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TIMING OF EARLY LAPAROSCOPIC CHOLECYSTECTOMY AFTER ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY

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ABSTRACT

Background: The common bile duct stone is highly incident in our community. The timing of laparoscopic cholecystectomy after endoscopic retrograde cholangiopancreatography is essential in management of these stones. **Aim of study:** To evaluate the timing of Laparoscopic cholecystectomy after endoscopic sphincterotomy (post ERCP) and its outcomes. **Patients and methods:** A clinical prospective comparative study carried out in Surgical Department of Al Jamhory Teaching Hospital in Mosul during the period from 15th of December 2020 to 1st of March 2023 on sample of 50 patients with Common Bile duct stone divided into two groups; groupI (25) patients who underwent laparoscopic cholecystectomy within 72 hours of ERCP(early), while (25) patients with laparoscopic cholecystectomy beyond 3 days (1-6 weeks) of ERCP were included in group II (delayed). **Results:** Mean operation time for group I patients was significantly shorterthan mean operation time for group II patients (p=0.02). Mean hospital stayduration for group I patients was significantly shorter than mean hospital stay duration for group II patients (p<0.001). There was a significantassociation between the two groups regarding wider cystic duct, and intraoperative adhesions, both findings were found more in group II. **Conclusions:** Earlier laparoscopic cholecystectomy after endoscopic retrograde cholangiopancreatography has better intraoperative and postoperative outcomes than delayed laparoscopic cholecystectomy.

KEYWORDS: Cholecystocholedocholithiasis, Endoscopic retrograde cholangiopancreatography, Laparoscopic cholecystectomy, Time Interval.

INTRODUCTION

Choledocholithiasis, the presence of stone in the common bile duct (CBD) is classified by its origin to primary common duct stones which form in thecommon bile duct and secondary common duct stones which go from the gallbladder down into the common bile duct.[1] CBD stones have a peak incidence in middle age group with female predominance. They may be large or small, multiple or single, and are present in 6% - 12% of patients with gall bladder stones. The incidence rises with increased age. Nearly, 20% to 25% of patients who are more than 60 years and suffer from gallstones with symptoms have stones in the CBD and half of them have complications [2]. In general primary CBD stones form brown pigmented stones; they are a combination of bile pigments and cholesterol which precipitate in the common bile duct. Brown stones formation commonly occurs due to biliary stasis and bacterial infection of the CBD and exists more in Asian populations. An enzyme secreted by the bacteria itself hydrolyzes bilirubin glucuronides to form unconjugated bilirubin, which then precipitates. The vast majority of CBD stones found are secondary, having originated inside the gallbladder and migrate down through the cystic duct into the bile duct. The term retained CBD stones refers to the stone found within short period after cholecystectomy.[1,3]

Most CBD stones are silent clinically and could be discovered during intraoperative cholangiography while performing cholecystectomy (Fig. 1). Intraoperative cholangiography revealed the presence of CBD stone in 10% of asymptomatic patients.

Absence of pain or abnormal enzymes on liver function test in which selective cholangiography is not done routinely during cholecystectomy, retained stones occur in 1% - 2% of patients.[4,5]

Figure 1: Intraoperative cholangiogram showing choledocholithiasis in an asymptomatic patient, with no filling of duodenum and outline of stone (arrow).[1]

For symptomatic patients, CBD stones may be manifested with symptoms ranging from recurrent biliary colic to the clinical presentation of obstructive jaundice, such as dark urine, scleral icterus, and light color stools. Jaundice with choledocholithiasis is likely to be associated with pain because of the rapid acute distention of the CBD and activation of pain fibers.[4]

Fever commonly occurs and could be accompanied by right upper abdominal pain and jaundice, a condition called as Charcot triad which suggests ascending cholangitis that, if untreated, may leads to septic shock. Hypotension and mental status changes that occur with shock if presented with Charcot triad is known as Reynolds pentad. Nausea and vomiting are common. If the stone was small, it could pass through the ampulla of vater spontaneously with resolution of symptoms. Larger stone may become completely impacted, leading to progressive jaundice. Elevation of liver enzymes is commonly seen in bile duct stones. However, if the obstruction is incomplete or intermittent. The liver chemistries could be normal.[1,3]

