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COMPARATIVE ANALYSIS OF EARLY VERSUS DELAYED LAPAROSCOPIC CHOLECYSTECTOMY FOR ACUTE CHOLECYSTITIS: A PROSPECTIVE OBSERVATIONAL STUDY

General Surgery

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ABSTRACT

Background: Acute cholecystitis is a prevalent inflammatory condition of the gallbladder that often requires surgical intervention. This study investigates whether the timing of laparoscopic cholecystectomy (LC)—early (within 72 hours) versus delayed (after 72 hours)—affects clinical outcomes in patients with acute cholecystitis. **Methodology:** This prospective observational study included 34 patients diagnosed with acute cholecystitis who were divided into two equal groups: those undergoing early LC (within 72 hours of symptom onset) and those undergoing delayed LC (after 72 hours). We evaluated postoperative pain using the Visual Analogue Scale (VAS), duration of hospitalization, time to return to normal activities, and complications. **Results:** Patients in the early LC group experienced significantly lower postoperative pain (mean VAS score: 3.2 vs. 5.6, p=0.027) and shorter hospital stays (mean: 2.3 vs. 4.8 days, p=0.00968) compared to the delayed group. The return to normal daily activities was also more rapid in the early intervention group. No significant differences were observed in conversion rates to open surgery between the two groups. **Conclusion:** Early laparoscopic cholecystectomy for acute cholecystitis demonstrates superior outcomes regarding patient recovery, comfort, and healthcare resource utilization. This approach appears to be both safe and effective, suggesting it should be considered the preferred surgical strategy for suitable candidates with acute cholecystitis.

KEYWORDS

INTRODUCTION

Acute cholecystitis represents one of the most common surgical emergencies encountered in clinical practice. This inflammatory condition of the gallbladder typically results from obstruction of the cystic duct, most commonly by gallstones, leading to progressive inflammation and potential infection of the gallbladder wall [1]. While the condition affects both genders, epidemiological data consistently demonstrate higher prevalence among women, individuals with obesity, and those over 40 years of age.

The management of acute cholecystitis has evolved significantly over recent decades. Laparoscopic cholecystectomy (LC) has replaced open cholecystectomy as the gold standard treatment, offering reduced postoperative pain, shorter hospital stays, improved cosmetic outcomes, and faster recovery [2]. However, considerable debate persists regarding the optimal timing of surgical intervention.

Traditionally, the management approach involved initial conservative treatment with antibiotics and delayed cholecystectomy after 6-8 weeks, allowing the acute inflammation to subside. This strategy was based on concerns that operating during acute inflammation might increase the risk of complications and conversion to open surgery. However, this approach necessitates two hospital admissions and carries the risk of recurrent symptoms during the waiting period.

In contrast, early laparoscopic cholecystectomy, performed within 72 hours of symptom onset, offers immediate definitive treatment and potentially reduces the overall disease burden. Emerging evidence suggests this approach may be advantageous, though consensus remains elusive [3].

This study aims to compare early versus delayed laparoscopic cholecystectomy in patients with acute cholecystitis, specifically examining operative parameters, postoperative pain, hospital stay duration, and overall recovery trajectories.

MATERIALS & METHODS

Study Design And Patient Selection

We conducted a prospective observational study involving 34 patients diagnosed with acute cholecystitis and scheduled for laparoscopic cholecystectomy. The study received appropriate institutional ethical approval, and informed consent was obtained from all participants. Patients were divided into two equal groups (n=17 each): those undergoing early LC (within 72 hours of symptom onset) and those undergoing delayed LC (after 72 hours).

Table 1 outlines the inclusion and exclusion criteria for the study.

Table 1: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Age 18-60 years	Common bile duct stones
Clinical diagnosis of acute cholecystitis	Gallstone pancreatitis
Radiological confirmation of acute cholecystitis	Cholangitis
Fit for general anesthesia	Pregnancy
Informed consent	Severe cardiopulmonary disease
	Previous upper abdominal surgery
	Malignancy
	Contraindication to laparoscopic surgery

Diagnostic Criteria

The diagnosis of acute cholecystitis was established through a combination of clinical, laboratory, and radiological criteria:

1. Clinical findings: Right upper quadrant abdominal pain and tenderness, fever, vomiting, and a positive Murphy's sign
2. Laboratory findings: Leukocytosis, elevated C-reactive protein
3. Ultrasonography findings: Presence of gallstones, gallbladder wall thickening (>3mm), pericholecystic fluid collection, and sonographic Murphy's sign

Surgical Procedure

All patients underwent laparoscopic cholecystectomy using a standardized four-port technique under general anesthesia. The procedure was performed by experienced surgeons with extensive laparoscopic expertise. Perioperative antibiotic prophylaxis was administered to all patients according to institutional protocols.

