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Original Research Article

A comparative study on early versus late laparoscopic cholecystectomy in a post ERCP patient with cholelithiasis with choledocholithiasis: a single institutional study in a tertiary centre in Nepal

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ABSTRACT

Background: An accepted surgical modality for cholelithiasis with secondary choledocholithiasis is the laparoscopic cholecystectomy (LC) following endoscopic retrograde cholangiopancreatography (ERCP). Despite recommendation for early cholecystectomy, there is no consensus about the time interval between LC and ERCP. The study aims to compare Early (<72 hours) versus Late (>6 weeks) laparoscopic cholecystectomy in post-ERCP patient with cholelithiasis with choledocholithiasis in terms of intra operative and post operative complications.
Methods: 58 patients who underwent ERCP were followed up in two groups with 29 patients each for those who had early (<72 hours) laparoscopic cholecystectomy (LC) (Group 1) and late (>6 weeks) LC (Group 2) and compared for intraoperative and post operative complications. Patients' age, gender, abdominal ultrasonography findings, ERCP findings, time interval between ERCP and LC, conversion rate, length of hospital stay, operation time, intraoperative complication and postoperative complication rates were collected.
Results: The mean±SD age of the study participants in this study was 45.5±15.8 years. No patients underwent conversion to open cholecystectomy. Operative time were similar in both groups (p=0.941). There was no statistically significant difference in difficult in Calot's dissection and time to achieve critical view of safety. No biliary tract injury was reported while requirement for blood transfusion (p=0.490) and drain placement (p=0.610) were similar in both groups.
Conclusions: The intra operative and post operative outcome with early (<72 hours) and late (>6 weeks) laparoscopic cholecystitis post ERCP in patients with cholelithiasis and choledocholithiasis is similar.

Keywords: Choledocholithiasis, Cholecystitis, Complication, Endoscopic retrograde cholangiopancreatography, Gall stone, Laparoscopic cholecystectomy

INTRODUCTION

Cholelithiasis is commonly seen in women during middle age.[1] In a 10-year follow-up, only 15–26% of initially asymptomatic individuals will develop symptoms. Over a 10-year period, only 2–3% of initially asymptomatic patients are expected to develop complications such as pancreatitis, cholecystitis and biliary obstruction.[2] In most cases, the migration of stones into the common bile duct (CBD) obstructs bile flow to the small intestine, leading to symptom development and complications such as pain, jaundice and, in some cases, cholangitis. Stones

that form directly within the biliary tree are classified as primary choledocholithiasis, while those that migrate from the gallbladder are referred to as secondary choledocholithiasis.[3]

Currently, the gold standard treatment for cholelithiasis is laparoscopic cholecystectomy (LC), while the most commonly used approach for choledocholithiasis is endoscopic retrograde cholangiopancreatography (ERCP) with endoscopic sphincterotomy (ES). However, the appropriate timing for laparoscopic cholecystectomy after ERCP for choledocholithiasis remains a topic of discussion.[4]

Endoscopic retrograde cholangiopancreatography (ERCP) is the standard treatment for choledocholithiasis and is successful in over 90% of cases. However, ERCP may lead to complications such as pancreatitis and cholecystitis.

\These complications may impact the subsequent laparoscopic cholecystectomy (LC), potentially resulting in longer operating times, perioperative complications and the need for conversion to open cholecystectomy.

However, interval cholecystectomy has been linked to a higher incidence of secondary choledocholithiasis and cholangitis. It is believed that early laparoscopic cholecystectomy after ERCP can help prevent recurrent biliary complications, reduce operation-related morbidity and shorten hospital stays.

ERCP can cause inflammation of the hepato-duodenal ligament, leading to frozen Calot's triangle, which makes dissection more difficult and increases the conversion rate from laparoscopic cholecystectomy to open cholecystectomy.[5]

This study aims to compare the outcomes of early versus late laparoscopic cholecystectomy in post-ERCP patients with choledocholithiasis, focusing on complications, conversion rates to open cholecystectomy, hospital stay duration and effectiveness in preventing recurrent biliary issues in a Nepalese tertiary hospital.

