

## Early Versus Delayed Laparoscopic Cholecystectomy after Endoscopic Retrograde Cholangiopancreatography (ERCP)

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### Abstract

**Background:** Gallstones have been recognized since antiquity and have been found during autopsies of Egyptian mummies. Following the first successful open cholecystectomy in 1882, it was Eric Muhe, a German surgeon, who performed the first laparoscopic cholecystectomy in 1985.

**Aim of Study:** To establish the feasibility, complications, and outcome of different time intervals between endoscopic retrograde cholangiopancreatography (ERCP) and laparoscopic cholecystectomy (LC) in the management of choledocholithiasis.

**Patients and Methods:** This study was carried out on 60 patients who were randomized by systematic randomization into two groups according to the interval between ERCP and LC defined as short (3 days) or long (weeks)

All patients have undergone ERCP with sphincterotomy followed by elective LC. Patients' age, sex, history of previous acute cholecystitis, acute pancreatitis and jaundice, abdominal ultrasonography findings, serum bilirubin, alkaline phosphatase, gamma-glutamyl transferase levels, ERCP findings, time interval between ERCP and LC, conversion rate, median operative time, intraoperative complications, hospital stay, and postoperative complication rates were collected.

**Results:** There was no statistically significant difference between the demographics of the patients, the preoperative history, laboratory data or ultrasonographic findings in the two groups.

**Conclusion:** Early cholecystectomy after ERCP within 72 h has better outcomes, probably due to less inflammatory processes following ERCP.

**Key Words:** Laparoscopic cholecystectomy — Endoscopic retrograde cholangiopancreatography (ERCP) — Time interval.

### Introduction

**GALLSTONE** disease clearly results from a complex interaction of genetic and environmental factors. This is established by an altered incidence of gallstone recognition in people from diverse geographical areas with a different dietary regimen, level of physical activity and hygiene. The common mechanism of gallstone formation includes cholesterol hypersecretion, alteration in intestinal bile salt, cholesterol absorption and gall bladder hypokinesia, which leads to bile cholesterol supersaturation and nucleation. Incidence of **CBD** stones in cases of cholelithiasis is around 3.4%-15%. Choledocholithiasis can either be primary or secondary. Secondary Choledocholithiasis being more common occurs due to stones originating in gallbladder and then migrating through cystic duct to **CBD**. These secondary bile stones are cholesterol stones in 75% and black pigment stones in 25% of patients. The diagnosis of choledocholithiasis is initially suggested by symptomatology, laboratory tests, and ultrasound (US) findings. Abdominal ultrasound being the most commonly used initial diagnostic tool for suspected biliary stones has a sensitivity of 25-60% and specificity of 95-100%. Since the introduction in 1991, Magnetic resonance cholangiopancreatography (MRCP) has emerged as an accurate, non-invasive diagnostic modality for investigating the biliary and pancreatic ducts with sensitivity of 90-100% and specificity of 92-100%. An impacted biliary stone will appear as a filling defect with a crescent of bile. The introduction of Laparoscopic cholecystectomy has significantly changed methods the treatment of patients with gallstones. Currently it is estimated that over 80% of cholecystectomies are performed using the laparoscopic approach. Laparoscopic cholecystectomy (LC) headed by preoperative ERCP remains the cornerstone and most frequently practiced approach worldwide for the management of coexisting gallbladder and **CBD** stones. According to the literature, the conversion rate for laparoscopic cholecystectomy (LC) after

endoscopic sphincterotomy (ES) for choledocholithiasis reaches 20%, when laparoscopic cholecystectomy is performed 6 to 8 weeks afterward [1].

Traditional surgical treatment of CBD stones includes intraoperative cholangiography tailed by choledochotomy with stone extraction and T-tube placement. This technique was simpler and more straightforward since the guidelines for open CBD exploration are clearly defined. The present options available for gallstone-disease-related choledocholithiasis have been altered because of the advent of laparoscopic techniques and instrumentation. The management at the time of laparoscopic cholecystectomy (LC) includes preoperative endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic sphincterotomy, intraoperative ERCP, postoperative ERCP, laparoscopic trans cystic CBD exploration, and laparoscopic choledochotomy with CBD exploration [1].

There is an argument about the standard management for CBD stones; ERCP and LC versus single-stage laparoscopy, postoperative ERCP versus laparoscopic choledochotomy, and preoperative versus postoperative ERCP.

The time effect on operation and operation outcome that elapsed between ERCP and LC is not well known.

