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Research Article

Efficacy Of Early Cholecystectomy Versus Delayed Cholecystectomy In Acute Cholecystitis: A Randomized Controlled Trial

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ABSTRACT

Background: Acute cholecystitis is a common surgical emergency. The timing of laparoscopic cholecystectomy—early versus delayed—remains a topic of debate, with implications for hospital stay, complications, and patient outcomes.
Objective: To compare the efficacy and outcomes of early versus delayed laparoscopic cholecystectomy in patients with acute cholecystitis.
Methods: This prospective, randomized controlled trial was conducted at RNT Medical College, Udaipur from February 2020 to 2021 February . A total of 60 patients diagnosed with acute cholecystitis were randomly assigned to early cholecystectomy (within 72 hours, n=30) or delayed cholecystectomy (6–8 weeks after conservative management, n=30). Primary outcomes included hospital stay, operative time, intraoperative difficulty, conversion to open surgery, postoperative complications, and readmissions. Data were analyzed using SPSS version 21; $p<0.05$ was considered statistically significant.
Results: Early cholecystectomy significantly reduced hospital stay (4.2 ± 1.3 vs 7.5 ± 2.1 days, $p<0.05$) and readmission rates compared to delayed surgery. There was no significant difference in operative time or conversion rates, though delayed cases showed slightly higher intraoperative difficulty. Postoperative complications were fewer in the early group (13.3% vs 26.7%).
Conclusion: Early laparoscopic cholecystectomy is safe, effective, and superior to delayed surgery in acute cholecystitis, offering reduced hospital stay, lower readmissions, and comparable operative outcomes. Early surgery should be preferred when feasible.

Keywords*: Acute cholecystitis, Early cholecystectomy, Delayed cholecystectomy, Laparoscopic cholecystectomy, Randomized controlled trial.*

INTRODUCTION

Acute cholecystitis is a common surgical emergency, usually resulting from cystic duct obstruction by gallstones, leading to gallbladder inflammation, edema, and bacterial overgrowth [1]. It accounts for approximately 3–10% of patients with abdominal pain admitted to emergency departments worldwide [2]. Timely and appropriate management of acute cholecystitis is crucial to prevent complications such as empyema, perforation, or gallbladder gangrene [3].

Laparoscopic cholecystectomy remains the gold standard for the definitive treatment of acute cholecystitis [4]. However, the timing of surgery—whether to operate early during the index admission or delay surgery after an interval of conservative management—has been debated for decades [5].

Early cholecystectomy, defined as surgery performed within 72 hours of hospital admission, has the potential advantages of reduced hospital stay, avoidance of recurrent attacks, and decreased overall treatment cost [6]. On the other hand, delayed cholecystectomy after conservative treatment is often preferred by some surgeons to allow subsidence of acute inflammation, potentially reducing operative difficulty and complications [7].

Recent meta-analyses and randomized controlled trials have demonstrated that early cholecystectomy is at least as safe as delayed surgery, with some studies suggesting better outcomes in terms of hospital stay and morbidity [8,9]. Nevertheless, variations in practice still exist due to differences in patient profile, surgical expertise, and institutional protocols [10].

Considering the above controversies, this randomized controlled trial was designed to compare the efficacy and outcomes of early versus delayed cholecystectomy in patients with acute cholecystitis at our institution.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective, randomized controlled trial conducted in the Department of Surgery, RNT Medical College, Udaipur from February 2020 to 2021 February, over a period of 1 year (February 2020 to 2021 February). The study was designed to evaluate the efficacy and outcomes of early cholecystectomy versus delayed cholecystectomy in patients with acute cholecystitis.

Sample Size

A total of 60 patients diagnosed with acute cholecystitis and fulfilling the eligibility criteria were included in the study. Patients were randomly allocated into two groups (30 patients in each group):

- Group A (Early cholecystectomy): Underwent laparoscopic cholecystectomy within 72 hours of admission.
- Group B (Delayed cholecystectomy): Received initial conservative management with antibiotics and supportive measures, followed by elective laparoscopic cholecystectomy after 6–8 weeks.