Ultrasonography either conventional or endoscopic is useful in detecting stones in the gallbladder, stone in the CBD and the diameter of the CBD 3. However, Endoscopic ultrasound requires endoscopic expertise capabilities making it not commonly used except in certain clinical scenarios.[6,7]

If the ultrasonography was inconclusive, magnetic resonance cholangiopancreatography (MRCP) provides excellent anatomic detail and has a sensitivity and specificity of 95% and 89%, respectively, for detecting choledocholithiasis but it provides no therapeutic solutions.[6]

The role of helical CT cholangiography can be very informative5 in detecting Common bile duct stone and often the diameter of the CBD can be measured. Its sensitivity can be as high as 95.5%. This modality is not commonly used with the availability of MRCP which limits the need for this technique.[8,9]

Percutaneous transhepatic cholangiography is rarely utilized in patients with choledocholithiasis but can be done for both diagnostic and therapeutic purposes in those who have contraindications to endoscopic or surgical approaches 3. With the development of ERCP intraoperative CBD exploration becomes obsolete because limited surgeons are expert in performing it and its high risk and longer operative time needed.[10]

The CBD stone is a common disease globally and it is responsible of higher incidences rates of hospitalization.[12] Nowadays, the laparoscopic cholecystectomy is the treatment of choice for cholecystolithiasis, while the endoscopic retrograde cholangiopancreatography with endoscopic sphincterotomy is the treatment of choice for clearing common bile duct stones.[13]

But the timing of laparoscopic cholecystectomy after common bile duct clearance by ERCP is an address of debate 11.

Aim of Study

To evaluate the timing of Laparoscopic cholecystectomy after endoscopicsphincterotomy (post ERCP) and its outcome

PATIENTS & METHODS

Study design & settings

The research was conducted as a cohort study from December 2017 to March 2020 in the surgical unit of the Al-Jamhory Teaching Hospital in Mosul.

Study population

Following the signing of an informed consent form, 50 patients with CBD stones (single or numerous) and cholecystitis underwent LC after ERCP with endoscopic sphincterotomy. The patients were randomly allocated into either early interference (within 72 hours) or late interference (3-7 days).

Inclusion criteria

Patients with CBD stones (single or numerous) and cholecystitis who underwent LC after ERCP with endoscopic sphincterotomy.

Exclusion criteria

The research did not include people who had pancreatitis, gall bladder cancer, received prior radiotherapy, or had had abdominal surgery.

Data Collection

All patients underwent LC after ERCP with endoscopic sphincterotomy while under general anesthesia and in the reverse Trendelenburg posture with their right side up.

The data was collected from both groups regarding the length of the operation, intraoperative results, complications, and post-operative hospitalization.

Ethical considerations

Before the research could be conducted, the scientific and ethical committee of the Arab Board of Surgery gave its approval. Each patientmust complete a consent form prior to enrollment.

Statistical analysis

The data of patients were processed and evaluated using SPSS version 26. Different descriptive statistical techniques were used to compile and tabulate the data (mean, SD, and percentages). Independent two-sample t-test was used to assess the difference in continuous data between two groups. A chi square test was used to assess the association between categorical data and time of operation. P-values of ≤0.05 was regarded as statistically significant.

RESULTS

No Twenty-five allocated to early interference group. Their age ranges from 35-64 years with mean±SD of 43.86±1.262 years. The age of other 25 patients who underwent late interference was ranging from 31 to 66 years with mean±SD of 46.23±11.89 years. The difference was statically not significant (p=0.07). The early interference group consist of 14 (56.0%) males and 11 (44.0%) females while the late interference group consist of 9 (36.0%) males and 16 (64.0%) females and the difference was statistically not significant (p=0.1). Examination of patient reveal the following: all patients have a stone in CBD; stone in GB was found in 18 (72.0%) of EI group and in 19 (76.0%) of LI group; lastly, common bile duct diameter >10 mm found in 17 (68.0%) of EI group and 21 (84.0%) of LI group. Please see table 2 below.