It has been found that intraoperative and postoperative complications and conversion to open surgery are more frequent in LC post-ERCP. Nevertheless, the mechanisms underlying this pattern have not been identified [1].

Cholelithiasis is more common in female patients, pregnant patients, older patients, and those with high serum lipid levels. Cholesterol stones are classically found in obese patients with low physical activity or patients that have lately intentionally lost weight. Black pigment stones are found in patients with cirrhosis, patients receiving total parental nutrition, and in those who have undergone an *Heal* resection [2].

A very fascinating observational study from Sweden reported a so-called "paradigm shift" from open choledochotomy and cholecystectomy toward bile duct clearance using the endoscopic route and selective laparoscopic cholecystectomy in patients presented with cholecysto-choledocholithiasis [4].

The single-stage laparo-endoscopic treatment, known as the "Rendezvous Technique" (RVT), is used to indicate simultaneous LC and intraoperative ERCP, facilitated by papilla visualization and cannulation through a guide-wire the surgeon inserts into the cystic duct. The technique was first described almost 20 years ago, and hypothetically, it combines several advantages, such as minimal invasiveness and an acceptable learning curve, at the

price of some organization troubles between endoscopists, surgeons and operating room personnel, but is yet to be accepted [5].

Complications of percutaneous biliary stone procedures have declined with experience. One of the most serious post-ERCP complications is cholangitis leading to subsequent septicemia. Enteric bacteria enter the biliary tree by the hematogenous route or following endoscopic or radiologic manipulation. Inadequately disinfected endoscopes and accessories may also introduce infection into the biliary tree.

The most common organisms responsible for infection after ERCP are the Enterobacteriaceae (especially *Escherichia coli* and *Klebsiella* species), alpha hemolytic streptococci, *Pseudomonas aeruginosa*, *Enterococcus*, and *Staphylococcus epidermidis*. In most patients with acute cholangitis, a single organism is isolated from blood cultures. Risk factors for post-ERCP infection include the use of combined percutaneous and endoscopic procedures, stent placement in malignant strictures, the presence of jaundice, low case volume, and incomplete or failed biliary drainage. Patients who are immunocompromised are more likely to experience an infectious complication. Although transient bacteremia has been reported in up to 27% of therapeutic procedures, cholangitis has been reported in 1% or fewer procedures. In a large retrospective study of 16,855 patients undergoing ERCP, infection was reported in only 1.4%; however, the mortality rate attributed to infections was 7.85% [5].

Prevention and/or reduction of the risk of post-ERCP infectious complications can be reached by judicious use of preprocedural antibiotics and intraprocedural steps, such as minimizing or avoiding contrast injection in patients with known biliary obstruction or cholangitis, endoscopic decompression, including the placement of a biliary stent or nasobiliary drain when complete drainage cannot be attained, and quick percutaneous drainage if endoscopic drainage is not probable or incomplete. Prophylactic preprocedural antibiotics should be given to patients with jaundice and suspected mechanical obstruction. In addition, patients with sclerosing cholangitis, pancreatic pseudocysts, and those who are immunocompromised should also receive preprocedural antibiotics [6].

Exemptions include patients with sclerosing cholangitis and those with post-transplantation biliary strictures. It is a common practice to continue such patients on oral antibiotics for 3-5 days post procedure. The antibiotic regimen should cover enteric gram-negative bacteria. Antibiotic agents that appear to reduce infection after ERCP include cephalosporins, aminoglycosides, and fluoroquinolones. Although the perfect antibiotic for biliary sepsis has not been found, ciprofloxacin and related fluoroquinolones are effective against most common or-

ganisms and are easy to administer with minimal adverse effects [7].

The aim of our study is to look for advantages of early cholecystectomy over late laparoscopic cholecystectomy.

## Patients and Methods

### Study design:

This prospective, randomized controlled study was carried out on 60 patients with gallstone-disease associated choledocholithiasis, who will be simply randomized by the closed envelope method in which a comparison was held between two groups of patients presented with choledocholithiasis.

- Group A consist of 30 patients with the interval between ERCP and LC defined as short (3 days).
- Group B consist of 30 patients with the interval between ERCP and LC defined as long (6 weeks).

Pre-study power analysis revealed that a sample size of 30 patients in each group would be sufficient to compare outcome of different time intervals between endoscopic retrograde cholangiopancreatography (ERCP) and laparoscopic cholecystectomy (LC), the difficulties and critical view of safety anatomical variations with 95% power and a p-value of 0.05.

