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Mini-incision open cholecystectomy under low-dose spinal anaesthesia and multimodal analgesia: A prospective single-centre study in a peripheral secondary care hospital

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Abstract

Background/Aim: Mini-incision open cholecystectomy remains relevant in resource-limited peripheral settings. This prospective study evaluated the safety, feasibility, and recovery profile of mini-incision open cholecystectomy under low-dose spinal anaesthesia and multimodal analgesia.

Methods: A prospective observational study was conducted at Sub-Divisional Hospital Patti, Punjab, India, between June 2025 and 15 June 2026. A total of 100 patients with symptomatic cholelithiasis undergoing elective mini-incision open cholecystectomy were included.Eras protocols were implemented in all cases. Primary outcomes included postoperative pain scores and complications. Secondary outcomes included operative duration, hospital stay, ambulation, oral intake, and return to routine activities. Data were analysed using descriptive statistics. Continuous variables were presented as mean ± standard deviation, whereas categorical variables were shown as frequencies and percentages.

Results: Mean age was 41.02±12.77 years; 95% were female. Mean operative duration was 40.2±10.6 minutes. Mean hospital stay was 2.8±0.7 days. No major post operative complication such as bile leak, or surgical-site infection or mortality occurred.

Conclusion: The procedure is safe, economical, and highly suitable for peripheral resource constrained hospitals.

Keywords: Mini-incision open cholecystectomy, low-dose spinal anaesthesia, multimodal analgesia, symptomatic cholelithiasis

Introduction

Gallstone disease is among the most common indications for general surgical intervention worldwide. While laparoscopic cholecystectomy remains the accepted standard of care, significant barriers to implementation remain in rural and peripheral healthcare institutions. Mini-incision open cholecystectomy offers a practical alternative requiring minimal infrastructure while preserving favorable clinical outcomes. The incorporation of low-dose spinal anaesthesia and multimodal analgesia may further enhance recovery and reduce perioperative morbidity.

Materials and Methods

This prospective observational study was conducted at Sub-Divisional Hospital Patti, Punjab, India, from June 2025 to May 2026. One hundred consecutive patients with symptomatic cholelithiasis were enrolled.

Inclusion Criteria

- Symptomatic cholelithiasis
- Age ≥18 years
- Fitness for spinal anaesthesia
- Informed consent

Exclusion Criteria

- Acute cholecystitis
- Choledocholithiasis
- Gallbladder malignancy
- Contraindications to spinal anaesthesia

Under strict aseptic conditions, Patients underwent elective mini-incision open cholecystectomy through a 4–6 cm right subcostal incision under low dose spinal anaesthesia. Low-dose spinal anaesthesia consisted of 1 mL hyperbaric bupivacaine with fentanyl 20 mcg. Postoperative analgesia included intravenous paracetamol or intravenous diclofenac, and transdermal diclofenac patches.Eras protocols were implemented in all cases. Outcomes included operative parameters, pain scores, postoperative recovery, and complications.

Results

Ninety-five patients were female and five were male. Mean age was 41.02±12.77 years. Mean incision length was 5.2±0.8 cm and operative duration was 40.2±10.6 minutes. No patient required conversion to conventional open surgery. Mean VAS scores were 3.8±1.1 at 6 hours and 3.1±1.2 at 24 hours. All patients ambulated within 18 hours and 98% tolerated oral intake within 12 hours. Mean hospital stay was 2.8±0.7 days and return to routine activities occurred after 7.2±2.1 days.

Discussion

The findings of this study support the continued role of mini-incision open cholecystectomy in contemporary surgical practice, particularly within peripheral and resource-constrained healthcare systems. Although laparoscopic cholecystectomy is widely accepted as the gold standard, availability of equipment, maintenance costs, and

trained personnel remain significant barriers in many secondary-care institutions.

The operative duration observed in this study compares favorably with previously published reports. Completion of all procedures without conversion suggests that the technique is reproducible and technically reliable in carefully selected patients. The small incision size likely contributed to reduced tissue trauma and accelerated recovery.

Low-dose spinal anaesthesia was effective in all patients. Avoidance of general anaesthesia may reduce airway-related complications and improve postoperative comfort. The low incidence of hypotension and absence of major anaesthetic complications further support the safety of this approach.

Multimodal analgesia has become a cornerstone of enhanced recovery pathways. The low postoperative pain scores and absence of rescue analgesic requirements in this series demonstrate the effectiveness of combining paracetamol and nonsteroidal anti-inflammatory drugs in an opioid-sparing strategy. Early ambulation and rapid return of oral intake observed in this study are consistent with enhanced recovery principles.

The overall complication rate of 2% compares favorably with published literature. Notably, no bile duct injury, wound infection, seroma, reoperation, or mortality occurred. Such outcomes reinforce the safety profile of mini-incision surgery.

