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Best Time for Laparoscopic Cholecystectomy Following Endoscopic Sphincterotomy Post Endoscopic Retrograde Cholangiopancreatography: A Prospective Observational Study

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Abstract

Background: Choledocholithiasis occurs in 10–15% of patients with symptomatic gallstones. Stones in the common bile duct ought to be removed to avoid complications like acute pancreatitis and cholangitis.
Objective: To estimate the timing of Laparoscopic cholecystectomy after endoscopic sphincterotomy (post endoscopic retrograde cholangiopancreatography) and its outcomes.
Patients and Methods: A clinical prospective comparative study was done in the Surgical Department of Rizgary Teaching Hospital in Erbil during the period from 1st of January 2019 to 1st of December 2021 on a sample of 50 patients with Common Bile duct stones categorized into two groups; group I (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 surgical duration for group I patients was significantly shorter than the mean surgical duration for group II patients (p=0.02). The mean hospital stay duration for group I patients was markedly shorter than the mean hospital stay duration for group II patients (p<0.001). There was an obvious association between the two groups regarding wider cystic duct, and intraoperative adhesions.Both findings were found more in group II.
Conclusion: Earlier laparoscopic cholecystectomy after endoscopic retrograde cholangiopancreatography has better intraoperative and postoperative outcomes than delayed laparoscopic cholecystectomy.
Keywords: Gall stones, Obstructive jaundice, endoscopic retrograde cholangiopancreatography

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Introduction

Choledocholithiasis occurs in 10–15% of patients with symptomatic gallstone disease. Common bile duct (CBD) stones ought to be removed to avoid complications like acute pancreatitis and cholangitis[1].

Traditional surgical treatment of CBD stones includes intraoperative cholangiography followed by choledochotomy with stone extraction and T-tube placement. This method was easier and more direct since the

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guidelines for open CBD exploration are defined[2].

The current choices available for gallstone-disease related choledocholithiasis have been changed since the advent of laparoscopic methods and instrumentation which includes endoscopic retrograde cholangiopancreatography (ERCP) before the surgery and endoscopic sphincterotomy, ERCP during and after the surgery, laparoscopic transcystic CBD checking, and laparoscopic choledochotomy[3].

There's a debate about the perfect management for CBD stones; ERCP and LC versus single-stage laparoscopy, postoperative ERCP versus laparoscopic choledochotomy, and preoperative versus postoperative ERCP [4]. Laparoscopic CBD exploration is still not broadly done because of the longer operative time, required advanced experience, and costly equipment [5].

ERCP remains the most excellent tool for treating CBD stones but the perfect timing of ERCP about LC isn't clearly defined [6]. The interval between ERCP and LC may vary from day to month [7]. The time impact on operation and operation result that passe between ERCP and LC isn't well known [6]. However, endoscopic ultrasound requires endoscopic skill capabilities making it not commonly utilized except in certain clinical scenarios [8, 9].

If the ultrasonography was uncertain, magnetic resonance cholangiopancreatography (MRCP) gives great anatomic detail and has a sensitivity and specificity of 95% and 89%, respectively, for recognizing Choledocholithiasis but it gives no therapeutic solutions [8]. The role of helical CT cholangiography can be very informative in recognizing CBD stones and frequently the diameter of the CBD can be measured. Its sensitivity can be as high as 95.5%. This modality isn't commonly utilized with the availability of MRCP which limits the need for this procedure [10, 11].

With the development of ERCP intraoperative CBD exploration becomes out of date since limited surgeons are experts in performing it and its high hazard and longer operative time required [12]. But the timing of laparoscopic cholecystectomy after common bile duct clearance by ERCP is an address of talk about [13].

Patients and Methods

Study design & settings

It is a clinical prospective comparative study done in the Surgical Department of Rizgary Teaching Hospital in Erbil from 1st January 2019 to 1st December 2021.

Study population

A total of 50 patients referred to the Surgical Department of the Hospital with CBD stone who underwent LC after ERCP with endoscopic sphincterotomy have been divided into two groups; group I (25) patients who underwent LC within 72 hours of ERCP (early); while (25) patients with LC beyond 3 days (1-6 weeks) of ERCP (delayed); were included in group II.

Inclusion criteria

Patients who have CBD stone (single/multiple) with or without cholecystitis who underwent LC following ERCP with endoscopic sphincterotomy and stone extraction with /without stent insertion.

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Exclusion criteria

Patients with pancreatitis, previous history of ERCP failure, radiation therapy, Pregnant women, previous abdominal surgery, unfit for G.A, LC with previous CBD exploration and LC in gall bladder carcinoma.

Data Collection

The data of patients were collected from them directly in a designed questionnaire. The questionnaire was arranged by the researcher. The questionnaire consists of the Demographic characteristics of study participants: Age and gender, ultrasound, MRCP, ERCP findings of study participants, intraoperative findings and complications and Postoperative hospital stay.

