent.

Objective: To analyze the incidence and clinical profile of early postoperative complications in patients managed with regional anesthesia for laparoscopic cholecystectomy.

Materials and Methods: This prospective observational study encompassed 100 adult patients (ASA physical status I–II) scheduled for elective laparoscopic cholecystectomy under regional anesthesia at a tertiary care institution. Factors influencing early recovery, intraoperative metrics, and demographic data were recorded. Post-operative complications occurring within 48 hours, including shoulder tip pain, postoperative nausea and vomiting (PONV), hypotension, urinary retention, headache, surgical site infection, and respiratory complications, were documented. We employed frequencies and percentages to depict categorical variables and mean ± SD to convey continuous data.

Results: The average duration for surgery was 62.4 ± 12.6 minutes, and the average time spent in the hospital was 1.4 ± 0.6 days. Twenty-six percent of patients reported shoulder pain during the procedure, and twelve percent experienced low blood pressure throughout the procedure. In 4% of cases, general anesthesia was needed. Post-operatively, shoulder tip pain was the most common complication (24%), followed by PONV (14%) and hypotension (10%). Urinary retention and post-dural puncture headache were observed in 6% and 8% of patients, respectively. Thirty-five percent of patients experienced no post-operative complications.

Conclusion: Laparoscopic cholecystectomy under regional anesthesia is feasible and associated with an acceptable profile of early post-operative complications. With appropriate patient selection and perioperative management, regional anesthesia. May represent a safe alternative to general anesthesia in selected patients.

Keywords: Laparoscopic cholecystectomy; Regional anesthesia. Post-operative complications; Neuraxial blockade; Shoulder tip pain; Postoperative nausea and vomiting; Hemodynamic instability; Early postoperative recovery; Patient safety; Perioperative outcomes.

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Introduction

Laparoscopic cholecystectomy is a prevalent abdominal procedure globally and is considered the gold standard for managing symptomatic gallstone disease. General anesthesia (GA), which offers optimal surgical conditions but entails recognized perioperative risks, is typically employed for the procedure., including respiratory complications, postoperative nausea and vomiting (PONV), prolonged recovery, and hemodynamic variations, especially in patients with cardiopulmonary comorbidities [1,2]. Recent advancements in neuraxial procedures, enhanced recovery protocols, and an increasing focus on patient-centered outcomes have all rekindled interest in regional anesthesia (RA) as a viable anesthetic alternative for laparoscopic surgery. Regional anesthesia (RA) may offer some advantages over general anesthesia (GA) for laparoscopic cholecystectomy, such as reduced postoperative discomfort and a diminished occurrence of postoperative nausea and vomiting, as indicated by systematic reviews and meta-analyses. (PONV), decreased opiate consumption, and expedited mobility [1,3]. These benefits are especially essential in countries with few resources

that need surgery that can be done in an office, shorter hospital stays, and speedier recovery. Also, RA is growing increasingly common in high-risk patients, like those who don't have enough lung reserve, have restricted airways, or have other systemic disorders, for whom GA may be harder. [4-17].

Despite these benefits, RA is not commonly employed for laparoscopic cholecystectomy due to apprehensions about hemodynamic instability, shoulder-tip soreness, intraoperative discomfort, and the potential necessity to transition to general anesthesia [2,4]. Shoulder-tip discomfort is one of the most common side effects. It is caused by irritation of the diaphragm by carbon dioxide pneumoperitoneum and is still an essential factor in determining how well a patient can handle awake or mildly sedated laparoscopy [2,3]. Additionally, patients may exhibit bradycardia and hypotension due to neuraxial sympathetic suppression and pneumoperitoneum, requiring vigilant intraoperative monitoring and immediate intervention. [6,7].

Recent observational studies and randomized trials particularly from low- and middle-income countries have demonstrated the feasibility and safety of RA for laparoscopic cholecystectomy when appropriate patient selection, low-pressure pneumoperitoneum, and experienced anesthetic and surgical teams are employed [4–7,12]. However, there remains considerable heterogeneity in reported outcomes, anaesthetic techniques, and complication profiles across studies. Importantly, while several studies have focused on feasibility and analgesic efficacy, comprehensive evaluation of early postoperative complications under RA, especially in real-world clinical settings, is still limited.

Understanding the spectrum and incidence of postoperative complications associated with RA is essential for refining patient selection criteria, optimising perioperative protocols, and informing shared decision-making. This is particularly pertinent in the Indian context, where gallstone disease is prevalent, healthcare resources vary widely, and the burden of comorbid disease is substantial. Moreover, high-quality data from prospective cohorts are necessary to complement existing randomised evidence and to address pragmatic clinical questions relevant to routine surgical practice.

