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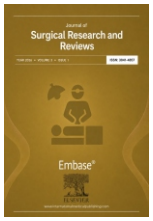

Research Article

Section: General Surgery

A Comparative Observational Study of Laparoscopic Interval Cholecystectomy & Laparoscopic Early Cholecystectomy in Acute Cholecystitis

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HIGHLIGHTS

- Early surgery shortened hospital stay
- Operative outcomes were comparable
- Complications remained comparable
- Conversion rates were similar
- Early surgery was safe

Key Words:

Acute cholecystitis

Early laparoscopic cholecystectomy

Interval laparoscopic cholecystectomy

ABSTRACT

Introduction: The Acute calculous cholecystitis is a common surgical emergency, and the optimal timing of laparoscopic cholecystectomy remains debated. **Aim & Objective:** This study compared to the clinical outcomes, intraoperative complications, conversion rates, and total hospital stay between early and interval laparoscopic cholecystectomy. **Material & methods:** A prospective comparative observational study was conducted in a tertiary care teaching hospital in Maharashtra. Fifty eligible patients with the acute calculous cholecystitis were consecutively enrolled, with 25 undergoing early laparoscopic cholecystectomy during the index admission and 25 undergoing interval laparoscopic cholecystectomy after 4–6 weeks of conservative management. The Demographic, clinical, operative, and postoperative outcomes were recorded and statistically compared. **Results:** The two groups were comparable regarding baseline characteristics and disease severity. Mean operative time was 72.4 ± 15.6 minutes in the early group and 66.1 ± 13.2 minutes in the interval group ($p=0.11$). Intraoperative complications occurred in 28.0% and 20.0%, respectively ($p=0.51$). Conversion to open surgery was required in 12.0% of early and 8.0% of interval cases ($p=0.64$). Postoperative complications were comparable (24.0% vs. 16.0%; $p=0.48$), as were postoperative hospital stay (3.6 ± 1.2 vs. 3.1 ± 0.9 days; $p=0.10$). However, total hospital stay was significantly shorter with early surgery (5.6 ± 1.8 vs. 9.8 ± 2.4 days; $p<0.001$). **Conclusion:** Early laparoscopic cholecystectomy was safe and feasible, with outcomes comparable to interval surgery regarding operative time, intraoperative and postoperative complications, and conversion to open surgery. Importantly, early surgery significantly reduced total hospital stay by approximately four days. These findings support early laparoscopic cholecystectomy as the preferred approach in suitable patients with acute calculous cholecystitis, improving healthcare efficiency without compromising safety.

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INTRODUCTION

Gallstone disease is among the most common gastrointestinal disorders encountered in surgical practice and represents a substantial cause of morbidity, hospital admissions, and healthcare utilization. Acute cholecystitis is one of the most frequent complications of gallstone disease and a major indication for emergency surgical admission. It is characterized by acute inflammation of the gallbladder, most commonly resulting from persistent cystic duct obstruction by a gallstone, leading to distension, ischemia, inflammation, and, in advanced cases, secondary infection. Clinically, patients commonly present with right upper quadrant pain, fever, leukocytosis, nausea, vomiting, and tenderness. Ultrasonography typically demonstrates gallstones, gallbladder wall thickening, pericholecystic fluid, and a positive sonographic Murphy's sign. The Tokyo Guidelines have standardized diagnosis and severity assessment by integrating local inflammatory signs, systemic inflammatory response, and characteristic imaging findings [1-3].

Gallstones affect approximately 10–20% of adults in Western populations, while their prevalence in Asian and Indian populations is lower but increasing with changing dietary and lifestyle patterns. Approximately 1–3% of individuals with gallstones develop acute cholecystitis annually, and the condition accounts for a substantial proportion of gallstone-related hospital admissions and emergency abdominal procedures. Acute cholecystitis is more frequently observed among middle-aged and elderly individuals and has a higher prevalence among females. Beyond clinical morbidity, the disease imposes considerable socioeconomic consequences through prolonged hospitalization, recurrent admissions, loss of productivity, and increased healthcare expenditure [4,5].

The pathogenesis of acute calculous cholecystitis involves mechanical obstruction, chemical inflammation, ischemia, and secondary infection. Impaction of a stone within the cystic duct or Hartmann's pouch obstructs bile outflow, resulting in gallbladder distension and increased intraluminal pressure. This compromises venous and lymphatic drainage and subsequently produces ischemic changes in the gallbladder wall. Chemical irritation from concentrated bile components, together with ischemic injury, promotes inflammatory mediator release, edema, wall thickening, and inflammatory cell infiltration. In advanced disease, bacterial infection may occur, with organisms such as *Escherichia coli*, *Klebsiella*, and *Enterococcus* commonly implicated. Untreated disease may progress to gangrene, perforation, pericholecystic abscess, biliary peritonitis, or sepsis. Conservative treatment may also be followed by recurrent biliary events, while repeated inflammation can produce fibrosis and dense adhesions around Calot's triangle, potentially increasing operative difficulty during delayed surgery [6-8].

