



## Ideal Timing for Laparoscopic Cholecystectomy Post Ercp in Patients With Choledocholithiasis and Cholelithiasis

### KEYWORDS

Laparoscopic cholecystectomy; Endoscopic retrograde cholangiopancreatography; Choledocholithiasis

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### ABSTRACT

**Background:** Endoscopic retrograde cholangiopancreatography (ERCP) followed by laparoscopic cholecystectomy (LC) comprises the current treatment modality in patients with common bile duct (CBD) stones. The optimum interval between ERCP and LC is a topic of debate.

**Methods:** A total of 60 patients underwent LC following ERCP from September 2013 to September 2015. Of these, 20 patients underwent surgery within 72 hours of ERCP (early) and 20 patients between 72 hrs and 6 weeks, following ERCP and 20 Patients underwent LC after 6 weeks. A prospective observational study of various technical difficulties encountered (operative duration, adhesions, frozen Calot's, bile duct injuries, conversion rate and need for drain) was done and comparison was done.

**Results:** The incidence of adhesions, frozen Calot's, cystic duct injury, need for drain placement and the mean operative duration and postoperative stay were significantly higher in the group where surgery was done between 72 hrs and 6 weeks. The conversion rate is statistically significant in second group and the complications and conversion rate in the group where LC was done after 6 weeks was minimal.

**Conclusion:** Early and late LC in patients post ERCP has lesser chances of encountering complications and the risk of conversion to open technique as well as the need for increased hospital stay following surgery. Late LC that is more than 6 weeks following ERCP is preferred.

### Introduction:

Studies have shown that laparoscopic cholecystectomy (LC) following endoscopic retrograde cholangiopancreatography (ERCP) is more difficult than LC for uncomplicated cholelithiasis<sup>1,2</sup>. The usual indication for ERCP is biliary pancreatitis<sup>3</sup>, which causes inflammation in the pericholechal region leading to adhesions. The use of contrast in ERCP also elicits an inflammatory reaction around the common bile duct (CBD) and sphincterotomy leads to bacterial colonization causing inflammation and scarring of the hepatoduodenal ligament leading to adhesions and frozen Calot's<sup>2,4</sup>. This theory of bacterial colonization is supported by the finding that bacteria have been isolated from bile in 60% of patients who underwent ERCP with sphincterotomy<sup>4,5</sup>. A significantly higher conversion rate was encountered when LC was done 2 - 6 weeks after ES, as compared to 1 week after ERCP<sup>6</sup>. Reports of LC done within days following ERCP show conversion rates as low as those for patients with uncomplicated cholelithiasis<sup>6</sup>.

There are not many studies on the timing of LC following ERCP. This study is aimed at comparing the various technical difficulties encountered during LC following ERCP, in the early period and after an interval, to decide upon the optimal timing for the surgery.

### Methods

A prospective observational cohort study was conducted in a 1200 bedded tertiary care hospital having well equipped departments of General Surgery, Surgical Gastroenterology and Medical Gastroenterology. All the patients who underwent LC following ERCP from September 2013 to September 2015 were included. Patients were divided into three groups, those undergoing LC within 72 hours of ERCP (early), 72 hrs to 6 weeks and beyond 6 weeks. A detailed

proforma was developed to record information regarding patient's age, sex, date of admission, date of discharge, date of surgery, intraoperative findings and the various technical difficulties encountered.

Patients undergoing LC along with other laparoscopic intervention in the same setting, LC with CBD exploration, LC in gallbladder carcinoma and patients with cardiovascular or pulmonary disease, coagulopathy, end stage liver disease and patients who underwent previous upper abdominal surgeries were excluded.

All patients with symptomatic gallstones with suspected choledocholithiasis had been evaluated by ERCP by one of the three specialities and CBD was cleared of stones followed by stent placement routinely. LC was performed using standard four port technique. Duration of surgery was calculated from the time of insertion of the first trocar till closure of all the port sites. The various intraoperative difficulties encountered were tabulated and compared between the three groups.

### Statistical analysis

Performed using SPSS (Statistical Package For Social Sciences) software version 18. Parametric data have been measured as means and standard deviations. Nonparametric data are measured as frequencies and percentages. Continuous data have been analyzed using paired t test and non-continuous data by Fisher's exact test.

### Results

During the course of the study, a total of 60 patients were included who underwent LC following ERCP among which, 20 patients underwent LC within 72 hours of ERCP, 20 patients underwent the surgery between 72 hrs and 6 weeks

and 20 patients beyond 6 weeks.

Most patients were in the age group of 41 - 60 (44%). There was no increased rate of conversion or complications associated with age variation. The frequency of various complications studied was higher in the group where LC was performed between 72 hrs and 6 weeks.

Omental adhesions and bowel adhesions to the gallbladder wall were noted in 33% of the patients. In early group, 10% (2/20) of patients, 90% (18/20) in second group and observed to have the adhesions (P value: 0.027).

In 18 patients, there was difficulty in Calot's triangle dissection of which 14 belonged to the second group and 4 from the early group (P value: 0.024).

Wide and short cystic duct leading to difficult clipping has been observed in 22(36.6%) of the patients. Among them, 65% (13/20) were in the second group and 45% (9/20) were in the early group (P value: 0.003).

Accidental/inadvertent injury to the cystic duct or artery were seen in four (8%) instances, all in the second group (P value: 0.032).

A total of 26 (43%) patients needed placement of drain due to excessive dissection.