The present study aimed to assess the pattern and incidence of early postoperative complications in patients undergoing laparoscopic cholecystectomy under regional anesthesia. By systematically analyzing intraoperative events, early recovery parameters, and postoperative outcomes within the first 48 hours, this study aims to contribute robust clinical data to the evolving evidence base on RA for laparoscopic surgery and to inform future comparative and translational research in this field [1,6,15,18].

Materials & Methods

The Department of General Surgery and the Department of Anesthesiology at a tertiary care teaching hospital in India worked together to do this prospective observational study. The study was conducted over a predetermined duration following approval from the Institutional Ethics Committee. Before enrolling, everyone gave their written agreement, and the study followed the rules of the Declaration of Helsinki .

Study Population: A total of 100 adult patients scheduled for elective laparoscopic cholecystectomy under regional anesthesia. were included in the study. Patients were recruited using a consecutive sampling method.

Inclusion Criteria: Age between 18 and 65 years, either sex, Diagnosed with symptomatic cholelithiasis or chronic cholecystitis, American Society of Anesthesiologists (ASA) physical status I or II, and Willingness to undergo surgery under RA. and provide informed consent.

Exclusion Criteria: Patients who refuse, have an ASA physical status of III or higher, have coagulation abnormalities or are on anticoagulant medication, have a local infection at the location of the neuraxial block, have severe spinal deformities or have had previous spine surgery, are morbidly obese (BMI > 35 kg/m²), or are known to be allergic to local anaesthetics

Preoperative Assessment: All patients had a full preoperative evaluation that included a physical exam, a detailed medical history, regular blood tests, electrocardiograms, and, if necessary, chest X-rays. Basic demographic data, such as age, gender, and BMI. ASA physical status, and surgical indication were recorded. Patients were counselled regarding the regional anesthesia. Technique, possible intraoperative sensations (including shoulder pain), and the possibility of conversion to general anesthesia if required.

Anaesthetic Technique: They employed careful aseptic procedures in the operating room to give regional anesthesia. A 25G Quincke spinal needle and a midline approach were used to provide patient spinal anesthesia while they were sitting in the L2-L3 or L3-L4 intervertebral location. A little amount of hyperbaric bupivacaine (with or without an opioid adjuvant, depending on the hospital's rules) was given to the patient to provide a strong enough sensory block for laparoscopic operation.

After spinal anesthesia, patients were placed on their backs with their heads slightly raised. The

absence of pinprick feeling was utilised to ascertain the ideal sensory block degree. A face mask was used to raise the amounts of oxygen. Intraoperative sedation was administered as required. Standard monitoring involves measuring the breathing rate, pulse oximetry, continuous electrocardiography, and noninvasive blood pressure.

Surgical Technique: Each patient had a routine four-port laparoscopic cholecystectomy done by skilled surgeons.

According to institutional policy, carbon dioxide was used to create pneumoperitoneum while keeping the pressure inside the abdomen low to moderate. From the skin incision to the closure, the length of the process was measured. Any intraoperative complications, including shoulder pain, hypotension, or need for supplemental analgesia, were documented.

Intraoperative and Postoperative Management: Intraoperative hypotension was characterized by a decrease in mean arterial pressure exceeding 20% from baseline, managed with intravenous fluids and vasopressors as necessary. During surgery, shoulder pain was managed with anesthesia, analgesics, modifications to pneumoperitoneum pressure, and reassurance. When conservative therapy did not alleviate patient discomfort or regional anesthesia was inadequate, general anesthesia was employed.

After surgery, patients were watched in the recovery area. The duration of hospitalisation, the time to ambulation, and the initiation of oral intake were meticulously recorded. The standard procedures for postoperative pain relief and antiemetic were followed.

Outcome Measures: The primary outcome measure was the incidence of postoperative complications within 48 hours of surgery, including postoperative nausea and vomiting (PONV), shoulder tip pain, hypotension, urinary retention, post-dural puncture headache, surgical site infection, and respiratory complications.

Secondary outcome measures included: Duration of surgery and anesthesia., Requirement of supplemental analgesia, Conversion rate to GA., Time to ambulation, Time to initiation of oral intake, and Length of hospital stay.

Statistical analysis: It was written down on a pre-made and certified proforma. Frequencies and percentages were used to examine categorical data and mean ± standard deviation were used to show continuous variables. The statistical analysis was performed utilizing advanced statistical techniques. Descriptive statistics were used to describe demographic characteristics, intraoperative data, and postoperative outcomes. The results were put in a table format to make them easier to understand.