Historically, acute cholecystitis was initially managed conservatively, followed by interval cholecystectomy after resolution of acute inflammation. The development of laparoscopic cholecystectomy transformed gallstone surgery and established it as the preferred minimally invasive approach. Initially, acute cholecystitis was considered relatively unsuitable for laparoscopic surgery because of concerns regarding edema, friability, distorted anatomy, difficult dissection, and conversion to open surgery. With increasing surgical expertise, improved instruments, and adoption of safety principles such as the Critical View of Safety, early laparoscopic cholecystectomy has become increasingly accepted [9,10].

Early cholecystectomy is generally defined as laparoscopic surgery performed during the index admission, commonly within 72 hours of symptom onset, whereas interval cholecystectomy is performed several weeks after initial

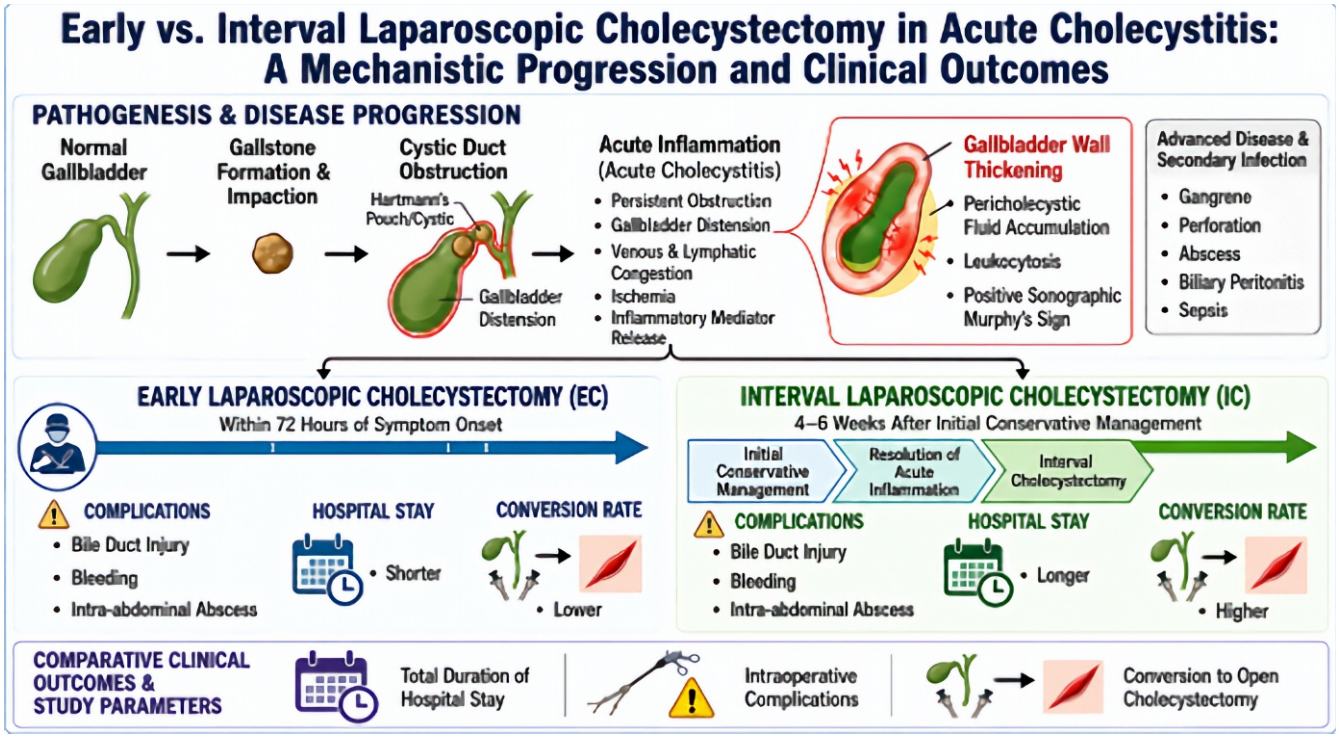

Figure 1: Shock Index predicting post-intubation hypotension.

conservative management, usually after 4–6 weeks. Early surgery provides definitive treatment during a single admission & may prevent recurrent attacks, reduce cumulative hospitalization, and decrease healthcare expenditure [25]. Randomized trials and meta-analyses have demonstrated that early laparoscopic cholecystectomy is feasible and generally safe, with comparable complication rates and shorter overall hospital stay than delayed surgery. Nevertheless, acute inflammation may cause tissue edema & friability, potentially increasing technical difficulty and concerns regarding bile duct injury or conversion to open surgery. Conversely, although interval surgery permits apparent resolution of acute inflammation, the waiting period exposes patients to recurrent biliary events and additional admissions [11-13].