### Patients:

Following the initial evaluation, all eligible patients asked to give informed consent to participate. All patients prospectively followed until complete healing. Ethical approval from the local ethics committee of surgery department obtained.

This study was conducted at Demerdash Hospital Faculty of Medicine, Ain Shams University from August 2020 — April 2021.

Preoperative work up:

*All Patients was subjected to:*

### History taking:

Patients were asked for age, sex, marital status, hypochondriac pain, jaundice, epigastric pain, vomiting and previous surgeries.

### I- Clinical examination:

All patients were assessed clinically and abdominal ultrasonography (US) will also performed.

Routine laboratory investigations will be performed including serum bilirubin, alkaline phosphatase, amylase, alanine aminotransferase, aspartate aminotransferase, and gamma-glutamyl transferase levels.

The indications for ERCP include elevated serum bilirubin level, elevated alkaline phosphatase, elevated gamma-glutamyl transferase, dilated CBD

(.8 mm), and/or stones in the CBD on US examination.

### ERCP procedure:

Before the ERCP procedure, all of the patients were evaluated by one or more of the non-invasive techniques demonstrating the biliary system, such as ultrasonography, computed tomography, and magnetic resonance cholangiography. ERCP was performed for therapeutic purposes rather than for diagnostic in all attempts. None of the patients received any antiplatelet agents or anti-coagulants before the procedure. The ERCP procedure was performed under general anesthesia. All patients were positioned on the left side as per standardization techniques. The ERCP procedures were performed by using standard video duodenoscopes with a 4.2 mm diameter accessory channel. Patients with cholangitis received intravenous antibiotics for 3 days and maintained orally afterward. Biliary cannulation was first attempted by using the "wire-guided" cannulation technique. Precut papillotomy, infundibulotomy, or trans pancreatic septotomy was used otherwise. Cannulation was followed by endoscopic sphincterotomy (ES) in all the patients. If ES was not large enough for stone extraction, the papilla was dilated with a balloon, selected according to the size of the overlying common bile duct. Stones were extracted by using an extraction balloon and/or a basket. Mechanical lithotripsy was performed when necessary. Complete stone extraction was defined as clearance of biliary stones as confirmed by balloon occluded cholangiography.

### Intra-operatively:

After obtaining the essential written and verbal consents with explaining the procedure and possible outcome and complications with the patient.

*Operative procedure:* Under general anesthesia.

Laparoscopic cholecystectomy (LC) will be performed by using the standard 4-trocar technique. Placement of the umbilical trocar using Hasson open technique.

A pneumoperitoneum will be established by insufflation of carbon dioxide gas up to an intra-abdominal pressure of 12mmHg Blunt dissection of the cystic duct and cystic artery will be done according to the standard technique. The cystic artery and duct will be clipped and transected only after the Critical View of Safety was established. The gallbladder will be then removed retrogradely. Drain will be inserted. The operative time will be calculated from the start of the incision until placement of the last suture.

### Outcome parameters:

Operating time is defined as 'time between first incision and placement of last suture'.

Complexity and length of the surgical procedure, conversion rate, post-operative complications and hospital stay were recorded for all patients. The complexity of LC was scored by the most experienced surgeon in the operating team on a 0-10 scale, with '0' (zero) being very easy and '10' very difficult. The scoring principle is the same as in the LANS trial [9].

ERCP findings, time interval between ERCP and LC, conversion rate, median operation time, intraoperative complication, postoperative complication rates, and median postoperative hospital stay will be collected. All patients were followed-up for 6 months.

#### Post-operative follow-up:

Antibiotics and analgesics were needed for both groups postoperatively for 3 days followed by administration of analgesics on demand.

All patients were followed every other day for one week, then weekly until complete healing, then monthly for four months.

## Results

#### Statistical analysis:

Using SPSS program (V.27) for Data analysis and management of the data. Univariate analysis of demographic and clinical laboratory was accomplished using one-way analysis of variance (ANOVA) to estimate the significance of different between groups where appropriate. Unpaired t-test was used to analyze univariate analysis when appropriate. Chi square ( $X^2$ ) test were used for categorical data comparison. Numerical variables were divided by 1 SDs for standardization. The difference between groups was considered significant when  $p < 0.05$ . Paired sample t-tests were used to test differences in the whole sample. Furthermore, paired sample t-tests were used to assess the differences before and after the surgery, separately, in every group. The operative time and hospital stay were also assessed.

The  $p$ -value  $< 0.05$  was considered statistically significant. All the analysis was carried out using SPSS 27. 0 version (SPSS Inc, Chicago, IL, USA).

