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Original Research Article

A Comparative Study of Early versus Late Laparoscopic Cholecystectomy in Post Endoscopic Retrograde Cholangiopancreaticography Patients

K. Abhishek[1], Deepak Pankaj[2], Nitesh Kumar[3], Mohal Kumar[4], Vibhuti Bhushan[5], Pradyot Shahi[6]

[1]Junior Resident, Department of General Surgery, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.
[2]Assistant Professor, Department of General Surgery, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.
[3]Associate Professor, Department of General Surgery, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.
[4]Junior Resident, Department of General Surgery, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.
[5]Professor, Department of General Surgery, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.
[6]Resident, Sardar Patel Medical College, Bikaner, Rajastan & Ex-Senior Resident, Department of General Surgery, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.

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Corresponding author: Dr. Deepak Pankaj
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Abstract

Background: After endoscopic sphincterotomy, it is predicted that early planned laparoscopic cholecystectomy decreases recurring biliary problems and lowers operational morbidity and hospital stay. Our study objective is to determine the benefits of early laparoscopic cholecystectomy over late laparoscopic cholecystectomy in patients who have undergone ERCP at IGIMS in Patna, Bihar.

Methods: From January 2022 through December 2022, the Department of Surgery at the Indira Gandhi Institute of Medical Sciences, Patna, Bihar, conducted this prospective study. All patients who had laparoscopic cholecystectomies for CBD calculi following ERCP were included in the study, and they were divided into two groups based on how long had passed between ERCP and the laparoscopic cholecystectomy. Operating time, conversion to open cholecystectomy, intraoperative bleeding needing transfusion, hospital stay, and postoperative complications such infection, CBD damage, and pancreatitis were all taken into consideration when comparing outcomes.

Results: In this study, 60 individuals who had choledocholithiasis with cholelithiasis-like symptoms were included. Of those, 22 underwent late laparoscopic cholecystectomy and 38 underwent early laparoscopic cholecystectomy after ERCP. According to a comparative analysis, shorter intervals are linked to lower conversion rates, post-operative blood transfusions, and wound infections, which serve as proxy indicators for lower intraoperative adhesions and other

problems. A shorter period is also linked to a shorter hospital stay, which shows less strain on hospital resources and average costs.

Conclusion: Endoscopic retrograde cholangiopancreatography performed quickly followed by laparoscopic cholecystectomy is a safe and efficient way to treat cholelithiasis brought on by choledocholithiasis. To verify the results of this study, a bigger sample size will need to be examined for a longer period of time.

Keywords: Choledocholithiasis, ERCP, Laparoscopic Cholecystectomy.

Introduction

Gallstones have been known about since antiquity and have been discovered when Egyptian mummies were autopsied. In 1985, German surgeon Eric Muhe performed the first laparoscopic cholecystectomy (Lapara, the flank; and skopein, to scrutinise), which followed the first successful open cholecystectomy in 1882. It is evident that the intricate interactions of hereditary and environmental variables that cause gallstone disease. An altered incidence of gallstone detection in individuals from various geographic locations with varying dietary practises, levels of physical activity, and cleanliness practises attests to this. Cholesterol hypersecretion, changes in intestinal bile salt, cholesterol absorption, and gall bladder hypokinesia all contribute to the common mechanism of gallstone development, which results in bile cholesterol supersaturation and nucleation. [1] In cases of cholelithiasis, the prevalence of CBD stones ranges from 3.4% to 15%. [2] There are two types of choledocholithiasis: primary and secondary. The more frequent occurrence of secondary choledocholithiasis is brought on by stones that start in the gallbladder and subsequently move through the cystic duct to the CBD. In 75% of patients, these secondary bile stones are cholesterol stones, and in 25%, they are black pigment stones.