Table 1 displays the variations in operational features between the study's two groups. The results show that early interference needed significantly less operation time (p=0.02) than late interference did (88.717.6 and 100.817.8 mint, respectively). While three of the late interference groups require open conversion, none of the early interference groups do. Only 4% more calots hadto be dissected due to late intervention, but the difference was not statistically significant (p=0.7). Late intervention increases the need for insertion by 16%, though it is not significantly more. The mean length of stay in the hospital for patients in group I was considerably lower than for patients in group II (p=001). Compared to early interference, late interference had a considerably higher percentage of wider cystic ducts (60.0% versus 32.0%). Three of the late interference group require it, compared to none of the early interference group's intraoperative damage to the cystic duct and artery. In late interference compared to early interference, there was a two-fold increase in surgical adhesion, and the difference was statistically significant (p=0.04).

Table 1: Comparison of intra-operative characteristics, complication and post-operativehospitalization between early and late LC after ERCP with endoscopic sphincterotomy.

Operative characteristics	Early interference group (<3 days)	Late interference group (>3 days)	p-value
Operation time in mint, mean±SD	88.7±17.6	100.8±17.8	0.02
Open conversion, No. (%)	0	3 (12.0)	0.07
Difficult calots dissection, No. (%)	7 (28.0)	8 (32.0)	0.7
Need for drain insertion, No. (%)	16 (64.0)	20 (80.0)	0.2
Hospital stay in days, Mean±SD	2.7±0.6	3.5±0.5	0.001
Wider cystic duct, No. (%)	8 (32.0)	15 (60.0)	0.04
Intraoperative injury to cystic duct and artery, No. (%)	0	3 (12.0)	0.07
Intraoperative adhesions, No. (%)	10 (40.00)	20 (80.0)	0.004

No significant differences were observed between CBD stones patients of group I and group II regarding age (p=0.07) and gender (p=0.1). (Table 2)

Table 2: Distribution of demographic characteristics according tostudygroups.

Variable	Study groups				P
	I (<3 days)		II (≥3 days)		
	No.	%	No.	%	
Age					0.07* NS
<40 years	4	16.0	5	20.0	
40-49 years	5	20.0	4	16.0	
50-59 years	9	36.0	2	8.0	
≥60 years	7	28.0	14	56.0	
Gender					0.1** NS
Male	14	56.0	9	36.0	
Female	11	44.0	16	64.0	

** Fishers exact test, **Chi square test, NS=Not significant.*

No significant differences were observed between CBD stones patients ofgroup I and group II regarding stones in GB (p=0.7) and common bile duct diameter +>10 mm (p=0.1). No significant differences were observed between CBD stones patients of group I and group II as all patients of twostudy groups had stones in the common bile duct. There was a significant association between multiple stones and group I patients (p=0.01); 84% of group I patients had multiple stones, while 52% of group II patients had multiple stones. (***Table 3 and Figures 2***)

Table 3: Distribution of ultrasonography and ERCP features according tostudy groups.

Variable	Study groups				P
	I (<3 days)		II (≥3 days)		
	No.	%	No.	%	
Stones in GB					0.7* NS
Yes	18	72.0	19	76.0	
No	7	28.0	6	24.0	
Stones types					**0.01*** S
Single	4	16.0	12	48.0	
Multiple	21	84.0	13	52.0	
Common bile duct>10 mm					0.1* NS
Yes	17	68.0	21	84.0	
No	8	32.0	4	16.0	
Stones in CBD					-
Yes	25	100.0	25	100.0	
No	0	-	0	-	

