



DOES EARLY LAPAROSCOPIC CHOLECYSTECTOMY AFTER ERCP OFFERS SIGNIFICANT BENEFIT IN SURGICAL OUTCOME? A COMPARATIVE STUDY BETWEEN EARLY AND LATE GROUPS

General Surgery

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ABSTRACT

Introduction:-

Endoscopic retrograde cholangiopancreatography (ERCP) prior to Laparoscopic Cholecystectomy(LC) is most commonly practiced strategy worldwide for management of co-existing cholelithiasis with choledocholithiasis. The time interval between Endoscopic Retrograde Cholangiopancreatography (ERCP) and Laparoscopic cholecystectomy (LC) is questionable and varies from 1 day to 6 weeks in different studies. **Aims and objectives:-** To compare two groups of patients managed with laparoscopic cholecystectomy (after ERCP), EARLY(24 to 72 hours), and LATE(> 6weeks) in terms of mean operative time in minutes, intraoperative difficulties, conversion rates to open cholecystectomy, conversion rates to open cholecystectomy, drain insertion required or not, postoperative complications, and duration of hospital stay. **Materials and methods:-** A prospective randomized comparative study was conducted on 70 patients who presented with concomitant cholelithiasis with choledocholithiasis over a period of January 2019 to June 2020 at the Department of General Surgery, Mahatma Gandhi Medical College & Hospital, Jaipur. After ERCP and stone retrieval patients were randomised into 2 groups using sealed envelope method. Group A underwent early laparoscopic cholecystectomy (24 to 72hours) and Group B underwent late laparoscopic cholecystectomy (after 6 weeks). Data collected, statistical analysis done, results and observations concluded. **Result:-** We found that mean operative time, intraoperative difficulties, post operative complications and mean hospital stay in days were significantly higher in Group B as compared to Group A. Though the conversion rates to open procedure and requirement of drain insertion were comparatively higher in Group B but were found to be statistically non significant. **Conclusion:-** We hereby conclude that early laparoscopic cholecystectomy (24 to 72 hours) after Endoscopic Retrograde Cholangiopancreatography (ERCP) is better as compared to late laparoscopic cholecystectomy (>6 weeks) after ERCP in patients of cholelithiasis with coexisting choledocholithiasis. So, we recommend performing early Laparoscopic Cholecystectomy (24-72hours) after Endoscopic Retrograde Cholangiopancreatography (ERCP).

KEYWORDS

Cholelithiasis, Choledocholithiasis, Endoscopic retrograde cholangiopancreatography, Laparoscopic Cholecystectomy.

INTRODUCTION

Prevalence of choledocholithiasis in patients with symptomatic cholelithiasis lies between 10 and 20%.[1-5] Nearly 55% of patients with common bile duct stones have symptoms and half of them have complications.[6] Currently, preoperative ERCP followed by laparoscopic cholecystectomy (LC) is the most preferred approach for patients having choledocholithiasis along with cholelithiasis.[7,8]

The time interval between ERCP and LC is questionable and varies from 1 day to 6 weeks in different studies, also depending upon the surgeon's availability and choice.[9-12] It is thought that during ERCP bile duct cannulation, contrast agent infusion, sphincterotomy or other minimally invasive procedures can trigger inflammation. Studies show that the long-term effect of these inflammatory changes may affect the overall outcome of Laparoscopic cholecystectomy in terms of intraoperative difficulties and postoperative complications. But, whether early LC offers a significant benefit in operation outcome is still unclear.

The present study is intended to compare two groups of patients managed with laparoscopic cholecystectomy (post ERCP), EARLY (24 to 72 hours), and LATE(> 6weeks) in terms of mean operative time in minutes, intraoperative difficulties, conversion rates to open cholecystectomy, conversion rates to open cholecystectomy, drain insertion required or not, postoperative complications, and duration of hospital stay.

MATERIALS AND METHODS

A prospective randomized comparative study was conducted on 70 patients who presented with concomitant cholelithiasis with choledocholithiasis over a period of January 2019 to June 2020 at the Department of General Surgery, Mahatma Gandhi Medical College & Hospital, Jaipur. *Institute Ethics Committee approval was obtained before the start of the study. Written and informed consent was obtained from all participants before enrolment into the study.* Patients with history of

failed ERCP, previous abdominal surgery, cholangitis, pancreatitis, peritonitis, cholecystitis were excluded from the study.