Patients' assessment

The diagnosis of Choledocholithiasis was made by a combination of clinical symptoms, laboratory investigations, abdominal ultrasound, MRCP and ERCP findings. Laparoscopic cholecystectomy was considered for all patients.

All patients had surgery under general anaesthesia with endotracheal intubation in the reverse Trendelenburg with the right side up position by using standard four-ports laparoscopic cholecystectomy.

The pneumoperitoneum was done by insufflating carbon dioxide gas with a veress needle closed method at a rate of 1-6 litre/min and fixed Co2 flow of about 200-400 ml/min to maintain pneumoperitoneum perioperatively. Intraperitoneal pressure was between 10 to 12 mmHg for all patients.

Surgery time was considered from the start to make the incision of the first port to the closure of the last port skin. We Irrigated the abdomen with normal saline during and at the finishing of the operation for those patients who had bile leakage and/or stone spillage, minimal bleeding and diluting bile and clotted material. Washing was done by normal saline infusion in the surgical site and the subdiaphragmatic space. The normal saline was suctioned immediately.

When indicated, closed tube drain insertion was through the most infra-lateral port and placed in the subhepatic space.

Surgery time with Intraoperative findings and complications were recorded for both groups including (open conversion, difficult Calot dissection, need for drain insertion, wider cystic duct, injury to the cystic duct and artery and omental or bowel adhesion to the gallbladder). All patients were followed postoperatively in the hospital and the duration of hospital stays was recorded.

Statistical Analysis

The data of patients were analyzed by application of the Microsoft Excel program and Statistical Package for Social Sciences (SPSS) version 23. The results were arranged in continuous variables and categorical variables. The Chi-square test and Fisher’s exact tests were used for categorical variables. Continuous variables were compared by independent sample t-test. A P-value of 0.05 or less was regarded as significant.

Results

No remarkable differences were seen between CBD stones patients of group I and group II in age (p=0.07) and gender (p=0.1) Table (1).

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Table (1): Distribution of demographic variables about study groups

Variable	Study groups				P
	I (<3 days)		II (≥3 days)		
	Numbers	%	Numbers	%	
Age in years					0.07* NS
<40	4	16.0	5	20.0	
40-49	5	20.0	4	16.0	
50-59	9	36.0	2	8.0	
≥60	7	28.0	14	56.0	
Gender					0.1** NS
Male	14	56.0	9	36.0	
Female	11	44.0	16	64.0	

* Fisher's exact test, **Chi-square test, NS=Not significant

No remarkable differences were seen between CBD stones patients of group I and group II regarding stones in GB (p=0.7) and common bile duct diameter +>10 mm (p=0.1). No remarkable differences were seen between CBD stones patients of group I and group II as all patients of the two study groups had common bile duct stones. There was a remarkable relation 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 (2).

Table (2): Distribution of ultrasonography and ERCP features about the study 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

The mean surgery duration for group I patients was markedly shorter than the mean surgery duration for group II patients (p=0.02). No remarkable differences were seen between CBD stones patients of group I and group II in relation to open conversion (p=0.07), difficult Calot dissection (p=0.7) and need for drain insertion (p=0.2) Table (3).

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Table (3): 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=Not significant, S=Significant

The mean hospital stay duration for group I patients was remarkably shorter than that of group II patients (p<0.001). There was remarkable relation between wider cystic duct and group II patients (p=0.04). No remarkable differences were seen between CBD stones patients of group I and group II in relation to intraoperative injury to cystic duct and artery (p=0.07), however, 12% of group II patients had an intraoperative injury to cystic duct and artery. A marked relation was noted 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 (4).

Table (4): 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, *** Fisher's exact test, NS=Not significant, S=Significant

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Discussion

In the current study, no remarkable differences were noted between CBD stones patients of different time intervals regarding age and gender. These findings mimic the results of Zhang *et al* [14] study in China which revealed no notable differences between 3 different groups of patients with different time intervals between ERCP with endoscopic sphincterotomy and laparoscopic cholecystectomy.

Our study showed no remarkable differences between patients regarding age and gender, with better outcomes associated with shorter time intervals. However, Matsui Y and Bazoua G in their studies were shown that the age and gender of patients had a significant effect on the incidence and outcome of laparoscopic cholecystectomy [15, 16].

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

In the present study, there was a remarkable relation between multiple stones and patients with shorter timing intervals between ERCP and LC. This mimics the results of Kostro *et al* [19] study in Poland, which found a remarkable difference in stone type between different groups of timing intervals between ERCP and LC and also reported that shorter time interval between ERCP and LC is commonly related to good outcomes.

The current study revealed that the mean surgery duration for group I patients was remarkably shorter than the mean operation time for group II patients (p=0.02). This result goes with results of Gorla *et al* study[20]. This longer time of surgical operation for patients with a longer periods between ERCP and LC is attributed to more intraoperative difficulties. Although no significant difference, open conversion was present in (12%) of patients who had longer time intervals. This result matches with the results of Aziret *et al* study [21].