Contemporary recommendations, including the Tokyo Guidelines and recommendations from major surgical societies, generally favor early laparoscopic cholecystectomy for surgically fit patients with mild to moderate acute cholecystitis. However, implementation varies according to disease severity, patient comorbidities, surgeon expertise, emergency operating-room availability, and institutional resources. Published studies have reported variable findings concerning intra-operative complications, conversion rates, and operative difficulty between early and interval approaches. These differences are particularly relevant in developing countries, including India, where delayed presentation and limitations in emergency laparoscopic services may influence surgical decision-making. The available literature also contains limited prospective evidence from Indian tertiary-care settings directly comparing these approaches in routine clinical practice [14,15].

Therefore, the present prospective comparative observational study was undertaken to compare early and interval laparoscopic cholecystectomy in patients with acute cholecystitis. The study specifically evaluated intraoperative complications, total duration of hospital stay, and conversion to open cholecystectomy. By assessing these clinically important outcomes in a real-world tertiary-care setting, the study aimed to provide locally relevant evidence regarding the optimal timing of laparoscopic intervention and to support practical, evidence-based surgical decision-making [15]. **Figure 1.** Pathogenesis and disease progression of acute cholecystitis, illustrating the mechanistic basis and comparative clinical outcomes of early versus interval laparoscopic cholecystectomy.

This study aims to compare the clinical outcomes of early cholecystectomy (EC) and interval cholecystectomy (IC) in patients with acute cholecystitis. The objectives are to assess and compare intraoperative complications between the two groups, evaluate the total duration of hospital stay in patients undergoing early and interval cholecystectomy, and analyze and compare the rate of conversion to open cholecystectomy in both groups.

MATERIALS & METHODS

This prospective comparative observational study was conducted at the Department of General Surgery, at a tertiary care teaching hospital in Maharashtra from 2023 to 2026. Ethical approval has been obtained from the Ethical Approval Committee of a tertiary care teaching hospital in Maharashtra.

Study Population

The study population comprised adults presenting to the surgical outpatient or emergency department with acute calculous cholecystitis diagnosed clinically, biochemically, and ultrasonographically. Eligible patients who were fit for laparoscopic surgery and provided written informed consent were included. Patients with choledocholithiasis, pancreatitis, cholangitis, gallbladder malignancy, acalculous cholecystitis, pregnancy, significant comorbidities precluding surgery, contraindication to general anesthesia, or requiring emergency open cholecystectomy were excluded. Participants underwent either early or interval laparoscopic cholecystectomy as appropriate.

Data Analysis

Collected data were entered into Microsoft Excel and analyzed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation or median with range, as applicable, while categorical variables were presented as frequencies and percentages. Comparisons between early and interval cholecystectomy groups were performed using Student's t-test or Mann–Whitney U test for continuous variables and Chi-square or Fisher's exact test for categorical variables. A p-value <0.05 indicated statistical significance.

RESULTS

The study included 50 patients, equally divided between early and interval laparoscopic cholecystectomy groups. Most patients were aged 41–50 years, accounting for 32.0% of the early group and 36.0% of the interval group, with mean ages of 44.6 ± 11.2 and 46.1 ± 10.8 years, respectively; the difference was not significant (p=0.62). Females predominated in both groups (64.0% vs. 60.0%), with no significant gender difference (p=0.77). All patients presented with right upper quadrant pain, while fever and leukocytosis were comparable between groups (p=0.78 and p=0.77, respectively), indicating similar baseline characteristics.

Ultrasonography showed gallstones in all patients, with comparable rates of wall thickening, pericholecystic fluid, positive sonographic Murphy's sign, and gallbladder distension between groups (all $p>0.05$), indicating similar baseline radiological characteristics **(Table 1)**. The mean operative time was slightly longer in the early LC group than in the interval LC group (72.4 ± 15.6 vs. 66.1 ± 13.2 minutes), but the difference was not statistically significant (p=0.11), indicating comparable operative duration between the two groups **(Table 2)**.

Intraoperatively, acute inflammatory changes such as gallbladder distension, wall thickening/edema, and friability were more frequent in the early LC group, whereas dense adhesions and fibrotic Calot's triangle were more common in the interval group; however, none of these differences were statistically significant (all $p>0.05$) **(Figure 2)**. Intraoperative complications were slightly more frequent in the early LC group than in the interval LC group (28.0% vs. 20.0%), including bleeding, gallbladder

perforation with bile spillage, and gallstone spillage; however, none of these differences were statistically significant (all p>0.05), and no adjacent-structure injuries occurred, indicating comparable intraoperative safety between the two approaches **(Table 3)**.

Conversion to open surgery occurred in 12.0% of patients in the early LC group and 8.0% in the interval LC group, while laparoscopic completion was achieved in 88.0% and 92.0%, respectively; the difference was not statistically significant (p=0.64), indicating comparable laparoscopic feasibility between the two approaches **(Figure 3)**.