From a health economics perspective, mini-incision open cholecystectomy offers important advantages. The procedure requires only standard surgical instruments, making it particularly useful during equipment failure, financial constraints, or in hospitals where laparoscopic facilities are unavailable. Reduced capital expenditure may improve access to definitive surgical care in underserved regions.

Limitations include the single-centre design, lack of a laparoscopic comparison group, and absence of long-term follow-up. Future larger comparative studies are warranted.

Conclusion

Mini-incision open cholecystectomy under low-dose spinal anaesthesia with multimodal analgesia is a safe, effective, and economical surgical option for symptomatic cholelithiasis. It offers excellent postoperative recovery and minimal complications and remains particularly valuable in peripheral secondary-care hospitals where laparoscopic facilities may be limited.

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Ethics Statement

Written informed consent was obtained from all participants. The study design was approved by the Institutional Ethics Committee.

Conflict of Interest

The authors declare no conflicts of interest.

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Author Contributions

Concept, design, data collection, analysis, manuscript preparation, and critical review were performed by the listed authors.

Table 1: Demographic Characteristics of Patients

Variable	Value
Sample Size	100
Mean Age	41.02 ± 12.77 years
Sex Distribution	95 Female, 5 Male

Table 2: Operative Parameters

Parameter	Result
Mean incision length	5.2 ± 0.8 cm
Mean operative duration	40.2 ± 10.6 minutes
Intraoperative hypotension	2 (2%)
Conversion to conventional open surgery	0
Intraoperative bile duct injury	0

Table 3: Postoperative Recovery Profile

Parameter	Result
Mean VAS score at 6 hours	3.8 ± 1.1
Mean VAS score at 24 hours	3.1 ± 1.2
Ambulation within 18 hours	100 (100%)
Oral intake within 12 hours	98 (98%)
Requirement of rescue analgesia	0 (0%)
Mean hospital stay	2.8 ± 0.7 days
Mean return to routine activity	7.2 ± 2.1 days

Table 4: Postoperative Complications

Postoperative nausea and vomiting (PONV)	2 (2%)
Surgical-site infection (SSI)	0
Seroma formation	0
Bile leak	0
Reoperation	0
Mortality	0
Overall complication rate (Minor)	2 (2%)

Table 5: Advantages of Mini-Incision Open Cholecystectomy in Peripheral Settings

Parameter	Observation
Requirement of advanced laparoscopic equipment	Not required
Feasibility in resource-limited settings	High
Requirement of general anaesthesia	Avoidable
Postoperative recovery	Early
Cost burden	Lower
Applicability during equipment failure	High
Suitability for peripheral hospitals	Excellent

References

1. Ros A, Gustafsson L, Krook H, et al. Ann Surg,2001:234(6):741-749.
2. Barkun JS, Barkun AN, Sampalis JS, et al. Lancet,1992:340(8828):1116-1119.
3. Kehlet H, Dahl JB. Anesth Analg,1993:77(5):1048-1056.
4. Keus F, de Jong JA, Gooszen HG, et al. Cochrane Database Syst Rev,2006,(4):CD006231.
5. Wick EC, Grant MC, Wu CL. JAMA Surg,2017:152(7):691-697.

6. Johansson M, Thune A, Nelvin L, et al. Br J Surg,2005:92(1):44-49.
7. Gurusamy KS, Davidson BR. BMJ,2014:348:g2669.
8. Ljungqvist O, Scott M, Fearon KC. JAMA Surg,2017:152(3):292-298.
9. Majeed AW, Troy G, Nicholl JP, et al. Lancet,1996:347(9007):989-994.
10. McMahon AJ, Russell IT, Ramsay G, et al. Laparoscopic and mini-laparotomy cholecystectomy: a randomized trial. Br J Surg,1994:81(1):137-140.
11. Bisgaard T. Analgesic treatment after laparoscopic cholecystectomy: a critical assessment. Surg Endosc,2006:20(9):1392-1401.
12. Gupta A, Thorn SE, Axelsson K, et al. Postoperative pain relief using multimodal analgesia. Anesth Analg,2002:95(4):1017-1024.
13. Fearon KC, Ljungqvist O, Von Meyenfeldt M, et al. Enhanced recovery after surgery: a consensus review. Clin Nutr,2005:24(3):466-477.
14. Schwenk W, Haase O, Neudecker J, Müller JM. Short term benefits for laparoscopic colorectal resection. Cochrane Database Syst Rev,2005,(3):CD003145.
15. Gutt CN, Encke J, Köninger J, et al. Acute cholecystitis: early versus delayed surgery. Ann Surg,2013:258(3):385-393.
16. Shea JA, Berlin JA, Escarce JJ, et al. Revised estimates of diagnostic test sensitivity and outcomes of laparoscopic cholecystectomy. Ann Surg,1994:220(5):643-654.
17. Moore MJ, Bennett CL. The learning curve for laparoscopic cholecystectomy. Am J Surg,1995:170(1):55-59.