All included patients were managed by ERCP followed by LC. The enrolled patients were divided into two groups (each=30 patients) according to the interval between the ERCP and LC: Group A with short interval (3 days or less), group B with long interval (6 weeks).

Out of 60 patients participated in the study, 39 were females (65%) and 21 Males (35%), age ranged from 20-72 years with mean of 43.9.

Group A had 19 Females (63.3%) and 11 Males (36.7%), Group B had 20 Females (66.7%) and 10 males (33.3%).

Tables (1,2) show descriptive data of both groups.

Preoperative US showed dilated CBD in the two groups that were ranging  $7.93 \pm 2.25$  in group A, and  $7.2 \pm 1.89$  in group B, with no significant difference between the three groups ( $p=0.3$ ) (Table 3).

Table (1): Group A descriptive data and patient characteristics.

	Minimum	Maximum	Mean	Std. Deviation
Age	20	72	43.90	14.094
Operative time-group A	45	98	73.70	14.237
Hospital stay-group A	1	1	1.00	.000
CBD diameter-group A	3.5000	11.3000	7.930000	2.2572718
Grade of difficulty-group A	4	10	6.67	1.709

Table (2): Group B descriptive data and patient characteristics.

	Minimum	Maximum	Mean	Std. Deviation
Age	22	68	43.90	11.115
Operative time-group B	45	221	94.06667	17.375
Hospital stay-group B	1	3	1.07	.365
CBD diameter-group B	3.8000	11.2000	7.210000	1.8839339
Grade of difficulty-group B	5	10	7.57	1.406

Table (3): Infra-operative finding and complications.

	Group A	Group B	p-value
Operative time mean	73.70 min	78.90 min	0.003
Biliary tract damage	0	1 (3.3%)	0.7
Wound infection	0	2 (6.6%)	0.5
Hospital stay mean	1.00 day	1.07 day	0.04
Complications	3 (10%)	20 (66%)	0.012
Difficult Calot's dissection			
Wide and short cystic duct	3 (10%)	0	0.3
Intraoperative injury to common bile duct	0	1 (3.3%)	0.4
Intraoperative bleeding	0	1 (3.3%)	0.7
CBD diameter mean	7.93 mm	7.21 mm	0.3
Conversion to open	1 (33%)	6 (20%)	0.008
History of pancreatitis	3 (10%)	4 (13.3%)	0.1
Grade of difficulty Mean	6.67	7.57	0.5

There were significant adhesions found in group B ( $p=0.01$ ), Intraoperative bleeding occurred in one patient that due to missed posterior cystic branch in one case that was controlled by laparoscopic clipping.

In 23 patients, there was difficulty in Calot's triangle dissection of which, 20 belonged to the second group and 3 from the early group. Wide and short cystic duct leading to difficult clipping has been observed in 3 patients. Accidental/inadvertent injury to the cystic duct or artery was seen in one instance, all in the group B.

A total of 30 (50%) patients needed placement of drain due to excessive dissection.

In the second group, 20% patients needed conversion to open procedure. There was 1 case of conversion in early group.

The analysis performed in the group with a previous Endoscopic retrograde cholangiography (ERCP) from the LANS trial showed that the length of the surgical procedure was 60min [standard deviation (SD) 22.7] (Reinders et al., 2013). In the sample size calculation, a difference of 10min in length of the surgical procedure was estimated.

No mortality was recorded in either group.

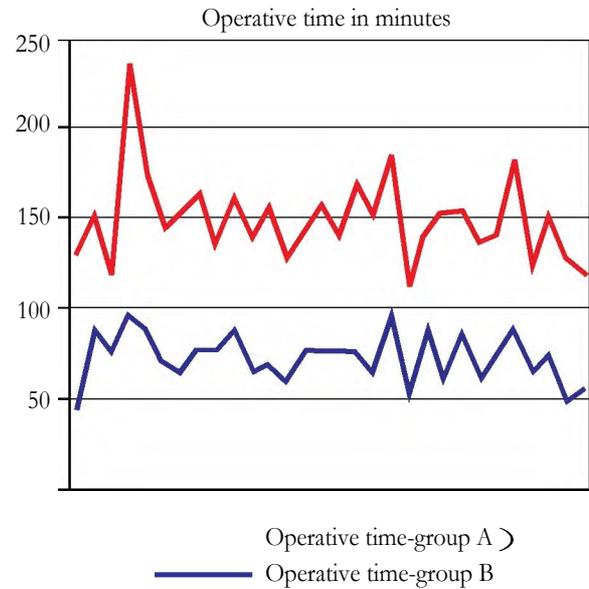


Fig. (1): Operative time in both groups.