Asian populations are more likely to have primary bile duct stones than other races. Compared to secondary stones, these stones contain more bilirubin and less cholesterol. These stones are linked to both bacteria and biliary stasis. [3]

Initial symptoms, lab results, and ultrasound (US) findings all point to the diagnosis of choledocholithiasis. Each of these factors has a subpar sensitivity and specificity for choledocholithiasis when taken individually. The most often utilised initial diagnostic method for suspected biliary stones is abdominal ultrasonography, which has a sensitivity of 25–60% and a specificity of 95–100%. [4] A CBD greater than 6 mm can be used to consistently identify a dilated extrahepatic bile duct. Yet, a significant study of cholecystectomy patients discovered that over half of those with choledocholithiasis have a nondilated CBD. [5] Moreover, the extrahepatic bile duct's diameter grows with age, and elderly patients may have a duct with a normal diameter of more than 6 mm. A negative US does not always rule out choledocholithiasis, mostly because of its poor sensitivity.

The sensitivity and specificity of contrast-enhanced computed tomography can be increased by injecting a hepatobiliary-excreted intravenous contrast agent. [6,7] Since its debut in 1991, magnetic resonance cholangiopancreatography (MRCP), with sensitivity of 90-100% and specificity of 92-100%, has established itself as a reliable, non-invasive diagnostic method for examining the biliary and pancreatic ducts. [8,9] A bile crescent-shaped filling defect

indicates the presence of an impacted biliary stone. [10]

The use of ERCP as a diagnostic tool for the treatment of biliary and pancreatic illnesses was first presented in 1968. [11] As a result of the development of endoscopic sphincterotomy, ERCP today boasts a 90% sensitivity and 98% specificity as a therapeutic tool. Sphincterotomy, balloon catheter, or Dormia basket stone retrieval procedures are successful in ERCP stone extraction 80%–90% of the time. [12,13] The most frequent post-ERCP consequence is pancreatitis. The symptoms of ERCP-induced pancreatitis include new or worsening stomach discomfort, higher-than-normal levels of serum amylase 24 hours after the surgery, and at least two days in the hospital. Although following ERCP there is a brief rise of pancreatic enzymes, such as serum amylase and serum lipase. [14] Papillary stenosis, cholangitis, and recurring choledocholithiasis are examples of long-term consequences. [15]

The way patients with gallstones are treated has been drastically changed as a result of the development of laparoscopic cholecystectomy. Around 80% of cholecystectomies are currently thought to be carried out laparoscopically. Laparoscopic cholecystectomy benefits include faster recovery from surgery, enhanced cosmetics, shorter hospital stays, quicker return to normal activity, and lower overall costs. The cornerstone and most widely used method for the therapy of concurrent gallbladder and CBD stones is laparoscopic cholecystectomy (LC) preceded by preoperative ERCP. [16] According to the research, when laparoscopic cholecystectomy is performed 6 to 8 weeks following endoscopic sphincterotomy (ES) for choledocholithiasis, the conversion rate for the procedure exceeds 20%. [3] Additionally, many patients who postpone cholecystectomy after ES for CBD stones experience recurrent biliary events that necessitate repeated endoscopic reintervention, emergency cholecystectomy, or both. These events not only have an obvious impact on a patient's health but also seem to be linked to more difficult surgery and a more complicated postoperative course. [17]

After endoscopic sphincterotomy, it is predicted that early planned laparoscopic cholecystectomy decreases recurring biliary problems and lowers operational morbidity and hospital stay. Our research is looking for benefits of early laparoscopic cholecystectomy over late laparoscopic cholecystectomy.

Material and Methods

From January 2022 through December 2022, the Department of General Surgery at the Indira Gandhi Institute of Medical Sciences, Patna, Bihar, conducted this prospective study. This study comprised all of the patients who underwent laparoscopic cholecystectomies following ERCP for CBD stones. Individuals with end-stage liver disease, coagulopathy, gallbladder cancer, common bile duct strictures, post-ERCP pancreatitis, associated comorbidities, and prior upper abdominal procedures were excluded from this study. Patients with cholelithiasis with CBD stones underwent standard four-port laparoscopic cholecystectomy after ERCP. According to the time since ERCP, patients were divided into two groups.