Outcome Measures

The following parameters were evaluated:

1. **Postoperative pain:** Assessed using the Visual Analogue Scale (VAS) on a scale of 0-10. Three readings (current pain, best pain, and worst pain) were recorded within 24 hours post-surgery and averaged to yield a composite pain score.
2. **Duration of surgery:** Measured from the first skin incision to the last skin closure.
3. **Length of hospital stay:** Calculated from the day of surgery until discharge.

4. **Conversion rate:** Instances requiring conversion from laparoscopic to open cholecystectomy.
5. **Return to normal activity:** Time taken to resume routine daily activities.
6. **Complications:** Any adverse events occurring intraoperatively or during the postoperative period.

Statistical Analysis

Data were analyzed using standard statistical software. Continuous variables were expressed as mean ± standard deviation and compared using Student's t-test. Categorical variables were expressed as frequencies and percentages and compared using the chi-square test or Fisher's exact test as appropriate. Statistical significance was established at $p < 0.05$.

RESULTS

Demographic Characteristics

The demographic profiles of both groups were comparable with no statistically significant differences. Table 1 summarizes the demographic and clinical characteristics of both study groups.

Table 1: Demographic and Clinical Characteristics of Study Participants

Characteristic	Early LC Group (n=17)	Delayed LC Group (n=17)	p-value
Age (years, mean ± SD)	46.64 ± 12.76	44.76 ± 12.18	0.653
Gender, n (%)			0.728
Male	6 (35.3%)	7 (41.2%)	
Female	11 (64.7%)	10 (58.8%)	
BMI (kg/m², mean ± SD)	27.8 ± 4.2	28.3 ± 3.9	0.716
Duration of symptoms before admission (hours, mean ± SD)	27.4 ± 12.6	29.3 ± 13.5	0.671
Comorbidities, n (%)			
Diabetes mellitus	4 (23.5%)	5 (29.4%)	0.694
Hypertension	6 (35.3%)	7 (41.2%)	0.728
Ischemic heart disease	2 (11.8%)	3 (17.6%)	0.628

LC: Laparoscopic Cholecystectomy, SD: Standard Deviation, BMI: Body Mass Index

The gender distribution was similar between groups, with a slight female predominance in both cohorts. Comorbidity profiles were also comparable between the two groups.

Operative Parameters

Table 2 presents the operative parameters for both study groups.

Table 2: Operative Parameters

Parameter	Early LC Group (n=17)	Delayed LC Group (n=17)	p-value
Operative time (minutes, mean ± SD)	78.3 ± 15.6	82.7 ± 17.2	0.432
Conversion to open surgery, n (%)	1 (5.9%)	2 (11.8%)	0.545
Reason for conversion, n			
Unclear anatomy	1	1	-
Dense adhesions	0	1	-
Intraoperative bleeding	0	0	-
Estimated blood loss (mL, mean ± SD)	42.6 ± 18.4	57.3 ± 23.7	0.061
Bile spillage, n (%)	2 (11.8%)	4 (23.5%)	0.370

LC: Laparoscopic Cholecystectomy, SD: Standard Deviation

The mean operative time was comparable between the early LC group and the delayed LC group, with no statistically significant difference. Additionally, no significant difference was observed in conversion rates to open cholecystectomy between the two groups. In the early group, 1 out of 17 cases required conversion due to unclear anatomy, while in the delayed group, 2 out of 17 cases were converted to open surgery (one due to unclear anatomy and one due to dense adhesions).

Postoperative Pain and Recovery

Pain assessment revealed that patients in the early LC group experienced significantly less postoperative pain compared to those in the delayed group. The mean VAS score was 3.2 ± 1.4 in the early group versus 5.6 ± 2.1 in the delayed group (p=0.027), representing a clinically and statistically significant difference.

Table 3 summarizes the key postoperative recovery parameters for both groups.