Among the five converted cases, unclear anatomy or inability to achieve the critical view of safety was the most common indication for conversion (60.0%), followed by dense adhesions in Calot's triangle (40.0%); no conversions were required because of uncontrolled bleeding or suspected bile duct injury **(Table 4)**.

Postoperative complications occurred in 24.0% of patients in the early LC group and 16.0% in the interval LC group, with no statistically significant difference (p=0.48); rates of surgical site infection, bile leak, intra-abdominal collection, and pulmonary complications were also comparable between the groups (all p>0.05) **(Table 5)**.

.Postoperative pain scores were slightly higher in the early LC group than in the interval LC group (3.9 ± 1.1 vs. 3.3 ± 1.0), but the difference was not statistically significant (p=0.06), indicating comparable postoperative pain between the two groups **(Figure 4)**. The mean time to initiation of oral feeding was slightly longer in the early LC group than in the interval LC group (13.2 ± 4.6 vs. 11.1 ± 3.8 hours), but the difference was not statistically significant (p=0.08), indicating comparable postoperative recovery of oral intake between the two groups **(Table 6)**. The mean postoperative hospital stay was slightly longer in the early LC group than in the interval LC group (3.6 ± 1.2 vs. 3.1 ± 0.9 days), but the difference was not statistically significant (p=0.10), with an identical median stay of 3 days, indicating comparable postoperative recovery duration between the two groups **(Figure 5)**. The total hospital stay was significantly shorter in the early LC group than in the interval LC group (5.6 ± 1.8 vs. 9.8 ± 2.4 days), with median stays of 5 and 9 days, respectively (p<0.001), demonstrating a clear advantage of early laparoscopic cholecystectomy in reducing overall hospitalization **(Table 7)**. The majority of patients had Grade I (mild) acute cholecystitis (72.0% in early LC vs. 68.0% in interval LC), while Grade II disease accounted for 28.0% and 32.0%, respectively; no Grade III cases were observed, with no significant difference in severity distribution between groups (p=0.76) **(Table 8)**.

Table 1. Comparison of Ultrasonographic Findings between Early and Interval Laparoscopic Cholecystectomy Groups

Ultrasonographic Finding	Early LC (n = 25)	Interval LC (n = 25)	Total (n = 50)	p-value
Gallstones present	25 (100%)	25 (100%)	50 (100%)	-
Gallbladder wall thickness >4 mm	17 (68.0%)	16 (64.0%)	33 (66.0%)	0.77
Pericholecystic fluid	9 (36.0%)	8 (32.0%)	17 (34.0%)	0.77
Sonographic Murphy's sign	19 (76.0%)	18 (72.0%)	37 (74.0%)	0.74
Distended gallbladder	14 (56.0%)	13 (52.0%)	27 (54.0%)	0.78

Table 2. Comparison of Operative Time Between Early and Interval Laparoscopic Cholecystectomy Groups

Operative Time (minutes)	Early LC (n = 25)	Interval LC (n = 25)	p-value
Minimum	45	40	
Maximum	110	95	
Median	70	65	
Mean ± SD	72.4 ± 15.6	66.1 ± 13.2	0.11

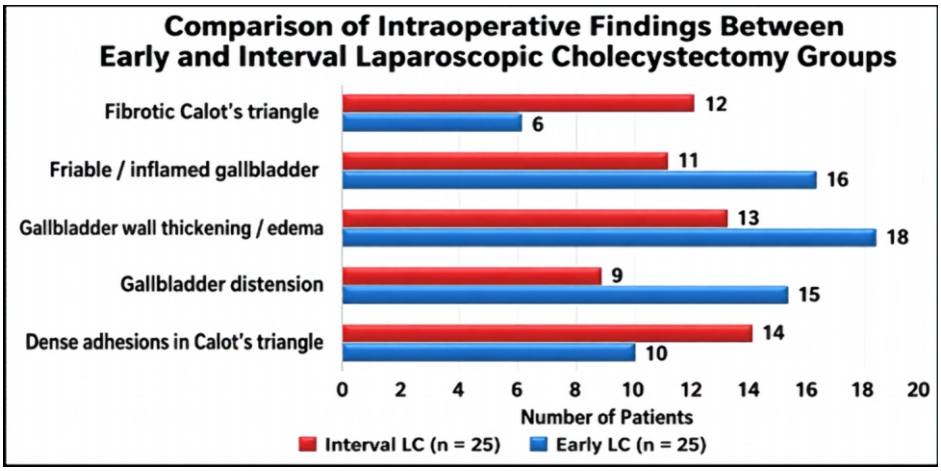

Figure 2: Comparison of Intraoperative Findings Between Early and Interval Laparoscopic Cholecystectomy Groups

Table 3. Comparison of Intraoperative Complications Between Early and Interval Laparoscopic Cholecystectomy Groups