8 of the patients in early group needed the drain whereas 90% (18/20) of the patients in the second group needed a drain (P value: 0.001).

In the second group 80% patients needed conversion to open procedure.. There was 10% conversion rate in early group. There were no conversions in the late group (P value: 0.0189)

The mean operative time in the early group was 65 ± 31 min , in the second group was 106 ± 33 min (P value: 0.037) and in the late group 58± 24 min. The mean post-operative hospital stay in the early group was 2.5 ± 1.37 days , in the second group was 3.32 ± 1.39 days (P value: 0.043) and in the late group was 2.2±1.09 days.

Surgical site infection was noted in 2 cases in the second group reason may be secondary to bile contamination.

The patients where ERCP is considered after 6 weeks such patients are put on 3 days course of antibiotics prior to discharge.

In all the cases which were converted into open procedure intraoperative cholangiogram was done to confirm the clearance of the stones.

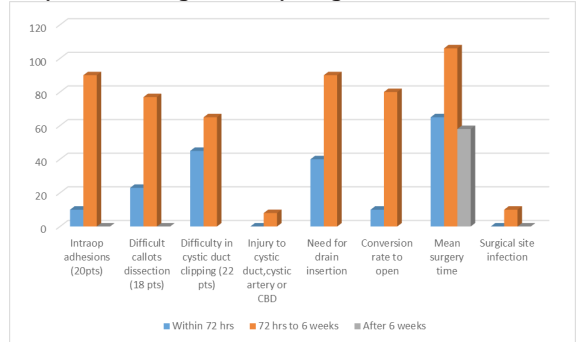
There were no mortalities or CBD injuries in any group.

**Table No 1: Showing different variables and comparison depending on the time of the surgery**

Sl no	variables	Within 72 hrs	72 hrs to 6 weeks	After 6 weeks
1	Intraop adhesions (20pts)	10%	90%	Nil
2	Difficult callots dissection (18 pts)	23%	77%	Nil
3	Difficulty in cystic duct clipping (22 pts)	45%	65%	Nil

4	Injury to cystic duct,cystic artery or CBD	Nil	8%	Nil
5	Need for drain insertion	40%	90%	Nil
6	Conversion rate to open	10%	80%	Nil
7	Mean surgery time	65 ± 31 min	106 ± 33 min	58± 24 min
8	Surgical site infection	Nil	10%	Nil

**Graph 1: Bar diagram comparing different variables.**



**Discussion**

In 1968, McCune, a surgeon, reported the endoscopic technique of visualizing of the common bile and pancreatic duct. With the introduction of endoscopic sphincterotomy in 1974, therapeutic pancreaticobiliary endoscopy subsequently was developed<sup>7</sup>.

In our hospital, ERCP with endoscopic sphincterotomy (ES) and stent placement followed by LC is routinely performed whenever choledocholithiasis is suspected. This is supported by the evidence from a randomized control trial conducted by Boerma et al<sup>2</sup> which states a wait and watch policy is not recommended after sphincterotomy in choledocholithiasis. In their study, 47% of patients, managed conservatively, developed at least one recurrent biliary complication and 37% needed cholecystectomy at a later date.

In studies by Lau et al <sup>8</sup> and Costi et al <sup>9</sup>, ERCP followed by LC was advocated for choledocholithiasis because of greater long-term morbidity and mortality in the ERCP alone group. .

Anandi et al <sup>10</sup>, in their study concluded that cholecystectomy within 1 week after ES may prevent recurrent biliary complications in the majority of cases and reduce the post-operative hospital stay. Akaraviputh et al<sup>11</sup>, in their study proved that same day approach for choledocholithiasis using endoscopic stone removal followed by LC is preferable. Zang et al <sup>12</sup> recommended that early LC after endoscopic CBD stone extraction in developing countries is feasible and safe and also reduces the total hospital cost effectively.

In our study, the chance of encountering adhesions was noted to significantly increase with age (P value 0.021). Increasing age is associated with an increased probability of multiple attacks of cholecystitis and thereby increased incidence of fibrosis and adhesions in the Calot's triangle. Randhawa et al <sup>13</sup> found that age more than 50 years is associated with the same difficulties. The risk of facing a frozen Calot's is also more as the interval between ERCP and LC increases (P value 0.024).

In the present study, the mean operative time in the early group was  $65 \pm 31$  min, in the second group was  $106 \pm 33$  min and in the late group was  $58 \pm 24$  min. The mean operative time in the early group and late group is shorter than that of the second group and this was similar with the results of the study done by Csendes et al<sup>5</sup>. The operating time was longer in patients who underwent cholecystectomy (P value 0.037) between 72 hrs and 6 weeks, possibly due to scarring and fibrosis of the biliary tree and Calot's triangle which make the surgeon very cautious during dissection of the junction between cystic duct, common hepatic duct and CBD.

Our study shows, a higher conversion rate was encountered when LC was performed between 72 hrs and 6 weeks following ERCP.

### Conclusion

Our study concludes that the ideal time to perform LC after ERCP is after 6 weeks and even within 72 hrs of ERCP can be considered in selected cases. The longer the interval between ERCP and LC, the lesser are the chances of encountering complications and increased need for conversion as well as prolonged operating time according to our observations.

Though LC following ERCP is the gold standard for choledocholithiasis in the current general surgical practice, the operating surgeon should always be aware of the various technical difficulties encountered. Knowledge of these challenges will enable the surgeon in providing a safer and more favorable outcome in cholecystectomy.

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