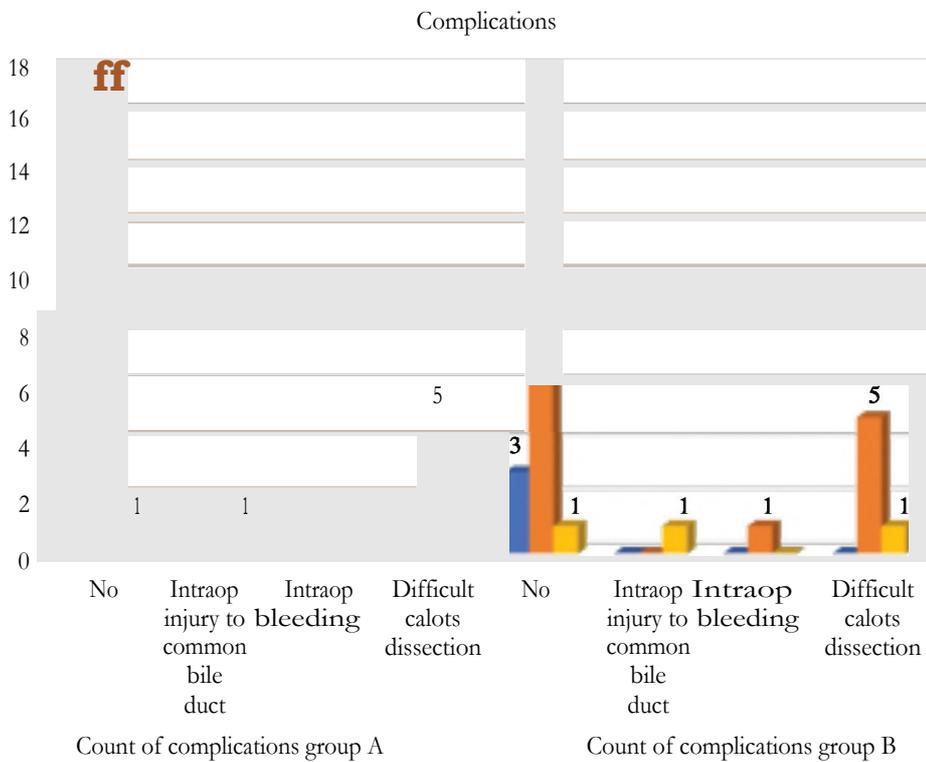


Fig. (2): Complications of both groups.

The mean operative time in the early group was 73.7±14.2min, in the second group was 94±17.3min. The mean postoperative hospital stay in the early group was 1 day, in the second group was 1.07±0.3 days. Surgical site infection was noted in 2 cases in the second group reason may be secondary to bile contamination as compared to the first group.

In group B, LC (Laparoscopic cholecystectomy) was attempted in 30 patients, of which six (20%) were converted to open cholecystectomy due to gallbladder bed bleeding or dense adhesions in Calot's triangle or intraoperative CBD injury.

Grade of difficulty was assessed using scoring system.

The scoring system proposed is based on the severity of cholecystitis and degree of potential difficulty with a score from 1 to 10. The key aspects of the score include access to the gallbladder including patient body mass index (BMI), the degree of pericolic and right upper quadrant adhesions particularly in patients who have had previous abdominal surgery, the presence of complicated cholecystitis and the time taken by the surgeon to achieve the triangle of safety with identification of the cystic artery and duct. With this scoring system a score of <2 would be considered easy, 2 to 4 moderates, 5-7 very difficult, and 8 to 10, extreme.

Fistulation of the gallbladder which would be associated with extreme difficulty and a high rate of conversion was not included in the score, given its rarity.

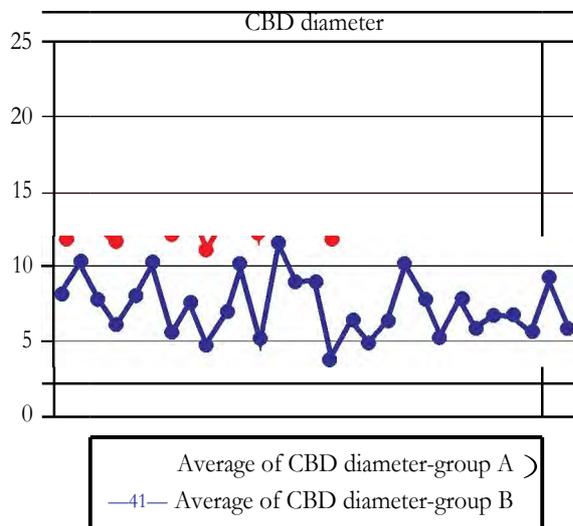


Fig. (3): CBD diameter by U/S.