Intraoperative Complication	Early LC (n = 25)	Interval LC (n = 25)	Total (n = 50)	p-value
Bleeding requiring additional hemostasis	3 (12.0%)	2 (8.0%)	5 (10.0%)	0.64
Gallbladder perforation with bile spillage	5 (20.0%)	3 (12.0%)	8 (16.0%)	0.44
Spillage of gallstones	4 (16.0%)	2 (8.0%)	6 (12.0%)	0.38
Injury to adjacent structures	0 (0%)	0 (0%)	0 (0%)	—
Any intraoperative complication	7 (28.0%)	5 (20.0%)	12 (24.0%)	0.51

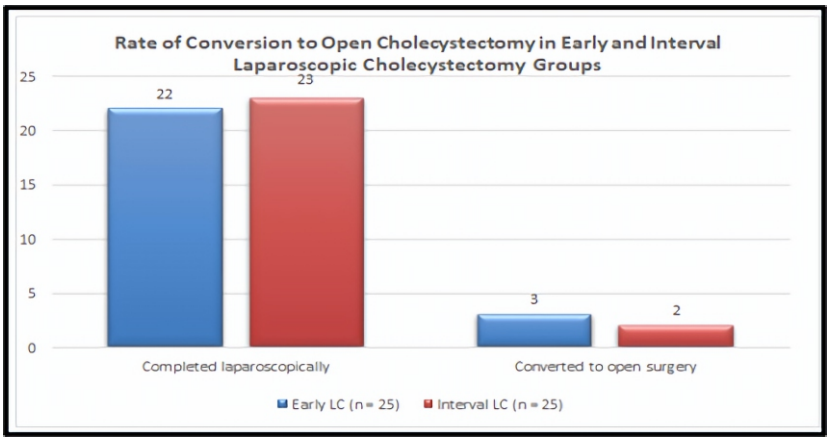

Table 2. Intubation characteristics and pre-intubation hemodynamics

Table 4. Indications for Conversion to Open Cholecystectomy in Early and Interval Laparoscopic Cholecystectomy Groups

Indication for Conversion	Early LC (n = 3)	Interval LC (n = 2)	Total (n = 5)
Dense adhesions in Calot's triangle	1 (33.3%)	1 (50.0%)	2 (40.0%)
Unclear anatomy/inability to achieve critical view of safety	2 (66.7%)	1 (50.0%)	3 (60.0%)
Uncontrolled bleeding	0 (0%)	0 (0%)	0 (0%)
Suspected bile duct injury	0 (0%)	0 (0%)	0 (0%)
Total conversions	3 (100%)	2 (100%)	5 (100%)

Table 5. Comparison of Postoperative Complications Between Early and Interval Laparoscopic Cholecystectomy Groups

Postoperative Complication	Early LC (n = 25)	Interval LC (n = 25)	Total (n = 50)	p-value
Surgical site infection	3 (12.0%)	2 (8.0%)	5 (10.0%)	0.64
Bile leak	1 (4.0%)	0 (0%)	1 (2.0%)	0.31
Intra-abdominal collection	1 (4.0%)	1 (4.0%)	2 (4.0%)	1.00
Pulmonary complications	2 (8.0%)	1 (4.0%)	3 (6.0%)	0.55
Any postoperative complication	6 (24.0%)	4 (16.0%)	10 (20.0%)	0.48

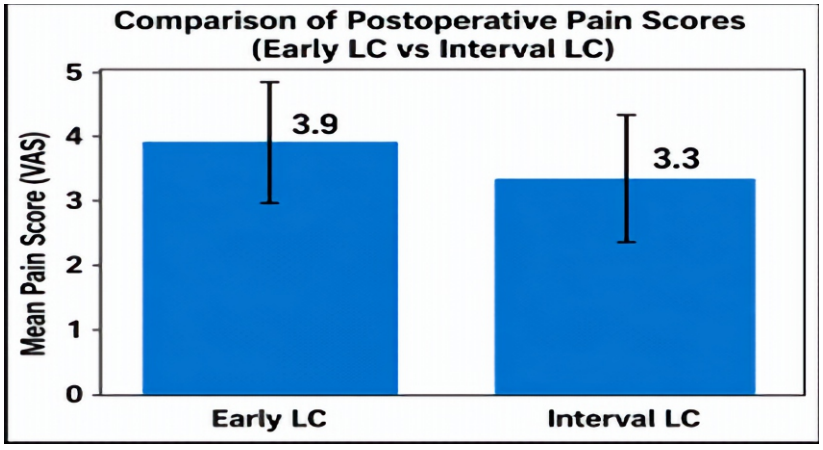

Figure 4: Comparison of Postoperative Pain Scores Between Early and Interval Laparoscopic Cholecystectomy Groups

Table 6. Comparison of Time to Initiation of Oral Feeding Between Early and Interval Laparoscopic Cholecystectomy Groups

Time to Oral Feeding (hours)	Early LC (n = 25)	Interval LC (n = 25)	p-value
Minimum	6	6	
Maximum	24	18	
Median	12	10	
Mean ± SD	13.2 ± 4.6	11.1 ± 3.8	0.08

