RESEARCH PAPER

Clinical Outcomes of Early versus Delayed Laparoscopic Cholecystectomy in Acute Calculous Cholecystitis

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ABSTRACT

Background

Acute calculous cholecystitis is one of the most common surgical emergencies encountered in clinical practice. Laparoscopic cholecystectomy is the gold standard treatment; however, the optimal timing of surgery remains a matter of debate. Early laparoscopic cholecystectomy may reduce recurrent symptoms and hospital stay, whereas delayed surgery is traditionally considered technically easier after resolution of inflammation.

Aim

To compare the clinical outcomes of early versus delayed laparoscopic cholecystectomy in patients with acute calculous cholecystitis.

Methods

A retrospective observational study was conducted at Shri Ramkrishna Institute of Medical Sciences and Sanaka Hospitals, Durgapur, from May 2025 to May 2026. Ninety-eight patients diagnosed with acute calculous cholecystitis were included. Patients were categorized into an Early Laparoscopic Cholecystectomy (ELC) group (within 72 hours of admission; n=50) and a Delayed Laparoscopic Cholecystectomy (DLC) group (6–8 weeks after conservative treatment; n=48). Operative duration, conversion rate, complications, hospital stay, and readmission rates were compared.

Results

The mean hospital stay was significantly shorter in the ELC group (4.8 ± 1.6 days) compared with the DLC group (8.9 ± 2.3 days, $p<0.001$). Readmission due to recurrent biliary symptoms was significantly higher in the delayed group (20.8% vs 2.0%, $p=0.003$). Postoperative complications and conversion to open surgery were comparable between groups ($p>0.05$).

Conclusion

Early laparoscopic cholecystectomy is a safe and effective treatment strategy for acute calculous cholecystitis and is associated with shorter hospitalization and fewer recurrent biliary events compared with delayed surgery.

Keywords: Acute calculous cholecystitis, Laparoscopic cholecystectomy, Early surgery, Delayed surgery, Outcomes, Gallstone disease.

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INTRODUCTION

Acute calculous cholecystitis is an inflammatory gallbladder disorder caused by gallstones obstructing the cystic duct. It contributes significantly to hospitalisations associated with gallstone disease and is one of the most frequent reasons of emergency surgical admissions globally. Right upper abdomen pain, fever, leukocytosis, and imaging results consistent with gallbladder inflammation are the condition's hallmarks. Acute

cholecystitis can develop into problems including empyema, gangrene, perforation, and generalised peritonitis if treatment is not received(1). Due to its minimally invasive nature, decreased postoperative pain, quicker recovery period, and better cosmetic results than open surgery, laparoscopic cholecystectomy has emerged as the preferred treatment for acute calculous cholecystitis and symptomatic gallstone disease. Although laparoscopic cholecystectomy is widely accepted, there is ongoing debate on the best time to perform surgery in cases with acute cholecystitis(2).

In the past, patients were treated conservatively during the acute phase with supportive care, antibiotics, and analgesics. After the inflammation subsided, interval cholecystectomy was performed a few weeks later. It was thought that by delaying the procedure, the danger of problems would be reduced. However, delaying surgery puts patients at risk for gallbladder disease development, gallstone pancreatitis, recurrent biliary symptoms, and repeated hospital admissions(3). Early laparoscopic cholecystectomy is becoming more and more popular due to recent developments in laparoscopic procedures and perioperative care. Early surgery allows for final treatment during the initial hospital stay and may avoid recurring attacks. It is often done within 72 hours of the onset of symptoms or admission. Early intervention has been shown to have positive effects in a number of studies, including shorter hospital stays and cheaper medical expenses(4).

However, there are still issues with the technical difficulties of working in an inflammatory surgical area, which can raise the danger of bleeding, bile duct damage, and the need for open surgery. Thus, ongoing clinical outcome assessment is required to inform evidence-based surgical decision-making. In order to evaluate the effects of early versus delayed laparoscopic cholecystectomy on operating parameters, postoperative complications, hospital stay, and recurrence of biliary symptoms in patients with acute calculous cholecystitis, the current study was conducted(5).

