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Original Article

# Interval Cholecystectomy Versus Early Cholecystectomy in Acute Calculous Cholecystitis: A Comparative Study

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## ABSTRACT

**Background:** Acute calculous cholecystitis is a common surgical emergency caused by obstruction of the cystic duct by gallstones. Although laparoscopic cholecystectomy is the standard treatment, the optimal timing of surgery—early versus interval—remains controversial.
**Aim:** To compare the outcomes of interval cholecystectomy and early cholecystectomy in patients with acute calculous cholecystitis.
**Materials and Methods:** This hospital-based observational study was conducted in the Department of General Surgery at Balrampur Hospital, Lucknow, over a period of two years (November 2020 to November 2022). A total of 52 patients aged 18–60 years with clinically and ultrasonographically confirmed acute calculous cholecystitis were included. Patients were divided into two groups: interval cholecystectomy (n=26) and early cholecystectomy (n=26). Data were collected regarding demographic profile, postoperative complications, hospital stay, and cost-effectiveness. Statistical analysis was performed using SPSS version 21.0, with $p < 0.05$ considered significant.
**Results:** The mean age of patients in the interval and early groups was 42.45 ± 14.86 years and 47.53 ± 14.74 years, respectively, with no significant difference (p=0.2217). Male predominance was observed in both groups. Postoperative complications were slightly higher in the early group (19.23%) compared to the interval group (11.54%), though not statistically significant. The mean hospital stay was significantly shorter in the early cholecystectomy group (7.34 ± 4.87 days) compared to the interval group (11.49 ± 5.68 days) (p=0.0067). No significant difference was observed in overall treatment cost between the two groups.
**Conclusion:** Early cholecystectomy is a safe and effective treatment for acute calculous cholecystitis, offering the advantage of significantly reduced hospital stay without increasing complication rates. It should be preferred over interval cholecystectomy in appropriate patients.

***Keywords****: Acute calculous cholecystitis, Early cholecystectomy, Interval cholecystectomy, Laparoscopic cholecystectomy, Hospital stay, Surgical outcomes.*

## INTRODUCTION

Acute calculous cholecystitis is a common surgical emergency resulting from obstruction of the cystic duct by gallstones, leading to inflammation of the gallbladder (1). It is a major cause of acute abdominal pain requiring hospital admission and surgical intervention worldwide (2). The incidence of gallstone disease has been increasing, particularly in developing countries, due to dietary changes, sedentary lifestyle, and rising obesity (3).

Patients typically present with right upper quadrant pain, fever, nausea, vomiting, and a positive Murphy's sign (4). Laboratory findings often include leukocytosis, while ultrasonography is the investigation of choice for diagnosis (5). Typical sonographic findings include gallbladder wall thickening, pericholecystic fluid collection, distension, and

gallstones or sludge (6). Early diagnosis and treatment are essential to prevent complications such as empyema, gangrene, perforation, and sepsis (7).

Laparoscopic cholecystectomy is the gold standard treatment for acute calculous cholecystitis due to its advantages of minimal invasiveness, reduced postoperative pain, and shorter recovery time (8). However, the optimal timing of surgery remains controversial.

Traditionally, conservative management followed by interval cholecystectomy after 6–8 weeks was practiced to allow inflammation to subside (9). However, this approach is associated with recurrent attacks, repeated hospital admissions, and increased healthcare costs (10). In contrast, early cholecystectomy, performed within 72 hours of symptom onset, has been shown to be safe and effective, with the added benefit of reduced hospital stay and prevention of recurrent biliary events (11,12).

Despite increasing evidence favoring early surgery, concerns regarding operative difficulty and complications persist. Therefore, this study was undertaken to compare interval and early cholecystectomy in terms of clinical outcomes, complications, hospital stay, and cost-effectiveness.

## MATERIALS AND METHODS

### Study Design and Setting

This was a hospital-based observational study conducted in the Department of General Surgery at Balrampur Hospital, Lucknow, Uttar Pradesh, India.

### Study Duration

The study was carried out over a period of two years, from November 2020 to November 2022.

### Sample Size

The sample size was calculated using standard statistical formulae (Bernard, 5th edition). Based on previous data (Singh et al., 2020), considering the mean hospital stay in early and interval cholecystectomy groups (6.5 vs. 10.8 days), a total sample size of 44 patients was obtained. After accounting for a 20% loss to follow-up, the final sample size was increased to 52 patients.

### Study Population

Patients aged 18–60 years of either sex presenting with clinical, laboratory, and ultrasonographic evidence of acute calculous cholecystitis were included in the study.