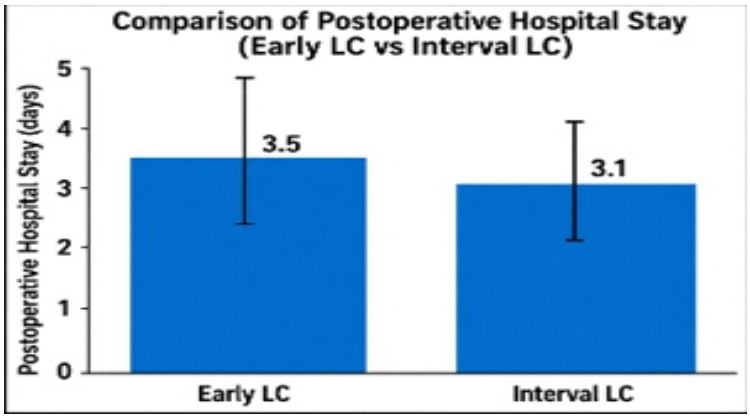

Figure 5: Comparison of Postoperative Hospital Stay Between Early and Interval Laparoscopic Cholecystectomy Groups

Table 7. Comparison of Total Hospital Stay Between Early and Interval Laparoscopic Cholecystectomy Groups

Total Hospital Stay (days)	Early LC (n = 25)	Interval LC (n = 25)	p-value
Minimum	3	6	
Maximum	9	14	
Median	5	9	
Mean ± SD	5.6 ± 1.8	9.8 ± 2.4	<0.001

Table 8. Severity Grading of Acute Cholecystitis According to Tokyo Guidelines 2018

Severity Grade	Early LC (n = 25)	Interval LC (n = 25)	Total (n = 50)	p-value
Grade I (Mild)	18 (72.0%)	17 (68.0%)	35 (70.0%)	
Grade II (Moderate)	7 (28.0%)	8 (32.0%)	15 (30.0%)	
Grade III (Severe)	0 (0%)	0 (0%)	0 (0%)	0.76
Total	25 (100%)	25 (100%)	50 (100%)	

DISCUSSION

The present study included 50 patients with acute calculous cholecystitis, equally divided into early laparoscopic cholecystectomy (early LC, n=25) and interval laparoscopic cholecystectomy (interval LC, n=25) groups. The demographic characteristics were comparable between the groups. Most patients belonged to the middle-aged category, with the highest proportion in the 41–50-year age group (34%). The mean age was 44.6 ± 11.2 years in the early LC group and 46.1 ± 10.8 years in the interval group, with no significant difference (p=0.62). Females constituted 62% of the overall cohort, with similar representation in the early (64%) and interval (60%) groups (p=0.77). This female predominance and middle-age distribution are consistent with the established epidemiology of gallstone disease and acute cholecystitis. Comparable baseline demographic characteristics between the groups strengthened the validity of subsequent outcome comparisons [4,16]. At presentation, all patients had right upper quadrant pain. Fever was present in 56% of early LC and 52% of interval LC patients (p=0.78), while leukocytosis was observed in 64% and 60%, respectively (p=0.77). Thus, the groups were clinically comparable with respect to major inflammatory manifestations. Ultrasonography demonstrated gallstones in all patients, while gallbladder wall thickening >4 mm was present in 68% of early and 64% of interval cases (p=0.77). Pericholecystic fluid was observed in 36% and 32% (p=0.77), sonographic Murphy's sign in 76% and 72% (p=0.74), and gallbladder distension in 56% and 52% (p=0.78), respectively. **Yokoe M, et. al; 2018** and **Bennett GL, et. al; 2002,** indicated comparable radiological disease characteristics at baseline and are consistent with established diagnostic criteria for acute cholecystitis [2,17]. The mean operative time was slightly longer in the early LC group than in the interval group (72.4 ± 15.6 versus 66.1 ± 13.2 minutes), but the difference was not statistically significant (p=0.11). Intraoperatively, acute inflammatory changes were more frequent in early LC, including gallbladder wall edema (72% versus 52%) and friability (64% versus 44%), whereas dense adhesions and fibrotic Calot's triangle were more frequent after interval treatment (56% versus 40% & 48% versus 24%, respectively). None of these differences reached statistical significance. These findings reflect the contrasting pathological patterns of acute

inflammation and subsequent fibrosis following conservative management [8,18].

Intraoperative complications occurred in 28% of early LC and 20% of interval LC patients (p=0.51). Gallbladder perforation with bile spillage occurred in 20% versus 12%, while gallstone spillage occurred in 16% versus 8%, respectively. Conversion to open surgery was required in 12% of early and 8% of interval cases (p=0.64).

Among converted cases, unclear anatomy or inability to achieve the critical view of safety was the leading indication (60%), followed by dense Calot's triangle adhesions (40%). No conversion was required because of uncontrolled bleeding or suspected bile duct injury. These findings are consistent with evidence showing comparable conversion and complication rates between early and delayed surgery [18-20].