METHODS

A prospective observational study was performed with convenient sampling in Department of General Surgery B. P. Koirala Institute of Health Sciences, Dharan, Nepal over a period of 12 months from April 2022 to May 2023 in 58 patients who had undergone ERCP and follow up comparison of the patients were carried out in two groups, one group of 29 patients who had LC undertaken immediately, defined as within 72 hours, after ERCP and another group of patients who had undertaken late LC, define as more than 6 weeks after ERCP. The decision on treatment modality depended on patient's choice and co morbidities. Those patients with age above 18 years of age along with imaging, clinical symptoms and signs consistent with the diagnosis of cholecysto-choledocho-lithiasis and no malformation of the biliary duct or previous history of biliary tract surgery were considered for study.

Those patients who did not give consent, unable to tolerate anesthesia, had severe liver and kidney disease, failed CBD stone clearance with ERCP, develop acute pancreatitis or other complication induced by ERCP were excluded from the study.

The ethical clearance from the institutional review board (IRB) of B. P. Koirala Institute of Health Sciences, Dharan, Nepal was taken. Data was entered into Microsoft Excel and exported to SPSS v11.5 (Statistical Package for Social Science) for statistical analysis.

Descriptive statistic was calculated as frequency, proportion, mean, standard deviation, median and interquartile range. For inferential statistics chi square, independent t-test or Mann-Whitney U Test were applied, wherever appropriate, to explore the distribution of study outcomes across two LC groups.

RESULTS

The mean±sd age of the study participants in this study was 45.6±15.6 years. More than half (60%) of the participants were female and majority (81%) of the participants were married.

The mean±sd stone size in gall bladder and biliary tract were found to be 12.3±2.5 mm and 10.8±2.1 mm, respectively. About 81% and 53.4% of the participants reported multiple stone in gall bladder and bile tract, respectively.

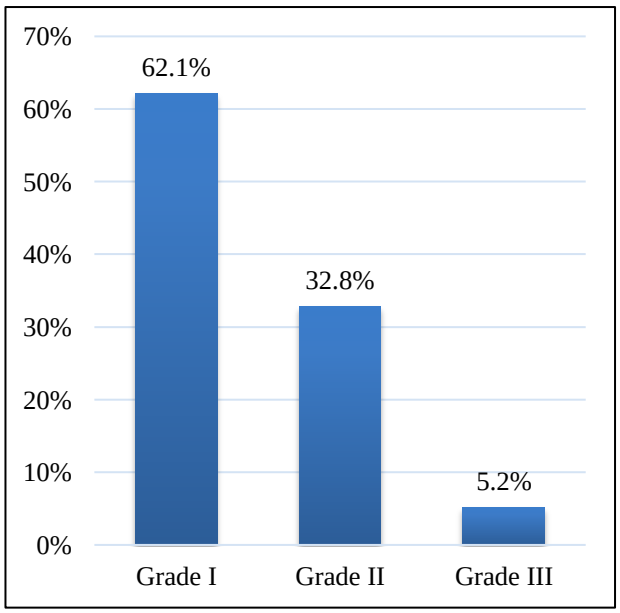

Figure 1: Participant with different grade of difficulty in calot's dissection (n=58).

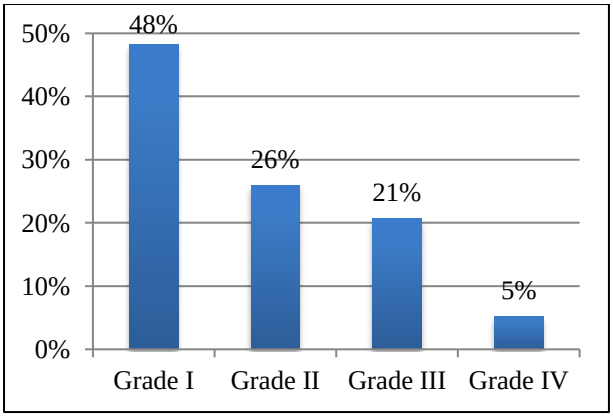

Figure 2: Participant with different grade of difficulty in Chang's grading in gallbladder inflammation. (n=58).