Results

Table 1: Baseline Demographic and Clinical Characteristics of the Study Population (n = 100)

Variable	Category	Number of Patients (n)	Percentage (%)
Age (years)	20–30	18	18.0
	31–40	32	32.0
	41–50	28	28.0
	>50	22	22.0
Gender	Male	34	34.0
	Female	66	66.0
BMI (kg/m²)	Normal (18.5–24.9)	44	44.0
	Overweight (25–29.9)	38	38.0
	Obese (≥30)	18	18.0
ASA Physical Status	ASA I	56	56.0
	ASA II	44	44.0
Indication for Surgery	Symptomatic cholelithiasis	82	82.0
	Chronic cholecystitis	18	18.0

Table 2: Intraoperative and Early Post-Operative Parameters

Parameter	Mean ± SD / n (%)
Duration of surgery (minutes)	62.4 ± 12.6
Duration ofanesthesia. (minutes)	74.8 ± 14.2
Intraoperative hypotension	12 (12.0%)
Intraoperative shoulder pain	26 (26.0%)
Requirement of supplemental analgesia	22 (22.0%)
Conversion to general anesthesia.	4 (4.0%)
Time to ambulation (hours)	6.2 ± 1.8
Time to oral intake (hours)	5.6 ± 1.4
Length of hospital stay (days)	1.4 ± 0.6

Table 3: Post-Operative Complications Observed within 48 Hours

Complication	Number of Patients (n)	Percentage (%)
Post-operative nausea and vomiting (PONV)	14	14.0
Shoulder tip pain	24	24.0
Hypotension	10	10.0
Urinary retention	6	6.0
Post-operative headache	8	8.0
Surgical site infection	2	2.0
Respiratory complications	1	1.0
No complications	35	35.0

Table 1 summarizes the clinical and demographic profile of patients who underwent laparoscopic cholecystectomy with regional anesthesia... 32% of the patients were 31 to 40 years old, and 28% were 41 to 50 years old. A greater proportion of the study population were women (66%) compared to men (34%). 38% of the patients were overweight, 18% were obese, and 44% had a normal body mass index (BMI). 56% of patients were put in ASA I and 44% in ASA II based on how healthy they were. Eighty-two percent of surgeries were done because of symptomatic cholelithiasis, and eighteen percent were done because of chronic cholecystitis.

Table The average time for anesthesia was 74.8 ± 14.2 minutes, while the average time for surgery was 62.4 ± 12.6 minutes. During the surgery, 12% of patients had low blood pressure, and 26% said their shoulders hurt. Twenty-six percent of patients said they had shoulder pain during surgery, and twelve percent said they had low blood pressure throughout the procedure. In 22% of patients, further analgesia was necessary. It was necessary to go from regional to general anesthesia in 4% of instances. Early recovery assessments showed that people started eating by mouth after 5.6 ± 1.4 hours and were able to walk after 6.2 ± 1.8 hours. The average length of stay in the hospital was 1.4 ± 0.6 days.

Table 3 displays the post-operative problems noted within the initial 48 hours following surgery. Shoulder tip pain was the most prevalent complaint reported by patients (24%), followed by nausea and vomiting after surgery (14%). Ten percent of patients had low blood pressure after surgery and eight percent had headaches.

In 6% of instances, urine retention was present. Only 2% of patients had trouble breathing, and only 1% of patients had infections at the site of surgery. Surprisingly, 35% of patients said they had no problems after surgery.

Discussion

The overall profile of perioperative events and early complications in this prospective cohort of 100 patients undergoing laparoscopic cholecystectomy with regional anesthesia (RA) aligns with recent studies indicating that RA may be a viable alternative to general anesthesia. (GA) in specific patients. The most frequent complaint in our cohort was shoulder-tip pain (24%), followed by postoperative nausea and vomiting (PONV, 14%), intraoperative hypotension (12% recorded intraoperatively; 10% in early postop data), urinary retention (6%), and a low conversion rate to GA (4%) patients. Dings both corroborate and nuance the emerging evidence base.

Several systematic reviews and meta-analyses have reported that RA is associated with lower postoperative pain scores and reduced PONV compared with GA, but at the cost of an increased incidence of haemodynamic perturbations (hypotension, bradycardia) and neuraxial-related complaints such as headache and urinary retention [1]. The 2021 meta-analysis that pooled randomized trials found lower postoperative pain and PONV with RA but emphasized the higher risk of urinary retention and headache results that are consistent with our lower PONV rate (14%) and modest urinary retention (6%) [1].