Postoperative complications were also comparable, occurring in 24% of early LC and 16% of interval LC patients (p=0.48). Postoperative pain scores (3.9 ± 1.1 versus 3.3 ± 1.0; p=0.06), time to oral feeding (13.2 ± 4.6 versus 11.1 ± 3.8 hours; p=0.08), and postoperative hospital stay (3.6 ± 1.2 versus 3.1 ± 0.9 days; p=0.10) showed no significant differences [8,18].

The most important finding was the significantly shorter total hospital stay with early LC: 5.6 ± 1.8 days compared with 9.8 ± 2.4 days for interval LC (p<0.001), representing a reduction of approximately 4.2 days. This result closely corresponds with previous randomized trials and meta-analyses that demonstrated a 3-4 day reduction in total hospitalization with early surgery. According to Tokyo Guidelines 2018, 70% of patients had Grades I and 30% Grade II disease, with no Grade III cases; severity distribution was comparable between groups (p=0.76). **Ljungqvist O, et. al; 2017** and **Van Dijk AH, et. al; 2016,** demonstrated that early laparoscopic cholecystectomy provides comparable operative and postoperative safety while substantially reducing cumulative hospitalization, supporting its use as the preferred approach in suitable patients with mild to moderate acute calculous cholecystitis [21,22].

CONCLUSION

This prospective comparative observational study demonstrated that early laparoscopic cholecystectomy is safe, feasible, and effective in suitable patients with acute calculous cholecystitis. No significant differences were observed in operative time, intraoperative complications, conversion to open surgery, postoperative complications, pain scores, time to oral feeding, or postoperative hospital stay. However, total hospital stay was significantly shorter with early surgery (5.6 ± 1.8 vs 9.8 ± 2.4 days; p<0.001). Thus, early intervention provides comparable safety while reducing hospitalization, repeated admissions, healthcare costs, and patient inconvenience, supporting its preferred use in appropriate patients.

LIMITATIONS & FUTURE PERSPECTIVES

The study's limitations include a single-centre setting, a relatively small sample size, and a short study duration, which may limit the broader applicability of the results. Future studies should incorporate multi-centre designs with larger populations to enhance validity, assess long-term outcomes, and investigate advanced diagnostic & management approaches. Such efforts will improve overall patient care & help minimize complications.

CLINICAL SIGNIFICANCE

The clinical significance of this study lies in its potential to bridge the gap between research findings and practical healthcare, diagnosis, and treatment outcomes. By highlighting real-care applications. It emphasizes the importance of translating scientific observations into meaningful improvements in patient world relevance, the study contributes to evidence based medical practice and supports informed clinical decision making. Ultimately, the findings aim to enhance patient quality of life, optimize therapeutic strategies, and promote better disease management in clinical settings.

ABBREVIATIONS

ACC: Acute Calculous Cholecystitis
LC: Laparoscopic Cholecystectomy
ELC: Early Laparoscopic Cholecystectomy
ILC: Interval Laparoscopic Cholecystectomy
IOC: Intraoperative Complications

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AUTHOR CONTRIBUTIONS

All authors significantly contributed to the study conception and design, data acquisition, or data analysis and interpretation. They participated in drafting the manuscript or critically revising it for important intellectual content, consented to its submission to the current journal, provided final approval for the version to be published, and accepted responsibility for all aspects of the work. Additionally, all authors meet the authorship criteria outlined by the International Committee of Medical Journal Editors (ICMJE) guidelines.

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CONFLICT OF INTEREST

Authors declared that there is no conflict of interest.

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None

ETHICAL APPROVAL & CONSENT TO PARTICIPATE
All necessary consent & approval was obtained by authors.

CONSENT FOR PUBLICATION
All necessary consent for publication was obtained by authors.

DATA AVAILABILITY
All data generated and analyzed are included within this research article. The datasets utilized and/or analyzed in this study can be obtained from the corresponding author upon a reasonable request.

USE OF ARTIFICIAL INTELLIGENCE (AI) & LARGE LANGUAGE MODEL (LLM)
The authors confirm that no AI & LLM tools were used in the writing or editing of the manuscript, and no images were altered or manipulated using AI & LLM.

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This article serves as an important educational tool for the scientific community, offering insights that may inspire future research directions. However, they should not be relied upon independently when making treatment decisions or developing public health policies.