Operative findings

Most (approximately 62%) of the cases were reported as grade I difficult for calot's dissection, followed by grade II (32.8%) and grade III (5.2%) (Figure 1). Similarly, majority (48.3%) of the participants had Chang's grade I of gall bladder inflammation followed by grade II (25.9%), grade III (20.7%) and grade IV (5.2%). The mean±SD operative time and time to achieve Critical View of Safety (CVS) were 66.9±15.4 min and 38.3±10.3 min respectively. The CVS was achieved on all the participants. No cases in either of the groups required to undergo conversion. There was no statistically significant difference in intra-operative findings, such as, operative time, empyema, cholecystitis, difficulty in Calot's dissection, Chang's grading of GB inflammation and time for achieving CVS among study participants across two groups (Table 3).

Complications

No intra-operative complication of biliary tract injury was reported among study participants. Only two cases required blood transfusion and both were in group where early LC was undertaken post ERCP. About four participants required drain placement post-surgery. However, no statistically significant difference was found in intra-operative complication across two groups (Table 4). Only single patient reported deep infection but no patient develops. There were no reported cases of hospital admission among study patients. The mean±sd hospital stay for the study participants was 1.8±0.9 days. Length of hospital stay was similar across both groups (Table 5).

Table 1: Demographic details of study participants in two groups.

	Group 1 (n=29)	Group 2 (n=29)	P value
Age			
Mean±SD	47.0±16.1	44.2±15.3	0.498+
Median (IQR)	41 (34.5–62)	42 (30.5–56)	
Sex			
Male	16, 55.2%	9, 31%	0.063*
Female	13, 44.8%	20, 69%	
Marital status			
Married	25, 86.2%	22, 75.9%	0.315*
Unmarried	4, 13.8%	7, 24.1%	

*Chi-square test, +Mann-Whitney U test, Bold signifies statistical significance at p<0.05, NA: Not Applicable

Table 2: Pre-operative findings in USG and ERCP.

	Group 1 (n=29)	Group 2 (n=29)	P value
Stone size in gall bladder			
Mean±SD	12.8±2.6	11.8±2.4	0.128+
Median (IQR)	12 (11.1–14.5)	12 (10–14)	
Number of stones in gall bladder			
Single	6, 20.7%	5, 17.2%	0.738*
Multiple	23, 79.3%	24, 82.8%	
Stone size in Biliary tract			
Mean±SD	10.9±2.5	10.6±1.6	0.826+
Median (IQR)	11 (9.8–12)	11 (9–12)	
Number of stones in biliary tract			
Single	13, 44.8%	14, 48.3%	0.792*
Multiple	16, 55.2%	15, 51.7%	
Common bile duct diameter (≥6 mm)	29, 100%	29, 100%	NA

*Chi-square test, +Mann-Whitney U test, Bold signifies statistical significance at p<0.05, NA-Not Applicable

Table 3: Intra-operative findings.

	Group 1 (n=29)	Group 2 (n=29)	P value
Operative time (in min)			
Mean±SD	68.8±16.7	65 ±14.1	0.459+
Median (IQR)	60 (60–83)	60 (50–75)	
Empyema	1, 3.4%	3, 10.3%	0.611*
Cholecystitis	3, 10.3%	6, 20.7%	0.470*
Difficulty in calots dissection			
Grade I	17, 58.6%	19, 65.5%	0.109*
Grade II	12, 41.4%	7, 24.1%	
Grade III	0	3, 10.3%	
Chang's grading of GB inflammation			
Grade I	12, 41.1%	16, 55.2%	0.463*
Grade II	10, 34.5%	5, 17.2%	
Grade III	6, 20.7%	6, 20.7%	
Grade IV	1, 3.4%	2, 6.9%	
Critical view of safety (CVS) achieved	29, 100%	29, 100%	NA
Time to achieve critical view of safety (CVS)			
Mean±SD	38.7±10.3	37.9±10.5	0.687+
Median (IQR)	40 (30–47.5)	35 (30–45)	
Conversion done	0	0	NA

*Chi-square test, +Mann-Whitney U test, Bold signifies statistical significance at p<0.05, NA: Not Applicable

Table 4: Intra-operative complication among study participants across two groups.