In our study, no remarkable differences were noted between CBD stone patients of group I and group II in relation to difficult Calot triangle dissection and the need for drain insertion. These results mimic the results of Mohseni *et al* study [22]. In the current study, the mean hospital stay duration for group I patients was notably shorter than the mean hospital stay duration for group II patients (p<0.001). This finding mimics many kinds of literature such as Sahoo *et al* [23] studies in India and the El-Labban study in Egypt [24] which all reported that patients with earlier time intervals between ERCP and LC had shorter hospital stay duration than patients with later interval.

In our study, there were no notable differences were seen between CBD stones patients of group I and group II in relation to intraoperative injury to cystic duct and artery, although, 12% of group II patients had an intraoperative injury to cystic duct and artery. This finding differs from reports of the Machado study in Oman [25] which stated that delay in LC after ERCP lead to a higher risk of intraoperative injury to cystic duct and artery.

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Our study also showed a notable association between intraoperative adhesions and group II (p=0.004). Similarly, Friis *et al* [26] meta-analysis study in Denmark on 14 studies found that delay in LC after ERCP is highly related to intraoperative adhesions. Despite these findings, Grosek *et al* [27] studies in Slovenia found no remarkable differences in conversion rate, during surgery and after surgery complications between earlier and later LC after ERCP. These differences might be related to differences in time intervals and surgeons' skills in addition to the availability of surgical equipment between different centres.

Conclusions

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

Recommendations

Encouraging Surgeons to adopt the option of earlier laparoscopic cholecystectomy after ERCP.Further large-sized studies on the value of earlier laparoscopic cholecystectomy after ERCP must be supported.

Source of funding: The current study was funded by our charges with no any other funding sources elsewhere.

Ethical clearance: The ethical approval was taken from the ethical committee of Hawler medical university, college of medicine.An informed consent was obtained from all of the patients after a full explanation of the operation and the aim of the study was explained to the patients, and each patient ensured the confidentiality of collected personal information.The researcher assisted in the management of patients accordingly.

Conflict of interest: Nill

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أفضل وقت لاستئصال المرارة بالمنظار بعد قص العضلة العاصرة بالمنظار بعد التصوير الرجعي للقنوات الصفراوية والبنكرياس بالمنظار: دراسة قائمة على الملاحظة

د.ئةزي محمد ديوانه محمد امين [١]

الملخص

خلفية الدراسة: المرضى الذين يعانون من أعراض مرض الحصوة في المرارة ١٠-١٥ ٪ منهم يكون عندهم حصاة في القنات الصفراء. يجب إزالة حصوات القناة الصفراوية لتجنب المضاعفات مثل التهاب البنكرياس الحاد والتهاب الأقنية الصفراوية.

اهداف الدراسة: لتقييم توقيت استئصال المرارة بالمنظار بعد قص المعصر بالمنظار (تصوير البنكرياس والقنوات الصفراوية الرجعي بعد التنظير) ونتائجه.

المرضى والطرائق: دراسة مقارنة سريرية مستقبلية أجريت في القسم الجراحي في مستشفى رزكاري التعليمي في أربيل خلال الفترة من يناير ٢٠١٩ إلى ديسمبر ٢٠٢١ على عينة من ٥٠ مريضا يعانون من حصوات القناة الصفراوية مقسمة إلى مجموعتين ؛ المجموعة الأولى (٢٥) مريضا خضعوا لاستئصال المرارة بالمنظار في غضون ٧٢ ساعة من المنظار الرجعي للقنوات الصفراوية والبنكرياس (مبكرا) ، في حين تم تضمين (٢٥) مريضا خضعوا لاستئصال المرارة بالمنظار بعد ٣ أيام (١-٦ أسابيع) من المنظار الرجعي للقنوات الصفراوية والبنكرياس في المجموعة الثانية (المتأخرة).

النتائج: كان متوسط وقت العملية لمرضى المجموعة الأولى أقصر بكثير من متوسط وقت العملية لمرضى المجموعة الثانية (p=0.02). وكان متوسط مدة الإقامة في المستشفى لمرضى المجموعة الأولى أقصر بكثير من متوسط مدة الإقامة في المستشفى لمرضى المجموعة الثانية (ص<٠,٠٠١). كان هناك ارتباط كبير بين المجموعتين فيما يتعلق باتساع قناة كيس المرارة ، والالتصاقات أثناء الجراحة ، تم العثور على كلتا النتيجتين أكثر في المجموعة الثانية.

الاستنتاجات: استئصال المرارة بالمنظار المبكر بعد استئصال العضلة العاصرة بالمنظار الرجعي للقنوات الصفراوية والبنكرياس لديه نتائج أفضل في الجراحة وبعد العملية الجراحية من استئصال المرارة بالمنظار المتأخر.

الكلمات المفتاحية: حصاة المرارة،يرقان انسدادي، المنظار الرجعي للقنوات الصفراوية والبنكرياس

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