All ERCPs were performed by Gastroenterology Department, Mahatma Gandhi Medical College, Jaipur. Cholangiography was done using the standard 76% Urografin as a contrast agent. Endoscopic sphincterotomy (ES) of the bile duct was performed before removing bile duct stones or placing a biliary stent. Stone retrieval by basket was preferred over a balloon if larger stones (>10mm), intrahepatic stones, smaller stones in a dilated duct, and stones that are larger than the downstream duct present. A double pigtail 7F * 10cm stent was placed. Radiological images were taken using C-arm X-ray device. The inability to cannulate the CBD was considered to be a failed procedure; failed ERCP procedures were not included in the present study.

Patients were then divided into two groups using sealed envelope method for randomisation.

Group A : Early laparoscopic cholecystectomy(24 to 72hrs) was performed

Group B : Late laparoscopic cholecystectomy(>6weeks) was performed

Conventional Laparoscopic cholecystectomy was the proposed surgical procedure under general anaesthesia. All cases were operated on in a single surgical unit by the same surgical team although the operating surgeon was blinded towards the patient's randomization. Data collected, statistical analysis done, results and observations concluded.

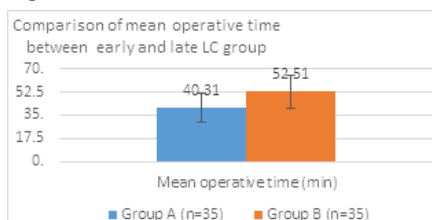
OBSERVATION AND RESULTS

A total 70 patients were included in the study. Out of 35 patients included in early LC group, total no. of female patients were 26 (74.3%) and male patients were 9 (25.7%) while in late LC group, total

no. of female patients were 22 (62.9%) and male patients were 13 (37.1%). Both the groups were comparable in term of gender distribution.

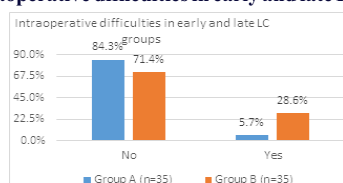
The mean operative time in early LC group (Group A) patients was 40.31 ± 10.84 minutes which was significantly lesser as compared to late LC group (Group B) patients in which mean operative time was 52.51 ± 12.91 minutes. (p value <0.01).

Figure 1: Comparison of mean operative time between early and late LC group



Out of 35 subjects, intraoperative difficulties were seen in 2 (5.7%) patients in early LC group, these included difficulty in dissecting Calot's triangle due to flimsy adhesions and edema, and GB bed bleed; while intraoperative difficulties seen in 10 (28.6%) patients of late LC group, which were due to dense fibrous adhesions, difficulty in delineating anatomy of Calot's triangle causing difficulty in dissecting it, biliary spillage and GB bed bleed. This difference was found statistically significant (p value = 0.02).

Figure 2: Intraoperative difficulties in early and late LC groups

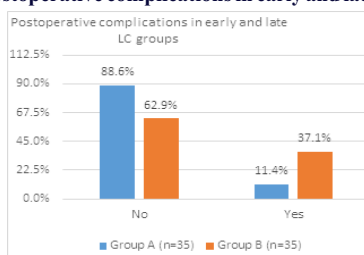


In group A no (0%) patient needed conversion of Laparoscopic Cholecystectomy into Open cholecystectomy (OC) compared to group B where 4 (11.4%) patients out of 35 needed conversion of laparoscopic procedure to open, mostly due to dense peritoneal adhesions causing difficulty in delineating anatomy of Calot's triangle causing threat of excessive bleeding and biliary spillage, latter being cause of conversion in 2 cases. Though the conversion rate is high in late LC group, difference was not found statistically significant while comparing both the groups.

Out of 35 patients in early LC group 2 (5.7%) required drain insertion, while drain insertion was required in 7 (20%) patients in late LC group. This difference was statistically not significant.

In early LC group, out of 35 only 4 (11.4%) patients developed prolonged ileus as complication in postoperative period compared to 13 (37.1%) patients out of 35 patients who developed complications in late LC group, most common complication being prolonged ileus found in 6 patients, significant drain output in 4, wound infection in 1 and SAIO in 1. One patient in group 2 had both prolonged ileus as well as significant drain output. The difference in both the groups was found statistically significant (p value = 0.01).