	Group 1 (n=29)	Group 2 (n=29)	P value
Biliary tract injury	0	0	NA
Bleeding requiring blood transfusion	2, 6.9%	0	0.150*
Drain placement	1, 3.4%	3, 10.3%	0.611*

*Chi-square test, Bold signifies statistical significance at p<0.05, NA:Not Applicable

Table 5: Post-operative complications among study participants across two groups.

	Group 1 (n=29)	Group 2 (n=29)	P value
Superficial infection	0	0	NA
Deep infection	0	1, 3.4%	0.999*
Length of hospital stay			
Mean±SD	1.9±1.0	1.6±0.8	0.294+
Median (IQR)	2 (1–2.5)	1 (1–2)	
Hospital re-admission	0	0	NA

*Chi-square test, +Mann-Whitney U test, Bold signifies statistical significance at p<0.05, NA:Not Applicable

DISCUSSION

The management of cholelithiasis with secondary choledocholithiasis should focus on clearing common bile duct stone and removing the gallstones' origin.[6,7] The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) recommendations state that the decision is based on local availability and local competence due to financial considerations and availability.[8] All patients with a clinical suspicion of common bile duct stone should undergo preoperative ERCP or intraoperative transhepatic cholangiography, according to the NIH consensus statement.[9] The delay in waiting time for LC could lead to recurrent biliary complications. Recurrent symptoms and reinterventions not only obviously affect a patient's health, but they also seem to be linked to more challenging surgery and a more difficult postoperative course. Conversion to open cholecystectomy is a perioperative issue but is not considered an LC consequence. Open cholecystectomy, however, is linked to more postoperative discomfort, more pulmonary problems, more wound infections and a longer hospital stay. Hence, most convenient option of timely surgery after ERCP seems worthwhile.[10]

Early cholecystectomy following ERCP is related with a lower chance of conversion to an open procedure and a shorter hospital stay, according to a new systematic review of 14 studies by Friis et al. They came to the conclusion that early cholecystectomy should be the

norm and should be performed within 24 and 72 hours after ERCP.[11] In contrary to the above findings, this study did not find any significant difference in conversion rate or peri-operative complications between two groups. This was consistent to the findings from another retrospectively reviewed study.[12]

Early cholecystectomy, however, is not always clinically appropriate or may not be logistically feasible in high volume healthcare system functioning with limited resources. The chance for disease development appears to increase with a longer time between ERCP and LC.

Longer intervals would be anticipated to be associated with higher conversion rates if illness progression is the primary cause of higher conversion rates in successive LC.[13] No such difference was apparent in this study. Theoretically, delaying LC following ERCP and ES is done in order to give the CBD and GB time to calm down and heal from acute hepatic inflammation before LC can be performed.[14,15]

In patients who had a preoperative ERCP, the adhesion scores and likelihood of running into a scleroatrophic gallbladder during LC appeared to be higher. In the long run, the ERCP-induced inflammatory response in the biliary tree and Calot's triangle may cause the gallbladder to scar and fibrose.

The significant conversion rates may be a result of the patients in this group having a high rate of scleroatrophic gallbladders and high adhesion scores (3 or 4).[16] However, this study did not find any difference in difficulty in Calot's dissection and time for attaining critical view of safety. Also, length of hospital stay was similar in both groups in this study in contrary to the findings from other studies.

Limitations of our study are relatively small sample size and single center study.

CONCLUSION

Late (>6 weeks) laparoscopic cholecystectomy following ERCP was found to have no difference in prognostic outcomes as compared to early (with 72 hours) laparoscopic cholecystectomy. The study revealed no significant difference in treatment outcomes including complications across two group of patients where LC was performed early (within 72 hours) and late (>6 weeks) after ERCP. The intra operative findings were also similar for participants in either of the group. Similarly, this study showed no difference in peri operative and post operative complication across both group of patients.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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