### Inclusion Criteria

- Patients aged 18–60 years
- Clinical features suggestive of acute calculous cholecystitis
- Laboratory and ultrasonographic confirmation

### Exclusion Criteria

- Evidence of common bile duct calculi, pancreatitis, gall bladder perforation, gangrene, or abscess
- History of previous abdominal surgery
- Associated intra-abdominal pathology
- Septic shock
- Pregnant or lactating women
- Patients with significant systemic illness
- Patients unwilling to participate

### Diagnostic Criteria

Diagnosis of acute calculous cholecystitis was established based on the presence of at least two of the following:

- Characteristic right upper abdominal pain
- Positive Murphy's sign
- Total leukocyte count >10,000/µL
- Ultrasonographic findings suggestive of acute cholecystitis

Ultrasonographic features included gallbladder distension, wall edema, pericholecystic fluid collection, presence of gallstones/sludge, and ultrasonographic Murphy's sign.

### Grouping of Patients

A total of 52 patients were enrolled and divided into two groups:

- Group A (n = 26): Interval cholecystectomy
- Group B (n = 26): Early cholecystectomy

**Clinical Evaluation and Investigations**
All patients underwent detailed history taking and thorough clinical examination, including general physical and systemic examination.

**Baseline investigations included:**
- Hemoglobin, total and differential leukocyte count, ESR
- Random blood sugar (RBS)
- Liver function tests (LFT)
- Kidney function tests (KFT)

**Preoperative evaluation included:**
- Chest X-ray (PA view)
- Electrocardiogram (ECG)
- Abdominal X-ray to rule out other acute conditions

All patients underwent ultrasonography (USG) of the abdomen to confirm the diagnosis and assess gallbladder pathology.

**Postoperative Management**
All patients received standard postoperative care, including:
- Intravenous antibiotics
- Fluid management for 24–48 hours
- Analgesics

**Postoperative outcomes assessed included:**
- Complications
- Duration of hospital stay
- Cost-effectiveness

**Follow-Up**
Patients were followed up in the surgical outpatient department at:
- 2 weeks
- 6 weeks
- 6 months post-surgery

**Statistical Analysis**
Statistical analysis was performed using SPSS software (Version 21.0; SPSS Inc., Chicago, IL, USA).
- Continuous variables were expressed as mean ± standard deviation (SD)
- Categorical variables were expressed as frequency and percentage
- Chi-square test or Fisher's exact test was used for categorical data
- Student's t-test was used to compare means between groups
- A p-value <0.05 was considered statistically significant

**Level of Significance**
- $p > 0.05$: Not significant
- $p < 0.05$: Significant
- $p < 0.01$: Highly significant
- $p < 0.001$: Very highly significant

**RESULT AND OBSERVATIONS**

**TABLE 1: Age-wise Distribution and Comparison of Patients in Both Groups**

| Age (Years) | Interval Cholecystectomy (n=26) | Early Cholecystectomy (n=26) | P-value |
|---|---|---|---|
| | N | % | N |
| 20–30 | 5 | 19.23% | 6 |
| 31–40 | 7 | 26.92% | 3 |
| 41–50 | 6 | 23.08% | 3 |

| | | | |
|---|---|---|---|
| **51–60** | **5** | **19.23%** | **10** |
| **>60** | **3** | **11.54%** | **4** |
| **Total** | **26** | **100%** | **26** |
| **Mean Age ± SD** | **42.45 ± 14.86** | **47.53 ± 14.74** | **t = 1.238, p = 0.2217** |
| **Chi-square ($\chi^2$)** | **-** | **-** | **4.500** |
| **Overall P-value** | **-** | **-** | **0.3425** |

**TABLE 2: Gender-wise Distribution and Comparison of Patients in Both Groups**

| Gender | Interval Cholecystectomy (n=26) | Early Cholecystectomy (n=26) | P-value |
|---|---|---|---|
| | N | % | N |
| **Male** | **21** | **80.77%** | **20** |
| **Female** | **5** | **19.23%** | **6** |
| **Total** | **26** | **100%** | **26** |
| **Chi-square ($\chi^2$)** | **-** | **-** | **0.1153** |
| **Overall P-value** | **-** | **-** | **0.7342** |

**TABLE 3: Complications among Patients in Both Groups**

| Complications | Interval Cholecystectomy (n=26) | Early Cholecystectomy (n=26) | P-value |
|---|---|---|---|
| | N | % | N |
| **Wound Infection** | **1** | **3.85%** | **2** |
| **Biliary Leaks** | **2** | **7.69%** | **3** |
| **Total** | **3** | **11.54%** | **5** |
| **Chi-square ($\chi^2$)** | **-** | **-** | **-** |
| **Overall P-value** | **-** | **-** | **-** |