Figure 5: Postoperative complications in early and late LC groups



The mean hospital stay (in days) in early LC group (Group A) patients was 1.91 ± 0.81 which was significantly lesser compare to late LC group (Group B) patients in which mean hospital stay was 2.60 ± 1.12 days. (p value <0.01). [Table 6, Figure 6]

Table 7: An overall comparison between both groups

	Group A (n=35)	Group B (n=35)	P value	Level of significance
Mean operative time (min)	40.31±10.84	52.51±12.91	<0.01	S
Intraoperative difficulties (%)	2 (5.7%)	10 (28.6%)	0.02	S
Converted to Open Cholecystectomy (%)	0 (0%)	4 (11.4%)	0.11	NS
Requirement of drain insertion (%)	2 (5.7%)	7 (20%)	0.15	NS
Postoperative complications (%)	4 (11.4%)	13 (37.1%)	0.01	S
Mean hospital stay (days)	1.91±0.81	2.60±1.12	<0.01	S

DISCUSSION

In present study, mean operative time in early LC group patients was 40.31 ± 10.84 minutes which was significantly lesser compare to late LC group (Group B) patients in which mean operative time was 52.51 ± 12.91 minutes. (p value <0.01). In study by Ghnnam WM et al [15], the mean operative time in early LC group was 53.6 ± 32.18 minutes and in late LC group was 79.8 ± 26.3 minutes which is similar to our study. Finding of our study was similar with the results of the study done by Csendes A et al [16], The operating time was longer in Group II patients who underwent delayed cholecystectomy, mostly due to scarring and fibrosis of the biliary tree and Calot's triangle which make us very cautious during its dissection due to threat of excess bleeding and biliary spillage. In study by Salman B et al [14], mean operation time in early cholecystectomy group was 38.3 ± 7.8 minutes while in late cholecystectomy group, mean operative time was 68.4 ± 5.96 minutes. In study by Ibrahim ZH et al [17], mean operative time in group 1 was 45 min (range from 35 to 98 min) versus 75 min (range from 50 to 150 min) in group 2. These all studies supported our findings.

Out of 35 subjects, intra-operative difficulties were seen in 2 (5.7%) patients in early LC group while intraoperative difficulties seen in 10 (28.6%) patients of late LC group. This difference was found statistically significant (p value = 0.02).

Gall bladder bed bleeding was seen in 1 (2.9%) patients during early laparoscopic cholecystectomy and in 5 (14.3%) patients in late laparoscopic cholecystectomy group. In early LC group, adhesions in Calot's triangle was found in 2 (5.7%) patients compared to group B where 7 (20.0%) patients were having adhesion. Other intra-operative difficulties seen in late LC group were bile leakage (n=2; 5.7%) and Difficulty in dissecting Calot's triangle which was seen in only 1 patient in both groups.

In study by Ibrahim ZH et al [17], five (13.9%) LC were converted to open cholecystectomy in late LC group. These patients were converted to open cholecystectomy because of extensive adhesions of the Calot's triangle and pericholecystic adhesions interfered with identification of the anatomy and for control of bleeding in one patient. Intra operative bleeding occurred in two patients in late LC group due to injury to cystic artery; one of them was controlled laparoscopically and the other was converted to open cholecystectomy.

El Nakeeb A et al [13] reported in intraoperative difficulties in 11 (10%) cases out of which 6 were due to unclear anatomy, 3 patients with marked adhesion, and 2 patients with uncontrolled bleeding. No significant difference between both groups was observed in term of intraoperative complications including CBD injury or bleeding. Salman B et al [14] also reported the dense adhesions in Calot's triangle in late group which lead to conversion in to open procedure.

Abdominal drain was required in those cases who had excess bleeding or biliary spillage intraoperatively in an attempt to clear dense peritoneal adhesions to delineate anatomy. Out of 35 patients in group A, only 2 (5.7%) patient required drain insertion while it was needed in 7 (20.0%) patients in group B. Though more no. of patients required drain insertion in late LC group but the difference was statistically not significant. In study by Ghnnam WM et al [15], drain was inserted in 21.95% cases in early LC group compare to 48.8% cases in late LC group. In study by El Nakeeb A et al [13], Ultrasound guided tubal

drainage was needed in 3 cases in both group. Finding of our study were also in concordance to study by Ibrahim ZH et al [17] in which Drain used only in 15 patients, 4 patients in early LC group and 11 in late LC group.

In early LC group no (0%) patient required conversion of Laparoscopic Cholecystectomy (LC) into Open cholecystectomy (OC) compared to late LC group where 4 (11.4%) patients out of 35 needed conversion of laparoscopic procedure in to open. Though the conversion rate is high in late LC group, the difference was not found to be statistically significant while comparing the both the groups.

