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Research Article

Comparative Analysis of Early Versus Late Laparoscopic Cholecystectomy Following Endoscopic Retrograde Cholangiopancreatography in Cases of Cholelithiasis with Choledocholithiasis

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ABSTRACT
Background: The optimal timing of laparoscopic cholecystectomy (LC) following endoscopic retrograde cholangiopancreatography (ERCP) for choledocholithiasis remains debated. While early LC (≤72 hours) may reduce operative difficulty and hospital stay, late LC (>6 weeks) has traditionally been practiced to allow inflammation to subside.
Methods: A prospective comparative study was conducted on 60 patients with cholelithiasis and choledocholithiasis who underwent successful ERCP for common bile duct clearance at a tertiary care hospital. Patients were randomized into early LC (within 72 hours; n=30) and late LC (>6 weeks; n=30) groups. Demographic, operative, and postoperative parameters including operative time, adhesion grading, conversion to open surgery, complications, and hospital stay were analyzed using standard statistical tests.
Results: Both groups were comparable in terms of age, sex, and comorbidities. Mean operative time was significantly shorter in the early LC group (56.2 ± 8.5 min vs. 77.4 ± 9.1 min; p<0.001). Severe adhesions were more frequent in late LC (40% vs. 10%; p=0.01). The mean length of hospital stay was reduced in the early LC group (2.9 ± 0.7 vs. 4.3 ± 1.2 days; p=0.002). Conversion to open surgery (1 vs. 2 cases) and postoperative complications (6.7% vs. 10%) were not statistically different.
Conclusions: Early LC within 72 hours of ERCP is safe and associated with shorter operative time, less operative difficulty, and reduced hospital stay without increasing complication rates. These findings support early cholecystectomy as the preferred strategy in patients with cholelithiasis and choledocholithiasis.

Keywords: Cholelithiasis, Choledocholithiasis, Laparoscopic Cholecystectomy, ERCP, Timing, Surgical Outcomes.

INTRODUCTION

Gallstone disease is one of the most common gastrointestinal disorders, with a global prevalence ranging between 10% and 20%, and is more frequent in middle-aged females [1]. Among these patients, 10–15% develop choledocholithiasis, characterized by the presence of gallstones in the common bile duct (CBD), which can cause biliary obstruction, cholangitis, or pancreatitis [2]. Laparoscopic cholecystectomy (LC) remains the gold standard treatment for symptomatic cholelithiasis, whereas endoscopic retrograde cholangiopancreatography (ERCP) is considered the first-line intervention for CBD stone clearance [3,4].

Although ERCP followed by LC is widely accepted as the optimal management strategy, the ideal timing of cholecystectomy after ERCP remains debated. Proponents of early LC (within 72 hours of ERCP) argue that it reduces the risk of recurrent biliary events, shortens hospital stay, and minimizes operative difficulty [1,3,5]. In contrast, delayed LC performed after 6–8 weeks has traditionally been preferred to allow resolution of local inflammation, although it is associated with more severe adhesions, longer

operative times, and higher conversion rates [6,7].

Recent studies, including randomized and observational trials, have reported conflicting outcomes. While some support early LC as safe and effective [1,3,5], others suggest no significant difference between early and late approaches [2]. In view of this controversy, the present study was undertaken to compare perioperative outcomes, complications, and hospital stay between early and late LC following ERCP in patients with cholelithiasis and choledocholithiasis.

MATERIALS AND METHODS

This prospective comparative study was conducted at Mahatma Gandhi Medical College And Hospital, Jaipur, a tertiary care center, between 2024 to 2025. A total of 60 patients diagnosed with cholelithiasis and choledocholithiasis who underwent successful ERCP and CBD clearance were included.

Study Groups

Patients were divided into two groups:

Group I (Early LC): 30 patients underwent laparoscopic cholecystectomy within 72 hours of ERCP.

Group II (Late LC): 30 patients underwent laparoscopic cholecystectomy after at least 6 weeks of ERCP.

Eligibility Criteria

Inclusion Criteria: patients >18 years with gallstones and choledocholithiasis confirmed on imaging/ERCP.

Exclusion Criteria: patients with acute pancreatitis, malignancy, uncontrolled comorbidities, failed ERCP, or those unwilling to consent.

Data Collection

Demographic data, intraoperative findings (adhesion grading, operative time, conversion to open surgery), and postoperative outcomes (complications, hospital stay, readmission) were recorded. Adhesion severity and operative difficulty were graded using standard scoring systems [6].