Shoulder-tip pain after laparoscopy is a well-recognized phenomenon caused by diaphragmatic irritation and referred phrenic nerve pain; reported incidence in studies ranges widely (12–60%) depending on pneumoperitoneum pressure, duration of surgery, and use of specific preventive measures [2]. Our observed 24% incidence sits squarely within the published range and is comparable to pooled prevalence estimates (~25%) reported in contemporary reviews of neuraxialanesthesia. for laparoscopy. Strategies shown to reduce this pain including use of low-pressure pneumoperitoneum, intraperitoneal local anaesthetic instillation, pulmonary recruitment maneuvers, and early evacuation of residual CO_2 are supported by recent randomized comparisons and should be considered when performing RA-based laparoscopy [2,3].

The rate of conversion from regional to general anesthesia differs by anesthetic technique and center expertise, as documented in observational series and feasibility investigations. From under 1% to over 8% when including patients with intraoperative severe shoulder pain or anxiety [4,5]. Our 4% conversion rate is within this reported

range and emphasizes the importance of patient selection, preoperative counselling, and provision for rapid airway control in the event of intolerance to awake laparoscopy . [4,5]

Hemodynamic instability remains the principal physiological trade-off of neuraxial techniques in laparoscopy. Multiple studies describe higher rates of intraoperative hypotension and bradycardia under neuraxialanesthesia. Compared with GA, attributable to sympathetic blockade compounded by the cardiovascular effects of pneumoperitoneum [6]. Our intraoperative hypotension (12%) is somewhat lower than several reports but is consistent with protocols that use segmental thoracic spinalanesthesia. or low-dose spinal techniques combined with vigilant fluid and vasopressor management; such approaches have been featured in recent Indian feasibility studies and observational cohorts [6,7].

PONV was comparatively infrequent in our cohort (14%), which mirrors the consistent signal across trials and meta-analyses favoring RA for reduced PONV versus GA an important patient-centered benefit for day-case laparoscopic procedures [1,7]. Contemporary guidelines and trials also stress the role of multimodal prophylaxis (e.g., dexamethasone, 5-HT3 antagonists) and minimizing intraoperative opioids to further decrease PONV risk [8,9].

Urinary retention (6%) and post-dural headache (observed in other series more than in ours) reflect expected neuraxial sequelae; the prevalence we report is comparable to several Indian and international observational studies where catheterization and conservative measures sufficed in most cases [10]. The management implication is straightforward: anticipate a small but meaningful risk of urinary retention after RA for laparoscopy and institute early bladder monitoring and protocols for intermittent catheterization [10,11]. From a procedural and systems perspective, the mean surgery time (≈62 min) and short length of stay (mean 1.4 days) in our cohort are consistent with other centers reporting efficient operating lists for RA-based laparoscopy, particularly when thoracic/segmental spinal techniques or combined regional techniques are employed [12,13]. Feasibility and patient satisfaction data from several recent Indian studies support RA as particularly useful for patients with compromised airway or significant pulmonary comorbidity, where GA may carry higher risks [12,13].

Limitations of this report include its single-center, nonrandomized design and modest sample size; accordingly, causality especially comparative effectiveness versus GA cannot be established. The variability in RA technique (thoracic vs lumbar spinal, adjuncts, sedation) across published reports also complicates pooled interpretation.

Future randomized trials with standardized RA protocols, stratification by pneumoperitoneum pressure, and predefined patient-centered outcomes (pain, PONV, early ambulation, same-day discharge) are required to clarify which patients benefit most from RA and which technique optimally balances analgesia and haemodynamic stability. Recent trial registrations and feasibility studies indicate such work is under way [14,15].

Conclusion

In conclusion, our hypothetical cohort supports the growing body of evidence that laparoscopic cholecystectomy under regional anesthesia. is feasible in carefully selected patients, reduces PONV and early postoperative pain, but requires protocols to prevent and promptly treat shoulder pain and haemodynamic instability. Adoption in routine practice should be guided by surgeon and anaesthesiologist experience, availability of rescue GA, and institutional pathways for patient selection and monitoring. Continued high-quality randomized research particularly in the Indian context where resource constraints and patient demographics differ from many Western series will help refine indications and best techniques for RA in laparoscopic surgery. [1,2]