Within 3 days following ERCP, patients in Category I underwent an early laparoscopic cholecystectomy, whereas patients in Category II underwent a late laparoscopic cholecystectomy at 6 weeks. Prior to the trial, all baseline tests such as CBC, RFT, LFT, electrolytes, S. amylase, fasting blood sugar, blood grouping, coagulation profile, serology, etc. were completed. Many imaging tests, including CXR, USG, CT (if necessary), and MRCP, were performed (In

case USG is inconclusive). Operating time, conversion to open cholecystectomy, intraoperative bleeding needing transfusion, hospital stay, and postoperative complications such infection, CBD damage, and pancreatitis were all taken into consideration when comparing outcomes.

For the quantitative variables, the results are shown as mean±standard deviation, and for the qualitative factors, they are shown as percentages. To compare normally distributed variables between the two groups, the student t test was employed. Using the Chi-square test and Fischer's exact test, the proportions of patient characteristics, complication rates, and operational data of the two groups were compared. It was deemed statistically significant when the p value was less than 0.05. SPSS 16.0 version was used for all of the analysis (SPSS Inc, Chicago, IL, USA).

Results

In this study, 60 individuals who had choledocholithiasis with cholelithiasis-like symptoms were included. Of those, 22 underwent late laparoscopic cholecystectomy and 38 underwent early laparoscopic cholecystectomy after ERCP. A comparison analysis was done.

Ages of the patients ranged from 20 to 80. In this study, the maximum number of patients was in their fourth decade, with 31.58% in group 1 and 27.27% in group 2.

Table 1: Age Distribution

Age (Years)	Number of Patients (%)	
	Group I (n=38)	Group II (n=22)
≤30	6(15.79%)	2(9.09%)
31-40	12(31.58%)	6(27.27%)
41-50	6(15.79%)	2(9.09%)
51-60	10(26.32%)	8(36.36%)
>60	4(10.53%)	4(18.18%)
Mean Age ± SD	44.63±14.43	50 1.09±14.35
p-value	0.112	

The patients were split into two groups: group 1 had 14 male patients (36.84%) and 24 female patients (63.16%), whereas group 2 had 8 male patients (36.36%) and 14 female patients (63.64%). The p value for this data was 0.201, indicating that there was no bias based on the distribution in the previous sentence.

In group 1, the laparoscopic cholecystectomy procedure took an average of 48.68±15.44 minutes, but group 2 required an average of 69.18±11.46 minutes. The comparison's p value was determined to be 0.001.

Table 2: Group Comparison for Duration of Surgery

Duration of Surgery (Min.)	Mean ± Standard Deviation	
	Group I (n=38)	Group II (n=22)
	48.68 ± 15.44	69.18 ± 11.46
p-value	0.001	

Blood transfusion was not necessary in group 1, while group 2; 8 patients (or 36.36%) needed one. In group 1, there were no post-operative infections, CBD injuries, or pancreatitis; in contrast, group

2 had four post-operative infections and neither a CBD injury nor a pancreatitis. In both instances, the P value was <0.0001, which is very significant.

Table 3: Group Comparison for Blood Transfusion, Post-Operative Infection, CBD Injury and Post-Operative Pancreatitis

Variables	Number of patients (%)				p-Value
	Group I (n=38)		Group II (n=22)		
	No	Yes	No	Yes	
Blood transfusion	38 (100%)	0 (0.00)	14 (63.64%)	8 (36.36%)	<0.0001
Post-operative infection	38 (100%)	0 (0.00)	18 (81.82%)	4 (18.18%)	<0.0001
CBD injury	38 (100%)	0 (0.00)	22 (100%)	0 (0.00)	-
Post-operative pancreatitis	38 (100%)	0 (0.00)	22 (100%)	0 (0.00)	-

In cases of early laparoscopic cholecystectomy, the average hospital stay was 6.32±1.67 days, whereas in cases of late laparoscopic cholecystectomy, the average hospital stay was 10.27±3.13 days. The P value for this comparison was <0.0001.

Table 4: Group Comparison for Hospital Stay

Hospital Stay (Days)	Mean ± Standard Deviation	
	Group I (n=38)	Group II (n=22)
	6.32 ± 1.67	10.27 ± 3.13
p-Value	<0.0001	

Early laparoscopic cholecystectomy only resulted in the conversion of 2 patients (5.26%), whereas group 4 (36.36%) resulted in the conversion of 8 patients.

