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Original Research Article

Analysis of laparoscopic cholecystectomy after endoscopic retrograde cholangiopancreatography for choledocholithiasis-a prospective study

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ABSTRACT

Background: Endoscopic retrograde cholangiopancreatography (ERCP) followed by laparoscopic cholecystectomy (LC) remains the cornerstone of treatment worldwide for coexisting CBD and gall bladder calculi. The interval between ERCP and LC is disputed. In our study, LC is performed at or more than 6 weeks after ERCP keeping in view by allowing the gall bladder to recover from the acute inflammatory changes if operated upon earlier.
Methods: We conducted a prospective observational study in the postgraduate department of general surgery government medical college Srinagar J and K India over a period of 2 years. The 25 patients above age of 18 years and with cholecysto-choledocholithiasis who underwent ERCP and LC at or more than 6 weeks were included.
Results: In our study the mean age was 45.3 years. Male: female ratio was 1:3.2. the distribution of patients as per Nassar grading scale 1 (4%) patient had grade I,12 (48%) patients had grade II, 5 (20%) patients had grade III and 7 (28%) patients had grade IV. In patients with grade I, the mean duration of surgery was 36.0 minutes, in grade II the duration of surgery ranged from 34-60 minutes with mean duration of surgery of 43.4 min (SD±8.9), in grade III duration of surgery ranged from 42-68 minutes with mean duration of surgery of 55.2 min (SD±10.06) and in grade IV duration of surgery ranged from 68-116 minutes with mean duration of surgery of 91.3 min (SD±17.66). We observed a definite relationship between the intraoperative Nassar grading scale and the post ERCP interval, 1 patient of grade I scale operated at 12 weeks post ERCP. 12 patients were between the post ERCP interval of 8-12 weeks (mean 10.1 weeks) and they had grade II. In grade III we had 5 patients with post ERCP interval of 7-11 weeks (mean 9.2 weeks). In grade IV we had 7 patients with post ERCP interval of 6-10 weeks (mean 7.9 weeks). p=0.008.
Conclusions: Interval LC after ERCP is safe but challenging, longer the interval time between ERCP and LC lesser the chances of encountering intra-operative complications. We recommend LC more than 6 weeks after ERCP is safe.

Keywords: LC, ERCP, Time interval

INTRODUCTION

Cholelithiasis is the most common biliary pathology. The incidence of gallstone disease varies throughout the world. In India gallstone disease is relatively common with overall prevalence in the order of 10-20% and predominantly a female disease.[1-3]Approximately 4-15% of patients with gall stones have common bile duct stones (cholecystocholedocholithiasis).[4] Many treatment modalities are currently available for cholecystocholedocholithiasis such as ERCP + LC, laparoscopic common bile duct exploration and open common bile duct exploration.[5] Among these treatment modalities ERCP + LC has fewer complications and is minimally invasive.[6] Several studies have shown that approximately 4-24% of patients who do not undergo cholecystectomy after ERCP will develop biliary complications.[7-9] Thus LC after ERCP is necessary to treat cholecystocholedocholithiasis, even without symptoms of cholecystitis.[10,11] The European association for the study of the liver also recommends preoperative ERCP + LC for cholecystocholedocholithiasis.[12]

Hence, ERCP followed by LC remains the cornerstone of treatment worldwide for coexisting CBD and gall bladder calculi.[13] The interval between ERCP and LC is disputed. In our study, LC is performed at or more than 6 weeks after ERCP keeping in view the likely difficulties to be faced due to oedema and adhesion if operated upon earlier. However, some studies claim that there is benefit to be sought by allowing the gall bladder to recover from the acute inflammatory changes.[14,15] We planned to conduct our study at 6 weeks post ERCP keeping in view the likely difficulties to be faced due to oedema and adhesion if operated upon earlier.

This study was conducted to analyze the effects of interval between ERCP and surgery, duration of LC, intraoperative findings, and postoperative complications.