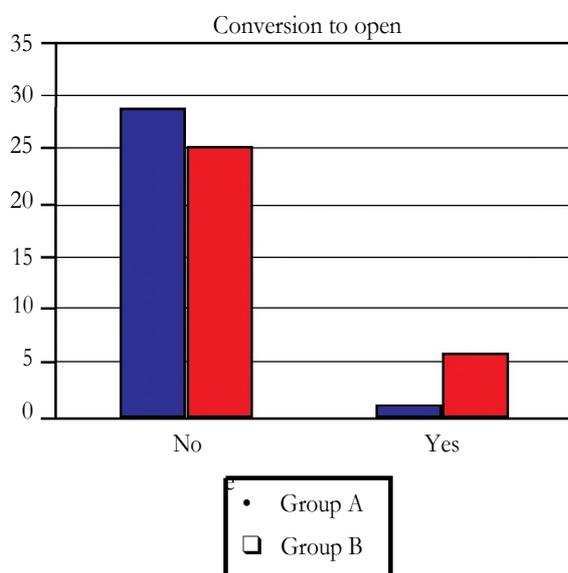


Fig. (4): Conversion to open surgery between both groups.

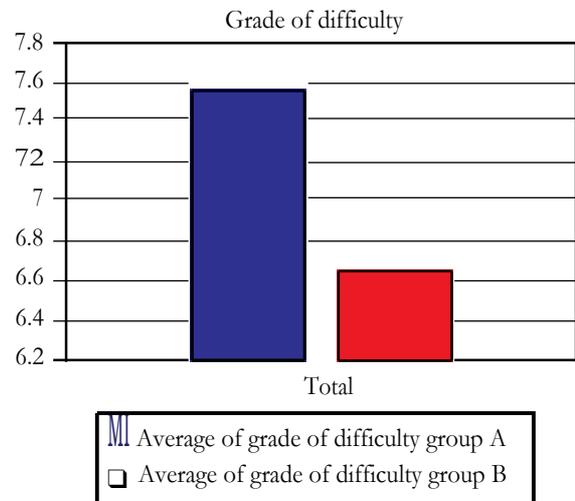


Fig. (5): Grade of difficulty between the Two groups.



Fig. (6): Intraoperative image gall bladder covered by adhesions in group B.

### Discussion

Since the 1990s the management of biliary lithiasis has changed radically with introduction of laparoscopic cholecystectomy, intraoperative cholangiography and laparoscopic CBD exploration. The presence of CBD stone significantly increases the morbidity, mortality, and costs of patients with gallstones. The obvious goal of treatment in choledocholithiasis is to remove the stones with the fewest number of interventions, lowest cost, and least morbidity [8].

In the present scenario, Laparoscopic cholecystectomy (LC) preceded by ERCP remains the cornerstone and is most commonly practiced strategy worldwide for management of co-existing gallbladder and CBD stones. However, timing between laparoscopic cholecystectomy after ERCP is still the matter of debate. Various parameters have been measured to assess the difficulty of surgery and morbidities associated if laparoscopic cholecystectomy after ERCP is done within 72 hrs. versus laparoscopic cholecystectomy done after 6 weeks of ERCP [10].

It is hypothesized that early planned laparoscopic cholecystectomy after endoscopic sphincterotomy prevents recurrent biliary complications and reduces operative morbidity and hospital stay.

In this study, we compared two groups: Group I in which laparoscopic cholecystectomy (LC) was done within 72 hrs. of endoscopic retrograde cholangiopancreatography (ERCP) and group II included patients who underwent LC after 6 weeks of ERCP. We compared these groups on the basis of duration of surgery, operative time, conversion rate to open cholecystectomy, length of hospital-stay and post-operative complications. In our study, mean operating time was longer in patients who underwent delayed cholecystectomy, possibly due to (mental and bowel adhesions, scarring and fibrosis of biliary tree and Calot's triangle which makes the surgeon very cautious during dissection of the junction between cystic duct, common hepatic duct and CBD [11,12].