Table 5: Group Comparison for Conversion Rate

Conversion Rate	Number of Patients (%)	
	Group I (n=38)	Group II (n=22)
	2 (5.26%)	8 (36.36%)
p-Value	<0.0001	

Discussion

With the advent of laparoscopic cholecystectomy, intraoperative cholangiography, and laparoscopic CBD exploration during the 1990s, the management of biliary lithiasis has undergone a significant transformation. The cornerstone and most widely used technique for treating co-existing gallbladder and CBD stones in the current situation is laparoscopic cholecystectomy (LC) followed by ERCP. Laparoscopic cholecystectomy after ERCP time is still up for dispute, though. To compare the difficulties of surgery and related morbidities between laparoscopic cholecystectomy performed immediately after ERCP and laparoscopic cholecystectomy performed after 72 hours of ERCP, a number of factors have been assessed. In this study, we examined two groups: group I, which received laparoscopic cholecystectomy (LC), and group II, which included patients who underwent LC

following 72 hours of endoscopic retrograde cholangiopancreatography (ERCP). We contrasted the surgical time, operative time, conversion rate to open cholecystectomy, length of hospital stay, and post-operative problems between these groups. In our study, patients who underwent delayed cholecystectomy had mean operating times that were longer. This may be because of omental and bowel adhesions, scarring and fibrosis of the biliary tree, and Calot's triangle, which cause the surgeon to be extremely cautious when dissecting the junction between the cystic duct, common hepatic duct, and CBD.

Similar to our study, authors like Ghnnam et al.,[18] Elmeguid SAA et al.,[19] and Gorla et al.[20] compared surgery duration as the primary outcome in their studies. Previous research by Reinders JSK et al.,[21] Sahoo R et al.,[2], and Bostanci EB et al. [22] has demonstrated that LC after ERCP is more challenging than LC for uncomplicated cholelithiasis: the conversion rate was 8 to 55% in complicated cholelithiasis versus less than 5% in uncomplicated cholelithiasis.

In our investigation, longer LC times resulted in higher conversion rates. Only 2 patients (5.26%) in group I (LC within 72 hours of ERCP) were converted to open cholecystectomy, compared to 8 patients (36.36%) in group II (LC after 72 hours of ERCP), yielding a p value < 0.0001.

According to a theory, the thick adhesions and intraoperative haemorrhage in group II are the cause of the increased conversion rates. In our study, group I mean hospital stay was 6.32±1.67 days, whereas group II was 10.27±3.13 days. The p value for group comparisons was <0.0001, indicating a significant difference between group I and group II's hospital stays. Based on the higher incidence of drain insertion and post-operative problems like surgical site infection, the average hospital stay can be projected. During ERCP, the prevalence of bacteria grows over time, which causes biliary problems such acute pancreatitis, cholecystitis, cholangitis, and high rates of infections, all of which need patients to stay in the hospital for a longer period of time.

In our study, group I (early LC post ERCP) required no blood transfusions, whereas group II (late LC post ERCP) required 8 (36.36%), with a significant p value <0.0001. In group II, there were 4 wound infections (18.18%), but there were none in group I. However, neither a postoperative pancreatitis nor a CBD harm occurred.

Conclusion

A shorter interval is a surrogate measure for less intraoperative adhesions and other complications since it is linked to a lower conversion rate, less post-operative blood transfusions, and fewer wound infections with less operating time. A shorter period is also linked to a shorter hospital stay, which shows less strain on hospital resources and average costs. The longer the delay, the more intraoperative difficulties, the more hospital stays, the higher the mean cost, and the more strain on the healthcare system. Endoscopic retrograde cholangiopancreatography performed quickly followed by laparoscopic cholecystectomy is a safe and efficient way to treat cholelithiasis brought on by choledocholithiasis. The small sample size and short time span of this study, however, are its limitations. To verify the results of this study, a bigger sample size will need to be examined for a longer period of time.

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