**TABLE 4: Hospital Stay Distribution and Comparison of Patients in Both Groups**

| Hospital Stay (Days) | Interval Cholecystectomy (n=26) | Early Cholecystectomy (n=26) | P-value |
|---|---|---|---|
| | N | % | N |
| **1–5** | **6** | **23.08%** | **20** |
| **6–10** | **9** | **34.62%** | **2** |
| **11–15** | **6** | **23.08%** | **3** |
| **16–20** | **5** | **19.23%** | **1** |
| **Total** | **26** | **100%** | **26** |
| **Mean ± SD (days)** | **11.49 ± 5.68** | **7.34 ± 4.87** | **t = 2.828, p = 0.0067*** |
| **Chi-square ($\chi^2$)** | **-** | **-** | **-** |
| **Overall P-value** | **-** | **-** | **-** |

**TABLE 5: Total Cost Comparison of Patients in Both Groups**

| Cost Component | Interval Cholecystectomy (n=26) | Early Cholecystectomy (n=26) | P-value |
|---|---|---|---|
| | Mean | SD | Mean |
| **Admission Charges** | **1** | **0** | **1** |
| **Operation Theatre Charges** | **400** | **0** | **400** |
| **Drug Charges (Pre/Intra/Post-operative)** | **0** | **0** | **0** |
| **Total Cost of Therapy** | **401** | **0** | **401** |

## DISCUSSION

The present study compared interval cholecystectomy with early cholecystectomy in patients with acute calculous cholecystitis and evaluated outcomes based on demographic profile, complications, hospital stay, and cost-effectiveness.

The mean age of patients in both groups was comparable (42.45 ± 14.86 years in interval vs. 47.53 ± 14.74 years in early group), with no statistically significant difference (p = 0.2217). This is consistent with previous studies indicating that acute cholecystitis commonly affects middle-aged individuals without significant intergroup variation (1,2). Similarly, age distribution across groups was statistically comparable (p = 0.3425), suggesting homogeneity in baseline characteristics.

Gender distribution showed male predominance in both groups, with no significant difference (p = 0.7342). Although gallstone disease is generally more common in females, variations may occur due to regional and lifestyle factors (3,4).

Postoperative complications were slightly higher in the early cholecystectomy group (19.23%) compared to the interval group (11.54%), though the difference was not statistically significant. The most common complications observed were biliary leaks and wound infections. These findings are in agreement with earlier studies demonstrating that early cholecystectomy does not significantly increase complication rates despite surgery being performed in the acute inflammatory phase (5,6).

A key finding of this study was the significantly shorter hospital stay in the early cholecystectomy group (7.34 ± 4.87 days) compared to the interval group (11.49 ± 5.68 days), with a statistically significant difference ($p = 0.0067$). Most patients in the early group were discharged within 1–5 days, whereas interval group patients required prolonged hospitalization. This observation is consistent with multiple randomized trials and meta-analyses that have reported reduced hospital stay with early intervention (7,8).

The shorter hospital stay in the early group can be attributed to single-stage management, eliminating the need for readmission and delayed surgery. In contrast, interval cholecystectomy involves initial conservative management followed by elective surgery, thereby increasing the overall duration of hospital stay.

Cost analysis in the present study did not show a significant difference between the two groups, likely due to standardized institutional charges. However, previous studies suggest that early cholecystectomy is more cost-effective due to reduced hospital stay and avoidance of repeated admissions (9,10).

Overall, the findings of this study support existing literature and international guidelines, such as the Tokyo Guidelines, which recommend early laparoscopic cholecystectomy as the preferred treatment for acute calculous cholecystitis (11,12). Early intervention is safe, reduces hospital stay, and prevents recurrent biliary events without significantly increasing complications.

## CONCLUSION

The present study demonstrates that early cholecystectomy is a safe and effective approach in the management of acute calculous cholecystitis. Although the incidence of postoperative complications was slightly higher in the early group, the difference was not statistically significant when compared to interval cholecystectomy.

A significant reduction in hospital stay was observed in patients undergoing early cholecystectomy, making it a more efficient treatment strategy. Early intervention also avoids the need for repeated hospital admissions and reduces the risk of recurrent biliary events.

Therefore, early cholecystectomy should be preferred over interval cholecystectomy in suitable patients, as it offers the advantages of shorter hospital stay, comparable complication rates, and better overall patient outcomes.

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