METHODS

We conducted a prospective observational study in the postgraduate department of general surgery government medical college Srinagar J and K India over a period of 2 years from Nov 2019 to Nov 2021.This study included 25 patients after fulfilling inclusion and exclusion criteria. Ethical clearance was obtained from institution ethical committee

All patients above age of 18 years and with cholecystocholedocholithiasis who underwent ERCP followed by LC at or more than 6 weeks were included. Patients with previous hepatobiliary surgery open/laparoscopic, malignancy of any organ, coagulopathy, pregnancy and unfit for general anaesthesia were excluded. The patients were taken for LC after proper clinical evaluation. Apart from the baseline investigations, latest abdominal ultrasound was done preoperatively to rule out any residual CBD calculus and status of biliary system. The following pre-operative parameters were considered in the study age, gender, the following intraoperative parameters were assessed; operative time, adhesions, calots triangle anatomy, conversion to open procedure and complications. Post procedure course included all complications were documented. The severity of adhesions was graded by use of Nassar grading scale (grades 1-4). The scale is as follows: grade 1: Gallbladder-floppy, non-adherent cystic pedicle-thin and clear Adhesions-Simple up to the neck/hartmann's pouch grade 2: Gallbladder-mucocele, packed with stones cystic pedicle-Fat laden adhesions-simple up to the body grade 3: gallbladder-deep fossa, acute cholecystitis, contracted, fibrosis, hartmans adherent to CBD, impaction cystic pedicle.

Abnormal anatomy or cystic duct-short, dilated or obscured adhesions-dense up to fundus, involving hepatic flexure or duodenum grade 4: gallbladder-completely obscured, empyema, gangrene. Cystic pedicle-impossible to clarify adhesions-dense, fibrosis, wrapping the gallbladder, Duodenum or hepatic flexure difficult to separate. The patients were followed up for 1 month during the period of study Follow up at 7th day, 10th day and at 1 month.

Data analysis

Statistical analysis of the data was carried out with the help of SSPS software version SPSS 20.0. P<0.05 was considered significant.

RESULTS

In our study the mean age was 45.3 years, the age group of the patients in this study ranged from 20-65 years. The highest incidence was seen in the age group of 50-64 years shown in Table 1.

Table 1: Age distribution of study patients.

Age (Years)	Number	Percentage (%)
20-34	6	24
35-49	8	32
50-64	9	36
≥ 65	2	8
Total	25	100
Mean ± SD (Range)=45.3±12.74 (20-65)		

Nine were females and 6 were males. Male female ratio was 1:3.2 shown in Table 2.

Table 2: Gender distribution of study patients.

Gender	Number	Percentage (%)
Male	6	24
Female	19	76
Total	25	100
Male: female=1:3.2		

The 20% patients had interval complications, 2 patients had biliary colic and 3 had acute cholecystitis (Table 3).

Table 3: Preoperative complications of study patients.

Past history	Number	Percentage (%)
Biliary colic	2	8
Cholecystitis	3	12
No complication	20	80
Total	25	100

As per the intra-operative Nassar grading scale, the distribution of patients were as under in Table 1. One (4%) patient had grade I, 12 (48%) patients had grade II, 5 (20%) patients had grade III and 7 (28%) patients had grade IV. In patients with grade I, the mean duration of surgery was 36.0 minutes, in grade II the duration of surgery ranged from 34-60 minutes with mean duration of surgery of 43.4 min (SD±8.9), in grade III duration of surgery ranged from 42-68 minutes with mean duration

of surgery of 55.2 min (SD±10.06) and in grade IV duration of surgery ranged from 68-116 minutes with mean duration of surgery of 91.3 min (SD±17.66). P<0.001 (Table 4).

Table 4: Operative time (minutes) as per Nassar grading scale.

Nassar grading scale	N	Mean time (min)	SD	Range (min)	P value
Grade I	1	36.0	0.00	-	<0.001*
Grade II	12	43.4	8.91	34-60	
Grade III	5	55.2	10.06	42-68	
Grade IV	7	91.3	17.66	68-116	

*Statistically significant difference (P<0.05); p by ANOVA.

In our study we observed a definite relationship between the intraoperative Nassar grading scale and the post ERCP interval (Table 2). We found 1 patient of grade I scale operated at 12 weeks post ERCP. 12 patients were between the post ERCP interval of 8-12 weeks (mean 10.1 weeks) and they had grade II. In grade III we had 5 patients with post ERCP interval of 7-11 weeks (mean 9.2 weeks). In grade IV we had 7 patients with post ERCP interval of 6-10 weeks (mean 7.9 weeks). P=0.008, shown in Table 5.

Table 5: Comparing post ERCP interval and Nassar grading scale.