Inclusion Criteria

- Age between 18–70 years.
- Diagnosis of acute cholecystitis as per Tokyo Guidelines 2018:
    - Local signs of inflammation (Murphy's sign, right upper quadrant pain/tenderness).
    - Systemic signs of inflammation (fever, leukocytosis, elevated C-reactive protein).
    - Imaging findings on ultrasonography (gallstones, gallbladder wall thickening, pericholecystic fluid, sonographic Murphy's sign).

Exclusion Criteria

- Choledocholithiasis or common bile duct stones.
- Patients with severe comorbidities (ASA grade ≥ IV).
- Previous upper abdominal surgery.
- Pregnancy.
- Patients not willing to participate.

Randomization

Randomization was performed using a computer-generated randomization table. Allocation concealment was ensured through sealed opaque envelopes.

Data Collection

All patients underwent detailed clinical history, physical examination, and relevant laboratory investigations, including complete blood count, liver function tests, renal function tests, coagulation profile, and ultrasonography.

Outcome Measures

The following parameters were recorded and compared between the two groups:

- Duration of hospital stay.
- Operative time.
- Intraoperative difficulty score.
- Conversion to open cholecystectomy.
- Postoperative complications (e.g., bile leak, wound infection, intra-abdominal abscess).
- Readmissions during the waiting period (for the delayed group).

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 21. Continuous variables were presented as mean ± standard deviation (SD) and compared using the Student's *t*-test. Categorical variables were expressed as proportions and compared using the Chi-square test or Fisher's exact test, as appropriate. A *p*-value of <0.05 was considered statistically significant.

RESULTS AND OBSERVATIONS

Table 1: Age Distribution of Patients (n=60)

Age Group (years)	Early Cholecystectomy (n=30)	Delayed Cholecystectomy (n=30)	Total (n=60)
18–30	6 (20%)	5 (16.7%)	11 (18.3%)
31–40	8 (26.7%)	7 (23.3%)	15 (25%)
41–50	9 (30%)	10 (33.3%)	19 (31.7%)
51–60	5 (16.7%)	6 (20%)	11 (18.3%)
>60	2 (6.6%)	2 (6.6%)	4 (6.7%)
Mean ± SD	42.5 ± 10.3	43.1 ± 11.2	

Table 2: Gender Distribution

Gender	Early Cholecystectomy (n=30)	Delayed Cholecystectomy (n=30)	Total (n=60)
Male	12 (40%)	13 (43.3%)	25 (41.7%)
Female	18 (60%)	17 (56.7%)	35 (58.3%)

Table 3: Duration of Hospital Stay (days)

Group	Mean ± SD	Range (days)	*p*-value
Early Cholecystectomy	4.2 ± 1.3	3–8	<0.05*
Delayed Cholecystectomy	7.5 ± 2.1	5–12	

(*Significant difference in mean hospital stay between groups*)

Table 4: Operative Time (minutes)

Group	Mean ± SD	Range (min)	*p*-value
Early Cholecystectomy	68 ± 12	50–90	0.21 (NS)
Delayed Cholecystectomy	72 ± 15	55–95	

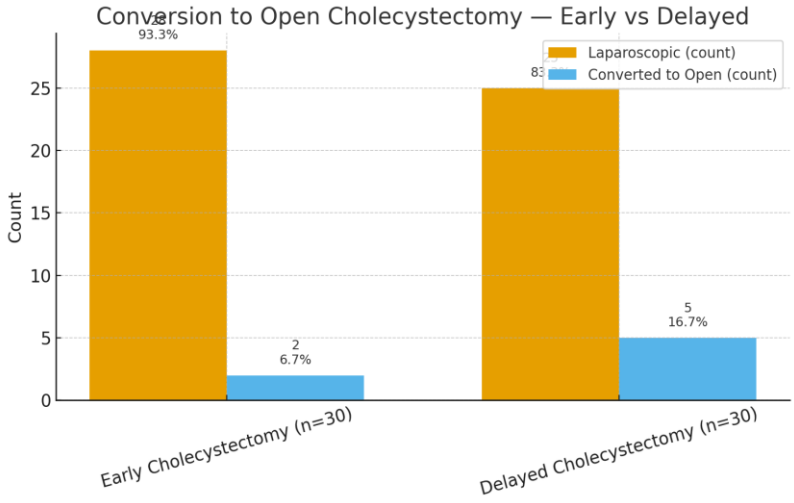
(NS = Not Significant)