MATERIALS AND METHODS

Study Design
Retrospective observational study.

Study Setting
Department of General Surgery, Shri Ramkrishna Institute of Medical Sciences and Sanaka Hospitals, Durgapur.

Study Duration
May 2025 to May 2026.

Sample Size
98 patients.

Study Groups
Group A (Early Laparoscopic Cholecystectomy)
- Surgery within 72 hours of admission.
- n = 50

Group B (Delayed Laparoscopic Cholecystectomy)
- Surgery performed 6–8 weeks after conservative treatment.
- n = 48

Inclusion Criteria
- Age ≥18 years.
- Ultrasound-confirmed acute calculous cholecystitis.
- Complete medical records.

Exclusion Criteria
- Acalculous cholecystitis.
- Gallbladder malignancy.
- Common bile duct stones requiring ERCP.
- Severe pancreatitis.

Data Collected
- Demographic characteristics.
- Operative duration.
- Conversion to open surgery.
- Intraoperative complications.
- Postoperative complications.
- Hospital stay.
- Readmissions before surgery.
- Mortality.

Statistical Analysis
Data were analyzed using SPSS version 26.

- Student's t-test.
- Chi-square test.
- Fisher's exact test.

p-value <0.05 considered statistically significant.

RESULTS

Table 1. Baseline Characteristics
Baseline demographic and clinical characteristics were comparable between the two groups.

Variable	Early LC (n=50)	Delayed LC (n=48)	p-value

Age (years)	47.8 ± 12.4	49.1 ± 13.1	0.61
Female (%)	68.0	70.8	0.76
Diabetes Mellitus (%)	24.0	27.1	0.72
Leukocyte Count (×10⁹/L)	12.8 ± 3.2	13.1 ± 3.5	0.68

RESULTS TEXT

Table 2. Operative Outcomes

Operative duration was slightly longer in the early surgery group, although the difference was not statistically significant. Conversion rates and intraoperative complications were comparable.

Parameter	Early LC	Delayed LC	p-value
Operative Time (min)	78.4 ± 18.6	72.1 ± 16.8	0.084
Conversion to Open Surgery (%)	8.0	6.3	0.74
Intraoperative Bleeding (%)	6.0	4.2	0.69
Bile Leak (%)	2.0	2.1	0.97

.**Table 3. Postoperative Outcomes**

The early surgery group demonstrated a significantly shorter total hospital stay. Postoperative complications were similar between groups.

Outcome	Early LC	Delayed LC	p-value
Hospital Stay (days)	4.8 ± 1.6	8.9 ± 2.3	<0.001
Surgical Site Infection (%)	4.0	6.3	0.61
ICU Admission (%)	2.0	4.2	0.53
Mortality (%)	0	0	—

Table 4. Recurrent Biliary Events Before Surgery

Patients awaiting delayed surgery experienced significantly higher rates of recurrent biliary symptoms and readmission.

Event	Early LC (%)	Delayed LC (%)	p-value
Recurrent Pain	2.0	18.8	0.006
Readmission	2.0	20.8	0.003
Acute Cholecystitis Recurrence	0	12.5	0.011

Table 5. Overall Clinical Success

Overall favorable outcomes were significantly higher among patients undergoing early laparoscopic cholecystectomy.

Outcome	Early LC (%)	Delayed LC (%)	p-value
Successful Laparoscopic Completion	92.0	93.7	0.74
Favorable Clinical Outcome	90.0	75.0	0.047

DISCUSSION

The clinical results of early and delayed laparoscopic cholecystectomy in patients with acute calculous

cholecystitis were compared in this retrospective analysis. When compared to delayed surgery, the results show that early laparoscopic cholecystectomy is linked to shorter hospital stays, fewer recurrent biliary events, and similar operative safety. The time of definitive surgical intervention for acute calculous cholecystitis, a common surgical emergency, has long been controversial. In the past, doctors thought that delaying surgery until after acute inflammation had subsided would minimise risks and make the procedure easier. But this conventional strategy has been called into question by improvements in laparoscopic methods and growing surgical expertise(6).