Nassar grading scale	N	Mean (weeks)	SD	P value
Grade I	1	12.0	0.00	0.008*
Grade II	12	10.1	1.51	
Grade III	5	9.2	1.64	
Grade IV	7	7.9	1.55	

*Statistically significant difference (P<0.05); p value by ANOVA

Conversion to open procedure was in 1 (4%) patient out of 25 patients due to dense adhesions shown in Table 6.

Table 6: Conversion to open.

Conversion to open	Number	Percentage (%)
Yes	1	4
No	24	96
Total	25	100

DISCUSSION

LC has become the gold standard treatment for gallstone disease.[1] The European association for the study of the liver recommends preoperative ERCP+LC for cholecystocholedocholithiasis.[12] In our study the mean age was 45.3 years, the age group of the patients in this study ranged from 20-65 years. The highest incidence was seen in the age group of 50-64 years. This was in accordance with the study by Idris where the mean age was 45.9 years range 27-80 years.[16] Our study included 25 patients, out of which 6 were males and 19 were females. Females dominated in this study and M:F was 1:3.2. Unisa et al in their study found that male to female ratio 1.9:5.[3] In our study we observed that some patients develop certain complications between the time interval of ERCP and LC (interval complications). 5 (8%) of our patients developed interval complications like biliary colic in 2 (8%) patients and acute cholecystitis in 3(12%) patients, rest of the patients didn't develop any complications during this interval. Mann et al had also observed similar interval complications in his study conducted on 43 patients.[13] Of these there were 6 readmissions (14%) before LC. Four patients were admitted for pain control and 2 for acute cholecystitis. In this study it was also observed that 1 (4%) patient had grade I, 12(48%) patients had grade II, 5 (20%) patients had grade III and 7 (28%) patients had grade IV intra-operative Nassar grading scale. This had a direct relationship with the operative time as is evident from the following figures. The mean duration of surgery was 36 minutes for grade I, the duration of surgery ranged from 34-60 minutes with mean duration of 43.4 minutes (SD±8.91) for grade II. In grade III duration ranged from 42-68 minutes with mean duration of 55.2 minutes (SD 10.06) and for grade IV patients the duration of surgery ranged from 68-116 minutes with mean duration of 91.3 minutes (SD±17.66). The relationship of the intra-operative Nassar grade scale to the duration of surgery was statistically significant with p<0.001. As intra-operative Nassar grade increases the operative time increases as well. We have interpreted significantly longer operating times as a surrogate marker of operative difficulty. Mann et al conducted a study including 43 patients.[13] LC was performed approximately 6 weeks after ERCP. The grade of adhesion was grade I in 9 (21%) patients, grade II in 11 (26%) patients, grade III in 8 (19%) and grade IV in 15 (35%). The median operative time was 110 minutes (p=0.013). In our study the patients who underwent LC after 12 weeks of ERCP, the intraoperative Nassar grade was I. At 8-12 weeks (mean 10.1 weeks) grade was II. At 7-11 weeks (mean 9.2 weeks) grade was III and at 6-10 weeks (mean 7.9 weeks) grade was IV. The relationship between post ERCP timing and intra-operative Nassar grading scale was statistically significant (P=0.008), thereby suggesting that longer the interval between the ERCP and LC, lower the grade and thereby lesser time of surgery. Indirectly we can also draw the inference that lower the grading lesser the time of surgery and there is less possibility of surgical complications. We found that the time interval between ERCP and LC impacted the duration of surgery. The explanation for the longer operative time in higher grade may be inflammation and fibrosis because endoscopic sphincterotomy, contrast agents and stent induce inflammation which causes adhesions in calots triangle and between the duodenum and common bile duct as well as the gall bladder. Reinders et al conducted study on 93

patients who had undergone a ERCP 6 weeks before LC.[17] The operative time ranged from (25-120) minutes with mean operative time 60 minutes. The conversion rate in our study was 4%, however keeping in view the lesser number of patients in our study the conversion rate actually may differ. Gorla et al reported 9.1% patients needed conversion to open procedure.[18]

CONCLUSION

The interval Laparoscopic cholecystectomy after ERCP is safe but challenging, longer the interval time between ERCP and LC lesser the chances of encountering intra-operative complications. We recommend LC more than 6 weeks after ERCP is safe. Also, further independent research should be undertaken to validate our findings.

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