The total number of patients in our study was 60 patients, out of 60 patients participated in the study, 39 were females (65%) and 21 Males (35%), age ranged from 20-72 years with mean of 43.9. The sex distribution in this study showed that cholecystocholedocholithiasis was predominant in women with a woman to man ratio of about 3.9: 2.2.

The most common decades of life for the development of cholecystocholedocholithiasis in this study were the fourth and fifth decades (60%) of our patients. This was in some agreement with Stanley et al. and Topal et al., who reported that the gallstones and CBD stones were more common in the fourth to fifth decades of life [13].

Previous studies as done by Reinders JSK et al., Sahoo R et al., Bostanci EB et al., have shown that LC after ERCP is more difficult than LC for uncomplicated cholelithiasis: The conversion rate of 8 to 55% has been seen in complicated cholelithiasis versus lower than 5% in case of uncomplicated cholelithiasis. In our study, higher conversion rate was seen when LC was done 6 weeks. Only 1 patient (3.3%) was converted to open cholecystectomy in group I (LC within 72 hrs. of ERCP) while 6 patients (20%) were converted to open cholecystectomy in group II (LC after 6 weeks. of ERCP) giving a p-value of <0.008 [14].

Jaundice was the most common complaint reported in 39 patients followed by a history of acute cholecystitis in 14 patients and then history of acute pancreatitis in 7 patients. Disturbance of liver functions was detected in 66.7% of our patients.

Abdominal US showed gallstones in all patients. Dilatation of CBD with stones inside was detected in 53 patients only. This denotes that US is highly accurate for the detection of gallstones (100%), but less accurate for the detection of CBD stones

(88.3%). Costi et al., found that the sensitivity of US for the detection of gallstones and CBD stones was 80-100% and 30-90%, respectively [15].

MRCP has an excellent overall sensitivity of 95% and a specificity of 97% for demonstrating CBD stones with no significant differences between it and endoscopic US in the detection rate of CBD stones [16].

Prophylactic broad-spectrum antibiotic (cefoperazone sodium) has potential use as it covers common biliary flora. It was given intravenously in a dose of 1g immediately before the procedure and continued for 1-3 days for patients with intraoperative gallbladder rupture or CBD injury. This also was supported by Bratzler et al., but disagreed with Banerjee et al., who denoted that antibiotic prophylaxis is not recommended before any operative intervention when obstructive biliary tract disease is not suspected [17].

The mean operative time in the early group was 73.7±14.2min, in the second group was 94±17.3min. The mean postoperative hospital stay in the early group was 1 day, in the second group was 1.07±0.3 days. Surgical site infection was noted in 2 cases in the second group reason may be secondary to bile contamination as compared to the first group.

Several treatment options are available in the treatment of combined choledochocystolithiasis. One-stage treatment by LC together with common bile duct exploration appeared as a safe and effective strategy in two recent meta-analyses. Complications of ES are avoided, and patients are treated with one procedure. However, true laparoscopic common bile duct exploration is a demanding technique that requires skills and experience that are not universally available. The patient is treated by one procedure, and, by using a rendezvous technique, the risk of post-ERCP pancreatitis can be reduced. When both surgical and endoscopic skills are available at the same time in the operating room, this although time consuming is a very efficient technique with a high success rate, low morbidity, and short hospital stay. These treatment options clearly have the advantage of immediate treatment of both bile duct and gallbladder stones [18].

In group B, LC (Laparoscopic cholecystectomy) was attempted in 30 patients, of which six (20%) were converted to open cholecystectomy due to gallbladder bed bleeding or dense adhesions in Calot's triangle or intraoperative CBD injury.

No differences were reported between ERCP preoperatively and intraoperatively regarding bile duct clearance, operative morbidity, conversion to an open procedure, and operation time. Although intraoperative ERCP is associated with lower complications, decreased hospital stay, and lower hospi-

tal costs, this treatment option is rarely performed [19].

In conclusion, if choledocholithiasis is suspected clinically, additional investigations should be conducted preoperatively to avoid the risk of a secondary operative intervention.

### Conclusion:

Shorter interval is associated with lower conversion rate, fewer post-operative blood transfusions, fewer wound infections with less operating time which is a surrogate marker for lesser intraoperative adhesions and other complications. Shorter interval is also associated with decreased hospital stay which depicts lower burden on hospital resources and on mean expenses. Longer interval is associated with recurrent symptoms, more intraoperative complications, more hospital stay, depicting a higher mean expense and a greater burden on health services. Short interval between endoscopic retrograde cholangiopancreatography and laparoscopic cholecystectomy is safe and effective method of treating cholelithiasis associated with choledocholithiasis. Moreover, the operating time was longer in patients who underwent cholecystectomy after 6 weeks, possibly due to scarring and fibrosis of the biliary tree and Calot's triangle, which may promote an error during dissection of the junction among cystic duct, common hepatic duct and **CBD**.