Table 3: Postoperative Recovery Parameters

Parameter	Early LC Group (n=17)	Delayed LC Group (n=17)	p-value
Postoperative pain (VAS score, mean ± SD)	3.2 ± 1.4	5.6 ± 2.1	0.027*
Hospital stay (days, mean ± SD)	2.3 ± 0.8	4.8 ± 1.6	0.00968*
Time to oral intake (hours, mean ± SD)	16.4 ± 5.7	24.8 ± 7.9	0.0276*
Time to ambulation (hours, mean ± SD)	12.6 ± 4.2	19.5 ± 5.8	0.0301*
Return to normal activities (days, mean ± SD)	9.4 ± 2.3	14.7 ± 3.5	0.0183*
Analgesic requirements (doses, mean ± SD)	4.2 ± 1.8	7.6 ± 2.4	0.0155*

LC: Laparoscopic Cholecystectomy, SD: Standard Deviation, VAS: Visual Analogue Scale * Statistically significant ($p < 0.05$)

The mean hospital stay was remarkably shorter in the early LC group compared to the delayed LC group (p=0.00968). Furthermore, patients in the early group returned to normal daily activities more quickly than those in the delayed group (p=0.0183). As shown in Table 3, the early LC group also demonstrated significantly faster time to oral intake, earlier ambulation, and reduced analgesic requirements.

Complications

Table 4 summarizes the complications observed in both study groups.

Table 4: Complications

Complication	Early LC Group (n=17)	Delayed LC Group (n=17)	p-value
Major complications, n (%)	0 (0%)	0 (0%)	-
Bile duct injury	0	0	-
Vascular injury	0	0	-
Bowel injury	0	0	-
Minor complications, n (%)	2 (11.8%)	3 (17.6%)	0.628
Wound infection	1 (5.9%)	2 (11.8%)	0.545
Persistent abdominal pain	1 (5.9%)	1 (5.9%)	1.000
Port site hematoma	0 (0%)	0 (0%)	-
Readmission within 30 days, n (%)	0 (0%)	1 (5.9%)	0.310
Mortality, n (%)	0 (0%)	0 (0%)	-

LC: Laparoscopic Cholecystectomy

No major intraoperative complications such as bile duct injury were reported in either group. Minor complications including wound infection and persistent abdominal pain occurred in 2 patients (11.8%) in the early group and 3 patients (17.6%) in the delayed group, but this difference was not statistically significant (p=0.628). One patient in the delayed group required readmission within 30 days for management of wound infection, while no readmissions were reported in the early group.

DISCUSSION

This prospective observational study demonstrates that early laparoscopic cholecystectomy for acute cholecystitis offers significant advantages over delayed intervention. The findings reveal that patients undergoing early LC experience less postoperative pain, shorter hospital stays, and faster return to normal activities without an increased risk of complications or conversion to open surgery.

The pathophysiology of acute cholecystitis progresses through stages of edema, suppuration, and eventually fibrosis. Early intervention takes advantage of the edematous phase, where tissue planes are often more distinct and less adherent, potentially facilitating dissection [4]. Conversely, delayed intervention may encounter more fibrosis and adhesions, potentially increasing technical difficulty and postoperative discomfort.

Table 5 presents a summary comparison of key outcomes between the

early and delayed LC approaches.

Table 5: Summary Comparison of Early versus Delayed LC Approaches

Parameter	Early LC Approach	Delayed LC Approach	Clinical Implication
Operative time	Comparable	Comparable	No significant difference in surgical efficiency
Conversion rate	Lower trend but not statistically significant	Higher trend but not statistically significant	Both approaches feasible laparoscopically
Postoperative pain	Significantly lower	Significantly higher	Better patient comfort with early LC
Hospital stay	Significantly shorter	Significantly longer	Resource optimization with early LC
Recovery time	Significantly faster	Significantly slower	Earlier return to productivity with early LC
Complication rate	Comparable	Comparable	Both approaches safe
Cost implications	Lower due to shorter stay	Higher due to longer stay	Economic advantage with early LC
Resource utilization	More efficient	Less efficient	System-wide benefits with early LC

LC: Laparoscopic Cholecystectomy

The significantly lower pain scores observed in the early LC group (mean VAS score: 3.2 versus 5.6, p=0.027) align with this pathophysiological understanding. Less tissue inflammation and manipulation during early surgery likely contribute to reduced postoperative pain, allowing for decreased analgesic requirements and improved patient comfort.

Perhaps the most compelling advantage of early LC is the substantial reduction in hospitalization duration. Our study demonstrated that patients in the early group were discharged, on average, 2.5 days earlier than those in the delayed group (2.3 versus 4.8 days, p=0.00968). This finding has significant implications for healthcare resource utilization, hospital bed availability, and overall system efficiency. Additionally, shorter hospitalization potentially reduces the risk of hospital-acquired infections and other complications associated with prolonged inpatient stays.