** Chi square test, S=Significant, NS=Not significant.*

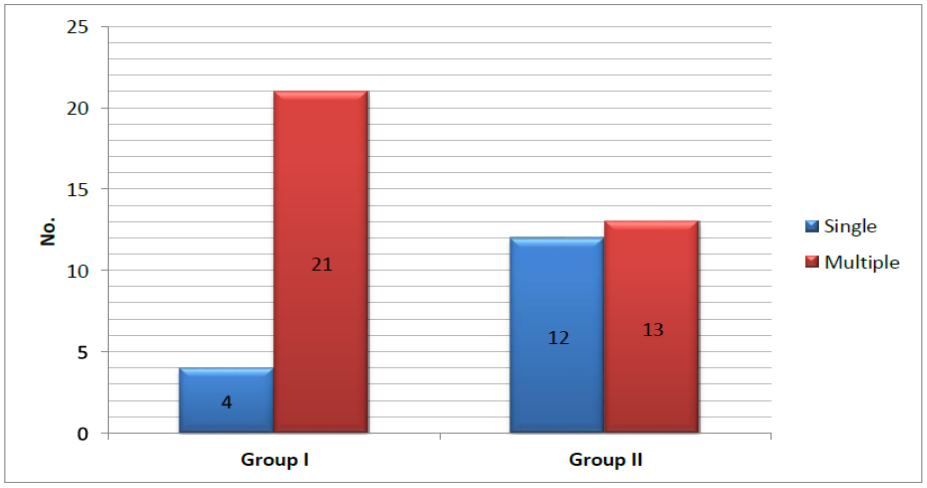

Figure 2: Distribution of stone types according to study groups.

Mean operation time for group I patients was significantly shorter than mean operation time for group II patients (p=0.02). No significant differences were observed between CBD stones patients of group I and group II regarding open conversion (p=0.07), difficult Calot dissection (p=0.7) and need for drain insertion (p=0.2). (***Table 4A and Figure 3***)

Table 4A: Distribution of outcomes according to study groups.

Variable	Study groups				P
	I (<3 days)		II (≥3 days)		
	No.	%	No.	%	
Operation time					0.02* S
Mean±SD (min.)	88.7±17.6		100.8±17.8		
Open conversion					0.07**
Yes	0	-	3	12.0	NS
No	25	100.0	22	88.0	
Difficult calots dissection					0.7***
Yes	7	28.0	8	32.0	
No	18	72.0	17	68.0	
Need for drain insertion					0.2***
Yes	16	64.0	20	80.0	
No	9	36.0	5	20.0	