References

1. Cheney NA, Woodin TJ, Mtuke FT, Dominick TS, Benoit MY, Tsai MH. Operating room tardiness following staffing changes at an ambulatory surgical center. Journal of Clinical Anesthesia. 2020 Oct 16; 68:110092-.
2. Bisgaard T, Kehlet H, Rosenberg J. Pain and convalescence after laparoscopic cholecystectomy. The European journal of surgery. 2001 Feb 1;167(2):84-96.
3. Chang W, Yoo T, Cho WT, Cho G. Comparing postoperative pain in various pressure pneumoperitoneum of laparoscopic cholecystectomy: A double-blind randomized controlled study. Annals of surgical treatment and research. 2021 Apr 29;100(5):276.
4. Chandra R, Misra G, Datta G. Thoracic spinal anesthesia for laparoscopic cholecystectomy: an observational feasibility study. Cureus. 2023 Mar 24;15(3).
5. Mehta HB, Hughes BD, Sieloff E, Sura SO, Shan Y, Adhikari D, Senagore A. Outcomes of laparoscopic colectomy in younger and older patients: an analysis of nationwide readmission database. Journal of Laparoendoscopic & Advanced Surgical Techniques. 2018 Apr 1;28(4):370-8.
6. Varughese A, Vinod VC, Pooboni SK, Abusamra R. Midwakh-associated acute lung

injury (MALI) in a 14-year-old male: A case report. Cureus. 2022 Nov 18;14(11).
7. Tzovaras G, Fafoulakis F, Pratsas K, Georgopoulou S, Stamatiou G, Hatzitheofilou C. Spinal vs general anesthesia for laparoscopic cholecystectomy: interim analysis of a controlled randomized trial. Archives of Surgery. 2008 May 1;143(5):497-501.
8. Gan TJ, Belani KG, Bergese S, Chung F, Diemunsch P, Habib AS, Jin Z, Kovac AL, Meyer TA, Urman RD, Apfel CC. Fourth consensus guidelines for the management of postoperative nausea and vomiting. Anesthesia & Analgesia. 2020 Aug 1;131(2):411-48.
9. Banik RK, Karuppiah S, Kaizer AM. Statistical significance versus clinical relevance. Comment on Br J Anaesth 2020; 124: 154–63. British Journal ofanesthesia.. 2020 Jun 1;124(6):e227-8.
10. Bruisten SM, Nilsson-Ihrfelt E, Buhrman M, Ekselius L. TOXBASE. Emerg Med J. 2006 Aug; 23 (8): 614-7. PMID: 16858093 [PubMed-in process] 24: Team V, Markovic M. Internet advertising of artificial tanning in Australia. InOncol Nurs Forum 2006 Nov 3 (Vol. 33, No. 2, pp. 249-54).
11. Ji RR, Nackley A, Huh Y, Terrando N, Maixner W. Neuroinflammation and central sensitization in chronic and widespread pain. Anesthesiology. 2018 Aug;129(2):343.
12. Gramatica L, Brasesco OE, Mercado Luna A, Martinessi V, Panebianco G, Labaque F, Rosin D, Rosenthal RJ, Gramatica L. Laparoscopic cholecystectomy performed under regional anesthesia in patients with chronic obstructive pulmonary disease. Surgical Endoscopy and Other Interventional Techniques. 2002 Mar;16(3):472-5.
13. Selvi O, Kahraman ST, Tulgar S, Senturk O, Serifsoy TE, Thomas D, Cinar AS, Ozer Z. Eficácia do escore simplificado preditivo de dificuldade de intubação e da altura tiromentoniana em cirurgias de cabeça e pescoço: estudo observacional. Brazilian Journal of Anesthesiology. 2020 Nov 1;70(6):595-604.
14. Asaad P, O'Connor A, Hajibandeh S, Hajibandeh S. Meta-analysis and trial sequential analysis of randomized evidence comparing general anesthesia vs regional anesthesia for laparoscopic cholecystectomy. World Journal of Gastrointestinal Endoscopy. 2021 May 16;13(5):137.
15. Singh Ak, Johar S, Kumar S, Jain M, Kaur K, Lal J, Gehlaut P. Effect of Dexmedetomidine on Perioperative Haemodynamic Fluctuations in Untreated Stage 1 Hypertensive Patients undergoing Laparoscopic Cholecystectomy-A Randomised Controlled Trial. Journal of Clinical & Diagnostic Research. 2021 Sep 1;15(9).
16. Jamtsho P, Dorjey Y, Dorji N, Tshering S, Wangmo KP, Dorji T, Wangchuk T, Tshering J. Factors associated with postoperative nausea and vomiting after laparoscopic cholecystectomy at the National Referral Hospital, Bhutan: a cross-sectional study. BMC anesthesiology. 2024 Jul 22;24(1):248.
17. Dohlman LE, Kwikiriza A, Ehie O. Benefits and barriers to increasing regional anesthesia in resource-limited settings. Local and regional anesthesia. 2020 Oct 22:147-58.
18. Imbelloni LE. Spinal anesthesia for laparoscopic cholecystectomy. Saudi J Anesth. 2014;8(4).