The expedited return to normal activities observed in the early LC group further underscores the patient-centered benefits of this approach. Early resumption of daily activities contributes to improved quality of life and potentially reduces indirect costs associated with prolonged recovery periods.

Contrary to traditional concerns, our study found no significant increase in conversion rates or complications with early LC. This challenges the historical assumption that operating during acute inflammation necessarily increases technical difficulty and risk. Our findings suggest that experienced surgeons can safely perform early LC with outcomes comparable to or better than delayed intervention.

These results align with recent systematic reviews and meta-analyses that increasingly support early LC as the preferred approach. A Cochrane review by Gurusamy et al. demonstrated that early LC reduces overall hospital stay and does not increase the risk of bile duct injury or conversion to open cholecystectomy [5]. Similarly, Gutt et al. found that early LC reduces morbidity and hospital stay compared to delayed intervention [6].

The Tokyo Guidelines 2018 also recommend early LC for patients with mild to moderate acute cholecystitis, particularly within 72 hours of symptom onset [7]. Our findings provide further evidence supporting these recommendations and suggest that implementation of early LC protocols may improve overall outcomes in patients with acute cholecystitis.

Several limitations should be acknowledged. The sample size is relatively small, potentially limiting statistical power. Additionally, the non-randomized nature of this observational study introduces the possibility of selection bias, although baseline characteristics were comparable between groups. Further large-scale randomized controlled trials would strengthen the evidence base for early LC in acute cholecystitis.

CONCLUSIONS

Early laparoscopic cholecystectomy, performed within 72 hours of symptom onset, appears to be a superior approach for the management of acute cholecystitis compared to delayed intervention. This approach offers significant advantages including reduced postoperative pain, shorter hospital stays, and faster return to normal activities without increasing the risk of complications or conversion to open surgery.

These findings have important implications for clinical practice and healthcare resource allocation. Implementation of protocols favoring early LC may improve patient outcomes while optimizing healthcare delivery. Surgeons should consider early LC as the preferred treatment strategy for appropriate candidates with acute cholecystitis.

REFERENCES

1. Strasberg SM: Clinical practice. Acute calculous cholecystitis. N Engl J Med. 2008, 358:2804-2811. 10.1056/NEJMcp0800929
2. Coccolini F, Catena F, Pisano M, et al.: Open versus laparoscopic cholecystectomy in acute cholecystitis. Systematic review and meta-analysis. Int J Surg. 2015, 18:196-204. 10.1016/j.ijsu.2015.04.083
3. de Mestral C, Rotstein OD, Laupacis A, et al.: Comparative operative outcomes of early and delayed cholecystectomy for acute cholecystitis: a population-based propensity score analysis. Ann Surg. 2014, 259:10-15. 10.1097/SLA.0b013e3182a5cf36
4. Ohta M, Iwashita Y, Yada K, et al.: Operative timing of laparoscopic cholecystectomy for acute cholecystitis in a Japanese institute. JSLS. 2012, 16:65-70. 10.4293/108680812X13291597716221
5. Gurusamy KS, Davidson C, Gluud C, Davidson BR: Early versus delayed laparoscopic cholecystectomy for people with acute cholecystitis. Cochrane Database Syst Rev. 2013, 6:CD005440. 10.1002/14651858.CD005440.pub3
6. Gutt CN, Encke J, Köninger J, et al.: Acute cholecystitis: early versus delayed cholecystectomy, a multicenter randomized trial (ACDC study, NCT00447304). Ann Surg. 2013, 258:385-393. 10.1097/SLA.0b013e3182a1599b
7. Yokoe M, Hata J, Takada T, et al.: Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute cholecystitis (with videos). J Hepatobiliary Pancreat Sci. 2018, 25:41-54. 10.1002/jhbp.515
8. Zafar SN, Obirieze A, Adesibikan B, Cornwell EE 3rd, Fullum TM, Tran DD: Optimal time for early laparoscopic cholecystectomy for acute cholecystitis. JAMA Surg. 2015, 150:129-136. 10.1001/jamasurg.2014.2339
9. Cao AM, Eslick GD, Cox MR: Early laparoscopic cholecystectomy is superior to delayed acute cholecystitis: a meta-analysis of case-control studies. Surg Endosc. 2016, 30:1172-1182. 10.1007/s00464-015-4325-4
10. Lyu Y, Cheng Y, Wang B, Zhao S, Chen L: Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: an up-to-date meta-analysis of randomized controlled trials. Surg Endosc. 2018, 32:4728-4741. 10.1007/s00464-018-6400-0