** Independent sample t-test, **Fishers exact test, ***Chi square test, NS=Notsignificant, S=Significant.*

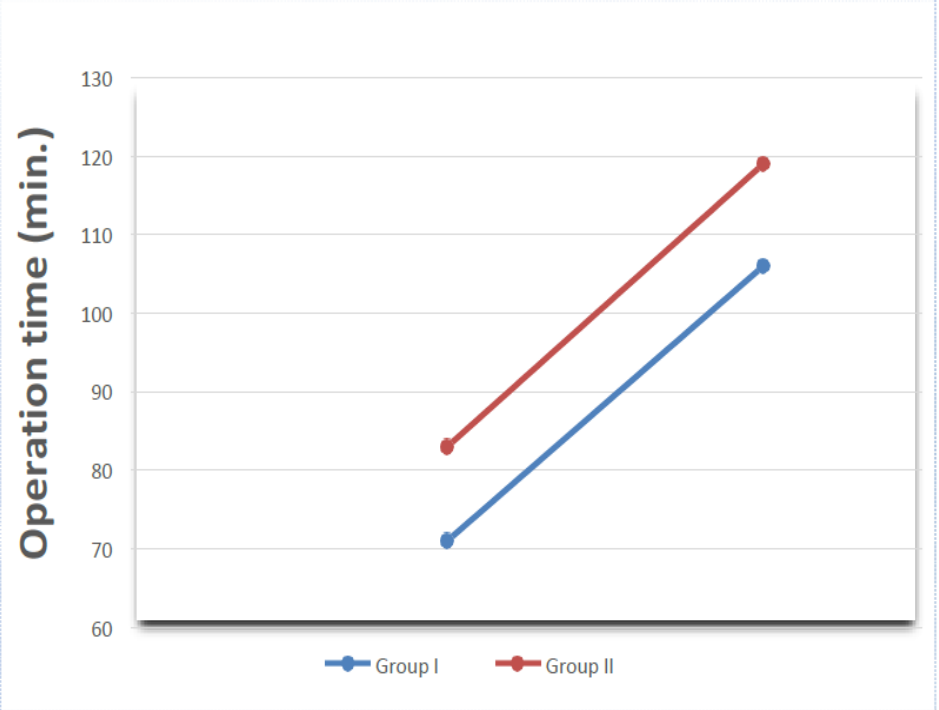

Figure 3: Distribution of operation time according to study groups.

Mean hospital stay duration for group I patients was significantly shorter than mean hospital stay duration for group II patients (p<0.001). There was a significant association between wider cystic duct and group II patients (p=0.04). No significant differences were observed between CBD stones patients of group I and group II regarding intraoperative injury to cystic duct and artery (p=0.07), however, 12% of group II patients had intraoperative injury to cystic duct and artery. A significant association was observed between intraoperative adhesions and group II patients (p=0.004); 80% of group II patients had intraoperative adhesions, while 40% of group I patients had intraoperative adhesions. (***Table 4B and Figures 4,5***).

Table 4B: Distribution of outcomes according to study groups.

Variable	Study groups				P
	I (<3 days)		II (≥3 days)		
	No.	%	No.	%	
Hospital stay					**<0.001*** S**
Mean±SD (days)	2.7±0.6		3.5±0.5		
Wider cystic duct					**0.04**** S**
Yes	8	32.0	15	60.0	
No	17	68.0	10	40.0	
Intraoperative injury to cystic duct and artery					0.07*** NS
Yes	0	-	3	12.0	
No	25	100.0	22	88.0	
Intraoperative adhesions					**0.004**** S**
Yes	10	40.0	20	80.0	
No	15	60.0	5	20.0	

** Independent sample t-test, **Chi square test, *** Fishers exact test, NS=Not significant, S=Significant.*

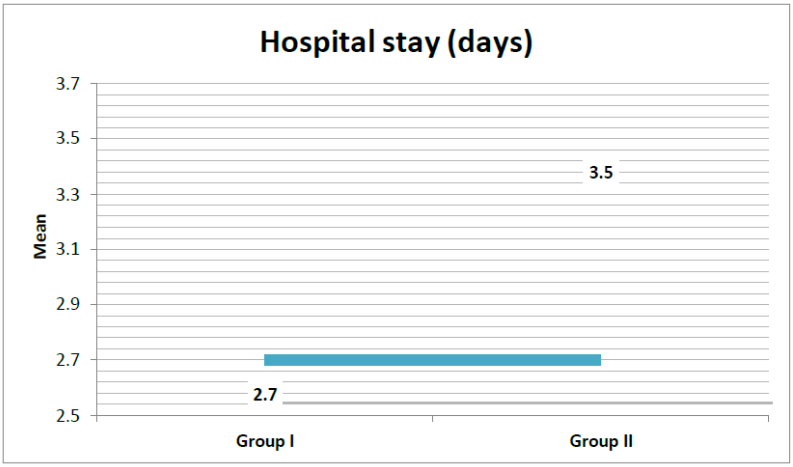

Figure 4: Distribution of hospital stay duration according to study groups.