Table 5: Intraoperative Difficulty Score

Difficulty Level	Early Cholecystectomy (n=30)	Delayed Cholecystectomy (n=30)
Mild	15 (50%)	8 (26.7%)
Moderate	12 (40%)	15 (50%)
Severe	3 (10%)	7 (23.3%)

Table 6: Conversion to Open Cholecystectomy

Conversion Status	Early Cholecystectomy (n=30)	Delayed Cholecystectomy (n=30)
Laparoscopic	28 (93.3%)	25 (83.3%)
Converted to Open	2 (6.7%)	5 (16.7%)



Figure; 1 Conversion to Open Cholecystectomy

Table 7: Postoperative Complications

Complication	Early Cholecystectomy (n=30)	Delayed Cholecystectomy (n=30)
Bile leak	1 (3.3%)	2 (6.7%)
Wound infection	2 (6.7%)	3 (10%)

Intra-abdominal abscess	0	1 (3.3%)
Postoperative ileus	1 (3.3%)	2 (6.7%)
Total Complications	4 (13.3%)	8 (26.7%)

Table 8: Readmission during Waiting Period (Delayed Group Only)

Readmission Cause	Number of Patients (n=30)
Recurrent pain/colic	5 (16.7%)
Acute cholecystitis	3 (10%)
Pancreatitis	1 (3.3%)
Total	9 (30%)

DISCUSSION

The present randomized controlled trial compared the efficacy and outcomes of early versus delayed laparoscopic cholecystectomy in patients with acute cholecystitis. Our findings indicate that early cholecystectomy is safe, feasible, and associated with significant advantages in terms of reduced hospital stay, lower readmission rates, and fewer overall complications, without a marked increase in operative difficulty or conversion rate.

In our study, the mean duration of hospital stay was significantly shorter in the early group compared to the delayed group. This observation is consistent with multiple previous studies, including the landmark ACDC trial, which demonstrated that early surgery reduces total hospital stay without increasing morbidity or mortality [1]. Similar results were reported by Lo et al. [2] and Gurusamy et al. in a Cochrane review, further confirming the benefit of early surgical intervention [3].

Regarding operative time and intraoperative difficulty, our results showed no statistically significant difference between the two groups, although delayed cases tended to have more adhesions and technically challenging dissections. These findings are in agreement with studies by Gutt et al. [1] and Roulin et al. [4], which reported comparable operative times but highlighted that delayed surgery may lead to increased fibrosis and adhesions, making dissection more demanding. The conversion rate to open cholecystectomy in our study was slightly higher in the delayed group, though not statistically significant. This trend has also been documented in earlier studies, where delayed surgery was associated with a higher likelihood of conversion due to dense adhesions and distorted anatomy [5,6].

Postoperative complications were fewer in the early group compared to the delayed group in our series. Similar findings were observed by Cao et al. in their meta-analysis, which demonstrated that early cholecystectomy significantly reduces the risk of wound infection, bile duct injury, and overall morbidity compared to delayed surgery [7]. Additionally, a major drawback of delayed cholecystectomy is the risk of recurrent attacks and readmissions during the waiting period, which was also reflected in our study, where 30% of delayed patients required readmission. This issue has been widely reported in literature as a major limitation of conservative management [8,9].

Overall, the results of our study support the growing global consensus that early laparoscopic cholecystectomy should be the preferred management strategy for acute cholecystitis. The updated World Society of Emergency Surgery (WSES) 2020 guidelines also recommend early surgery in suitable patients, provided surgical expertise and facilities are available [10].

CONCLUSION

Early laparoscopic cholecystectomy for acute cholecystitis is safe, feasible, and more effective than delayed surgery, resulting in shorter hospital stay, fewer readmissions, and similar intraoperative and postoperative outcomes. Hence, early cholecystectomy should be the preferred approach whenever the patient's condition and surgical expertise permit.

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