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REFERENCE

1. Strasberg SM. Acute calculous cholecystitis. N Engl J Med. 2008;358(26):2804-2811. https://doi.org/10.1056/nejmcp0800929
2. Yokoe M, Hata J, Takada T, Strasberg SM, Asbun HJ, Wakabayashi G, et al. Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute cholecystitis. J Hepato-biliary Pancreat Sci. 2018;25(1):41-54.
3. Yokoe M, Takada T, Strasberg SM, Solomkin JS, Mayumi T, Gomi H, et al. TG13 diagnostic criteria and severity grading of acute cholecystitis. J Hepatobiliary Pancreat Sci. 2013; 20(1):35-46. https://doi.org/10.1007/s00534-012-0568-9
4. Stinton LM, Shaffer EA. Epidemiology of gallbladder disease: cholelithiasis and cancer. Gut Liver. 2012;6(2):172-187. https://doi.org/10.5009/gnl.2012.6.2.172
5. Gurusamy KS, Samraj K, Gluud C, Wilson E, Davidson BR. Meta-analysis of randomized controlled trials on the safety and effectiveness of early versus delayed laparoscopic chole-cystectomy. Br J Surg. 2010;97(2):141-150. https://doi.org/10.1002/bjs.6870
6. Strasberg SM, Pucci MJ, Brunt LM, Deziel DJ. Subtotal cholecystectomy-"fenestrating" vs "reconstituting" subtypes and the prevention of bile duct injury. J Am Coll Surg. 2016;222(1):89-96. https://doi.org/ 10.1016/j.jamcollsurg.2015.09.019
7. Solomkin JS, Mazuski JE, Bradley JS, Rodvold KA, Goldstein EJC, Baron EJ, et al. Diagnosis and management of complicated intra-abdominal infection. Clin Infect Dis. 2010;50(2):133-164.
8. Lo CM, Liu CL, Fan ST, Lai ECS, Wong J. Prospective randomized study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. Ann Surg. 1998;227 (4):461-467. https://doi.org/10.1097/ 00000658-199804000-00001
9. Cuschieri A, Dubois F, Mouiel J, Mouret P, Becker H, Buess G, et al. The European experience with laparoscopic chole-cystectomy. Am J Surg. 1991;161(3):385-387. https://doi.org/10.1016/0002-9610(91)90603-b
10. Chandler CF, Lane JS, Ferguson P, Thompson JE Jr, Ashley SW. Prospective evaluation of early versus delayed laparo-scopic cholecystectomy for acute cholecystitis. Am Surg. 2000;66(9):896-900. https://doi.org/10.1177/000313480006600921
11. Gutt CN, Encke J, Köninger J, Harnoss JC, Weigand K, Kipfmüller K, et al. Acute cholecystitis: early versus delayed cholecystectomy. Ann Surg. 2013;258(3):385-393. https://doi.org/10.1097/sla.0b013e3182a1599b
12. Menahem B, Mulliri A, Fohlen A, Guittet L, Alves A, Lubrano J. Delayed laparoscopic cholecystectomy increases total hospital stay. HPB (Oxford). 2015;17(10):857-862. https://doi.org/10.1111/hpb.12449
13. Gupta V, Jain G. Bile duct injury during laparoscopic cholecystectomy: mechanisms, preventive measures, and approach to management. Diagn Ther Endosc. 2011:1-10.

14. Wakabayashi G, Iwashita Y, Hibi T, Takada T, Strasberg SM, Asbun HJ, et al. Tokyo Guidelines 2018: surgical management of acute cholecystitis. J Hepatobiliary Pancreat Sci. 2018;25(1):89-114.
15. Goel R, Kumar P, Singhal M. Comparison of early versus interval cholecystectomy in acute cholecystitis. Int J Acad Med Pharm. 2024;6(2):130-134.
16. Everhart JE, Ruhl CE. Burden of digestive diseases in the United States part III: liver, biliary tract, and pancreas. Gastroenterology. 2009;136(4):1134-1144. https://doi.org/10.1053/j.gastro.2009.02.038
17. Bennett GL, Rusinek H, Lisi V, Israel GM, Krinsky GA, Slywotzky CM, et al. CT findings in acute gangrenous cholecystitis. AJR Am J Roentgenol. 2002;178(2):275-281. https://doi.org/10.2214/ajr.178.2.1780275
18. Gurusamy KS, Davidson C, Gluud C, Davidson BR. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis. Cochrane Database Syst Rev. 2013;(6):1-10. https://doi.org/10.1002/14651858.cd005440.pub3
19. Cao AM, Eslick GD, Cox MR. Early laparoscopic cholecystectomy is superior to delayed acute cholecystitis: a meta-analysis. J Gastrointest Surg. 2015;19(5):848-857. https://doi.org/10.1007/s11605-015-2747-x
20. Siddiqui T, MacDonald A, Chong PS, Jenkins JT. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: a meta-analysis. Surg Endosc. 2008;22(5): 1194-1199. https://doi.org/10.1016/j.amjsurg. 2007.03.004
21. Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery: a review. JAMA Surg. 2017;152(3):292-298. https://doi.org/10.1001/jamasurg.2016.4952
22. van Dijk AH, de Reuver PR, Tasma TN, et al. Systematic review of antibiotic treatment for acute calculous cholecystitis. Br J Surg. 2016;103(7):797-811. https://doi.org/10.1002/bjs.10146

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