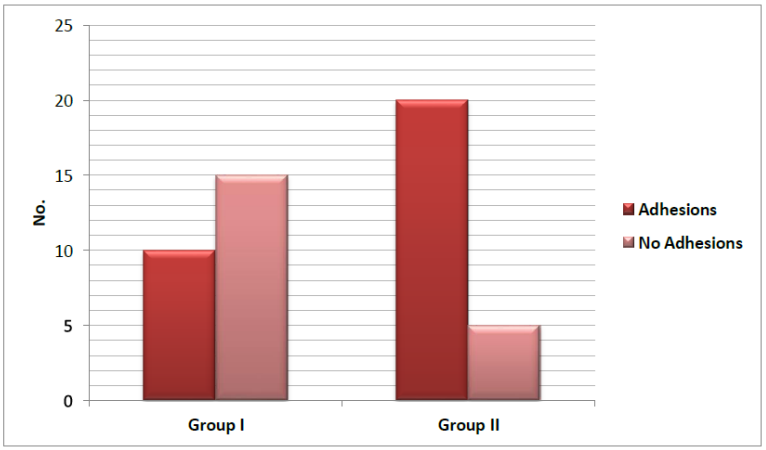

Figure 5: Distribution of intraoperative adhesions according to studygroup.

DISCUSSION

In present study, no significant differences were observed between CBD stones patients of different time intervals regarding age and gender. These findings are similar to the results of Zhang et al [14] study in China which revealed no significant differences between 3 different groups of patients with different time intervals between ERCP with endoscopic sphincterotomy and laparoscopic cholecystectomy.

Our study showed no significant differences between patients regarding age and gender with better outcomes associated with shorter time interval. However, it was shown that age and gender of patients had a significant effect on incidence and outcome of laparoscopic cholecystectomy.[15,16]

No significant differences were observed between CBD stones patients ofgroup I and group II regarding stones in GB, common bile duct diameter>10 mm and stones in common bile duct. These findings are consistent with results of Baghdadi et al study.[17] These ultrasonography and ERCP features are independent risk factors for outcome of success for laparoscopic cholecystectomy.[18]

In present study, there was a significant association between multiple stones and patients with shorter timing interval between ERCP and LC. This finding is similar to results of Kostro et al.[13] study in Poland which found a significant difference in stone type between different groups of timing intervals between ERCP and LC and also reported that shorter timeinterval between ERCP and LC is commonly related with good outcomes.

Current study revealed that mean operation time for group I patients was significantly shorter than mean operation time for group II patients (p=0.02). This finding is consistent with results of Gorla et al study.[19] This longer time of surgical operation for patients with longer time interval between ERCP and LC is attributed to more intraoperative difficulties. Although no significant difference, the open conversion was present in (12%) of patients with longer time interval. This finding coincides with results of Aziret et al study.[20]

In our study no significant differences were observed between CBD stones patients of group I and group II regarding difficult Calot triangle dissection and need for drain insertion. These findings are similar to the results of Mohseni et al study.[21]

In current study, mean hospital stay duration for group I patients was significantly shorter than mean hospital stay duration for group II patients (p<0.001). This finding is similar to many literatures such as Sahoo et al[22] study in India and El-Labban study in Egypt [23] which all reported that patients with earlier time interval between ERCP and LC had shorter hospital stay duration than patients with later interval.

Our study showed no significant differences were observed between CBD stones patients of group I and group II regarding intraoperative injury to cystic duct and artery, although, 12% of group II patients had intraoperative injury to cystic duct and artery. This finding is similar to reports of Machado study in Oman.[24] which stated that delay in LC after ERCP lead to higher risk of intraoperative injury to cystic duct and artery.

Our study also showed a significant association between intraoperative adhesions and group II (p=0.004). Similarly, Friis et al.[25] meta-analysis study in Denmark on 14 studies found that delay in LC after ERCP is highly related with intraoperative adhesions. Despite these findings, Grosek et al,[26] study in Slovenia found no significant differences in conversion rate, intraoperative and postoperative complications between earlier and later LC after ERCP. These differences might be related to difference in time intervals and surgeons skills in addition to availability of surgical.

CONCLUSIONS

Earlier laparoscopic cholecystectomy after ERCP has better intraoperative and postoperative outcomes than delayed laparoscopic cholecystectomy.

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