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## دراسة مقارنة بين استئصال المرارة بالمنظار فى وقت مبكر واستئصالها فى وقت متأخر بعد عمل منظار تراجعى للقنوات المرارية

تعتبر تقنية تصوير القنوات المرارية التراجعى مع بضع العضلة العاصرة بالمنظار متبوعاً باستئصال الحويصلة المرارية بالمنظار مقبولاً عمومًا كعلاج مفضل للمرضى الذين يعانون من تحص القناة الصفراوية الصفراوى المؤهلين لإجراء الجراحة. أظهرت الدراسات السابقة أن استئصال الحويصلة المرارية بالمنظار بعد منظار قنوات مرارية تراجعى يرتبط بمعدل تحويل مرتفع إلى جراحة مفتوحة.

يحدث تحص صفراوى فى ١٠-١٥٪ من المرضى الذين يعانون من أعراض مرض التهاب الحويصلة المرارية. يجب إزالة حصوات القناة الصفراوية المشتركة لتجنب المضاعفات مثل التهاب البنكرياس الحاد والتهاب القنوات الصفراوية.

يشمل العلاج الجراحى التقليدى لحصوات القنوات المرارية تصوير القنوات الصفراوية أثناء العملية متبوعاً بقطع القناة الصفراوية مع استخراج الحصوات ووضع أنبوب على شكل حرف تي. كان هذا الإجراء أبسط وأكثر وضوحاً منذ وضع المبادئ التوجيهية للتعامل مع حصوات القنوات المرارية. تم تغيير الخيارات الحالية المتاحة لمرض حصوات المرارة المرتبط بتهص صفراوى بسبب ظهور تقنيات وأدوات تنظيف البطن. تشمل طرق العلاج الجديدة عمل منظار قنوات مرارية تراجعى ما قبل استئصال الحويصلة المرارية بالمنظار وقطع العضلة العاصرة بالمنظار، او عمل منظار قنوات مرارية تراجعى أثناء الجراحة، او بعد الجراحة، وكذلك استكشاف القنوات عبر القناة المرارية بالمنظار، واستكشاف البطن بالمنظار. استئصال المرارة بالمنظار هو العلاج القياسى لحصوات المرارة المصحوبة بأعراض.

أظهرت تجربة سريرية حديثة أنه تم تجنب الأحداث الصفراوية المتكررة فقط إذا تم عمل استئصال الحويصلة المرارية خلال فترة زمنية قصيرة بعد منظار القنوات المرارية. إذا تم تأجيل العملية لمدة ٦-٨ أسابيع، وهى لا تزال السياسة المتبعة فى العديد من المراكز، فإن ٣٦٪ من المرضى يصابون بأحداث صفراوية متكررة فى الفترة ما بين المنظار واستئصال المرارة. أظهرت الدراسات السابقة أن استئصال الحويصلة المرارية بالمنظار بعد قطع العضلة العاصرة بالمنظار هو أكثر صعوبة من استئصال الحويصلة المرارية فى تحص صفراوى غير معقد: تم الإبلاغ عن أن معدل التحويل بعد قطع العضلة العاصرة بالمنظار سابق يصل إلى ٨-٥٥٪ مقابل أقل من ٥٪ فى المرضى الذين يعانون من مرض غير معقد. ، ٦-١١ يُعتقد أن المسببات ناتجة عن تمزق العضلة العاصرة لـ اودى وما تلاه من استعمار جرثومى للقناة الصفراوية مما يؤدي إلى التهاب وتندب لاحق فى الرباط الكبدى الاثنى عشرى مما يعوق تشريح مثلث كالوت. تم تعزيز نظرية الارتجاع والاستعمار البكتيرى هذه من خلال اكتشاف أن العصارة الصفراوية فى المرضى الذين خضعوا لبضع المصرة مستعمرة فى حوالى ٦٠٪ من المرضى. إذا كان استئصال الحويصلة المرارية بالمنظار بالفعل أكثر صعوبة بعد منظار قنوات مرارية، فقد يكون من المفيد إجراء هؤلاء المرضى لعملية جراحية بواسطة جراح مناظير ذو خبرة لتقليل مخاطر تحويل والمضاعفات اللاحقة.