Statistical Analysis

Data were analyzed using SPSS version 24.0. Continuous variables were expressed as mean ± standard deviation and compared using Student's *t*-test. Categorical variables were analyzed using chi-square or Fisher's exact test. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 60 patients with cholelithiasis and choledocholithiasis who underwent ERCP followed by LC were analyzed. Patients were divided equally into two groups: 30 in the early LC group and 30 in the late LC group.

Baseline Characteristics

Both groups were comparable in terms of demographic and clinical characteristics (Table 1). The mean age was 45.1 ± 12.4 years in the early LC group and 44.6 ± 13.1 years in the late LC group (p=0.84). Females constituted the majority in both groups (73% vs. 70%, p=0.78). No significant differences were observed in mean body mass index (24.8 vs. 25.1 kg/m², p=0.67) or comorbidities such as hypertension and diabetes (30% vs. 36%, p=0.61).

Intraoperative PARAMETERS

The mean operative time was significantly shorter in the early LC group (56.2 ± 8.5 min) compared to the late LC group (77.4 ± 9.1 min; p<0.001) (Table 2). Severe adhesions were encountered in 10% of patients undergoing early LC, compared to 40% in the late LC group, which was statistically significant (p=0.01). Conversion to open cholecystectomy was required in one patient (3.3%) in the early group and two patients (6.7%) in the late group; this difference was not statistically significant (p=0.55).

Postoperative Outcomes

Postoperative recovery was more favorable in the early LC group (Table 3). The mean hospital stay was significantly shorter in patients undergoing early LC (2.9 ± 0.7 days) compared to those undergoing late LC (4.3 ± 1.2 days; p=0.002). There was one case of biliary injury in the late LC group and none in the early group (p=0.31). Wound infection occurred in one patient (3.3%) in the early LC group and two patients (6.7%) in the late group (p=0.55). Readmission rates were equal in both groups (3.3% each, p=1.0).

Table 1. Baseline characteristics of patients (n=60)

Parameter	Early LC (n=30)	Late LC (n=30)	p-value
Age (years, mean ± SD)	45.1 ± 12.4	44.6 ± 13.1	0.84
Female sex (%)	22 (73%)	21 (70%)	0.78
BMI (kg/m²)	24.8 ± 2.9	25.1 ± 3.1	0.67
Comorbidities (HTN/DM)	9 (30%)	11 (36%)	0.61

Table 2. Intraoperative Parameters

Parameter	Early LC (n=30)	Late LC (n=30)	p-value
Operative time (min, mean ± SD)	56.2 ± 8.5	77.4 ± 9.1	<0.001
Severe adhesions (%)	3 (10%)	12 (40%)	0.01
Conversion to open (%)	1 (3.3%)	2 (6.7%)	0.55

Table 3. Postoperative Outcomes

Parameter	Early LC (n=30)	Late LC (n=30)	p-value
Hospital stay (days, mean ± SD)	2.9 ± 0.7	4.3 ± 1.2	0.002
Biliary injury (%)	0	1 (3.3%)	0.31
Wound infection (%)	1 (3.3%)	2 (6.7%)	0.55
Readmission (%)	1 (3.3%)	1 (3.3%)	1.0

DISCUSSION

This study demonstrated that early LC following ERCP was associated with significantly shorter operative time, fewer severe adhesions, and reduced hospital stay compared to delayed LC, while rates of conversion and complications were similar. These findings support the safety and efficacy of early LC.

Our results are consistent with Goel et al. [1] and Aziret et al. [3], who reported that early LC minimizes operative difficulty and shortens hospitalization. Similarly, Friis et al. [5] in a systematic review concluded that early LC should be the standard of care after ERCP. In contrast, Shrestha et al. [2] found no significant difference between early and late LC, suggesting that outcomes may vary by patient selection and institutional expertise.

The increased adhesion severity and operative difficulty in delayed LC observed in this study can be attributed to ongoing inflammation and fibrosis in Calot's triangle, making dissection technically challenging [6,7]. From a clinical perspective, performing LC within 72 hours after ERCP reduces patient morbidity and healthcare costs by avoiding repeat admissions for biliary complications.

Limitations include the modest sample size, single-center setting, and lack of randomization. Larger multicentric trials are warranted to confirm these findings.

CONCLUSION

Early laparoscopic cholecystectomy within 72 hours post-ERCP is associated with shorter operative time, reduced adhesions, and shorter hospital stay, with comparable complication rates to delayed surgery. It should be considered the preferred approach in patients with cholelithiasis and choledocholithiasis.

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