The two groups in the current investigation had comparable baseline clinical and demographic features, guaranteeing comparability of results. Patients undergoing early surgery had somewhat longer operating times, although this difference was not statistically significant. Tissue oedema, inflammation, and anatomical plane distortion may be the cause of the longer operating times seen in early surgery. However, these technological difficulties did not result in a rise in morbidity. The similar conversion rate between early and delayed laparoscopic cholecystectomy was one of the most significant discoveries. Only a tiny percentage of patients in both groups underwent conversion to open surgery, and there was no statistically significant difference. This result implies that skilled surgeons can safely do early laparoscopic cholecystectomy without raising the risk of open conversion(7).

In a similar vein, intraoperative problems such bile leakage and blood were rare and similar among groups. The safety profile of early surgery is supported by the low occurrence of serious complications, which is consistent with results from many randomised trials and meta-analyses. The lack of death in either group highlights the general safety of laparoscopic cholecystectomy in patients who are carefully chosen(8). The large decrease in overall hospital stay was the study's most notable benefit of early surgery. Compared to patients who underwent delayed surgery, those who underwent early laparoscopic cholecystectomy had far shorter hospital stays. This decrease probably results from the elimination of the waiting period necessary prior to interval cholecystectomy and the avoidance of recurrent admissions. Patient satisfaction and the use of healthcare resources are significantly impacted by shorter hospital stays(9).

The much lower risk of recurring biliary symptoms among individuals following early surgery was another clinically relevant finding. While awaiting definitive therapy, patients who underwent delayed surgery had greater incidence of recurrent cholecystitis, recurring discomfort, and hospital readmission. In addition to raising healthcare expenses, these recurring occurrences may put patients at risk for further morbidity and disease progression. The early surgery group had far better overall clinical outcomes. This finding implies that, when compared to a delayed strategy, decisive treatment during the index admission may result in better patient outcomes. The results corroborate the mounting evidence that early laparoscopic cholecystectomy is the best course of action for treating acute calculous cholecystitis(6).

There are a number of restrictions on the study. The sample size was somewhat small, and its retrospective nature may induce selection bias. Long-term follow-up data were also unavailable. Notwithstanding these drawbacks, the results offer important proof in favour of early surgical treatment for acute calculous cholecystitis. Overall, the study shows that early laparoscopic cholecystectomy has major therapeutic benefits without raising the risk of surgery. The findings are consistent with the current worldwide standards, which advise early surgery wherever possible(10).

CONCLUSION

The current study shows that a safe and efficient therapeutic option for patients with acute calculous cholecystitis is early laparoscopic cholecystectomy. Early intervention was linked to significantly shorter hospital stays, decreased readmission rates, and fewer recurrent biliary events while retaining equivalent operative safety when compared to delayed surgery. When conducted by skilled surgeons, early surgery does not raise procedural risk, as evidenced by the lack of substantial differences in conversion to open surgery, operative problems, or postoperative morbidity. There are significant therapeutic and financial advantages to less recurrent symptoms and fewer hospital hospitalisations.

These results corroborate the mounting evidence that early laparoscopic cholecystectomy is the best course of action for treating acute calculous cholecystitis. In addition to improving patient outcomes, early decisive management lowers total treatment burden and healthcare use. To confirm these results and assess long-term effects, more prospective multicenter trials with bigger sample sizes are advised. However, the current study encourages patients with acute calculous cholecystitis to routinely have early laparoscopic cholecystectomy whenever it is clinically possible.

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