Study by Ghnnam WM et al [15] reported higher conversion rate when LC was performed beyond 3 days following ERCP. In their study, there were no conversions in early LC group and two patients needed conversion to open cholecystectomy in late LC group. Studies on LC performed within days after ERCP show conversion rates as low as those for patients with uncomplicated cholelithiasis. Our study is also similar to the study by Bostanci EB et al [18] who found significant reduction in the conversion rate that was mostly attributed to inflammatory adhesions. In study by Salman B et al [3], 1 (2.5%) patient needed conversion of Laparoscopic Cholecystectomy into Open cholecystectomy (OC) in early LC compared to late LC group where 7 (17.5%) patients needed to convert the laparoscopic procedure in to the open cholecystectomy. In study by Ibrahim ZH et al [17], conversion rate was 0% in the early LC group versus 13.9% in late LC group. In study by El Nakeeb A et al [1], the conversion rate after ERCP from LC to open occurred in 11 (10%) cases due to unclear anatomy (6 patients), marked adhesion (3 patients), and uncontrolled bleeding (2 patients). The conversion rate was insignificantly higher in delayed LC than in early LC (10.9% vs. 9.1%, $P=0.75$).

Out of 35 only 4 (11.4%) patients developed complications in postoperative period in early LC group compared to 13 (37.1%) patients out of 35 patients who developed complications in late LC group. Rate of complication was found more in Group B as time taken for the surgery was significantly more and complications associated with the open procedure was added as both the patients who underwent open procedure developed wound infection. In study by Salman B et al [3], 2.5% patients reported complications in postoperative period in early LC group while postoperative complications rate was 10% in late LC group. Another study by Ibrahim ZH et al [17] reported, postoperative complication rate as 4% in early LC group versus 19.35% in late LC group.

Prolonged ileus was the most common complication in both the group, seen in all the 4 patients of group A with complications and 6 patients in Group B. Other complications seen in late LC were Significant drain output ($n=4$) SAIO ($n=1$), Wound site infection ($n=1$), Prolonged ileus with Significant drain output ($n=1$) while Salman B et al [3] and Ibrahim ZH et al [17] showed wound infection was the major complication in postoperative period because they had higher conversion rate in to open procedure in the late group

In our study, mean postoperative hospital stay (in days) in early LC group (Group A) patients was 1.91 ± 0.81 which was significantly lesser compare to late LC group (Group B) patients in which mean hospital stay was 2.60 ± 1.12 days. (p value <0.01). The subjects in the late LC group have significantly longer hospital stay than patients in the early group, which might be due to more postoperative complications in the late cholecystectomy group. Finding of our study were in concordance with Salman B et al [3], in which mean postoperative hospital stay (in early LC group patients was 1.96 ± 0.81 days while in late LC group patients mean hospital stay was 3.64 ± 2.33 days which was also significantly higher than 1st group. In contrast to our study, El Nakeeb A et al [1] reported median postoperative stay 1 day in both the groups with no statistical difference. Another study by Ibrahim ZH et al [17] also reported lesser Postop hospital stay in early LC group [42.9 (28-54) hrs] compare to late LC group [65.5 (29-95) hrs]. In study by Ghnnam WM et al [15], the mean length of postoperative hospital stay in early LC group was (4.1 ± 2.3 days) significantly lower than that of late LC group (6.1 ± 5.1 days) which is also in concordance to our study.

CONCLUSION:-

Based on the results achieved in the present study early laparoscopic cholecystectomy (24-72 hours) after ERCP in the patients of cholelithiasis with coexisting choledocholithiasis was found to be safe.

The 72 hours time point was selected because of the start of the subacute phase of inflammation beyond this point, which causes edema and flimsy adhesions around Calot's triangle and will make the laparoscopic procedure more difficult with high risk of slippage of ligature clips over edematous tissue of cystic duct or cystic artery causing biliary spillage or uncontrolled bleeding respectively. Keeping this risk in mind some surgeons preferred interval cholecystectomy after a period of 6 weeks considering it to be enough time for the Gall bladder bed and adjacent areas to cool off. But, the long term effects of inflammation like scarring, fibrosis, dense adhesions in Calot's triangle and pericholecystic adhesions place a constant threat of excess bleeding and biliary spillage at time of laparoscopic dissection, ultimately affecting mean operative time, more intraoperative difficulty, increased conversion rate to open procedure, drain requirement in more number of cases and more postoperative complications increasing overall hospital stay in late LC group.

Therefore, we hereby conclude that early laparoscopic cholecystectomy (24 to 72 hours) after Endoscopic Retrograde Cholangiopancreatography (ERCP) is better as compared to late laparoscopic cholecystectomy (>6 weeks) after ERCP in patients of cholelithiasis with coexisting choledocholithiasis.

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