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**EARLY VERSUS DELAYED LAPAROSCOPIC CHOLECYSTECTOMY  
AFTER ENDOSCOPIC RETROGRADE  
CHOLANGIOPANCREATOGRAPHY IN CASE OF CALCULAR  
OBSTRUCTIVE JAUNDICE**

By

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**ABSTRACT:**

**Background:** The exact time for laparoscopic cholecystectomy (LC) following endoscopic retrograde cholangiopancreatography (ERCP) in patients with obstructive choledolithiasis is controversial. We aim to compare early versus delayed LC after ERCP as regards conversion rate, postoperative morbidity and hospital stay.

**Patients and Methods:** The study was conducted on 40 patients who underwent LC after ERCP due to calculi obstructive jaundice, from August 2010 to June 2011 at The Department of General Surgery, Minia university hospital. Patients were randomly classified to two groups; group 1 (early group, n=20) LC was performed within one week after ERCP, while group 2 (delayed group, n=20) LC was performed after 4 weeks.

**Results:** Conversion rate was significantly more incident when LC was delayed for more than 4 weeks after ERCP (20% in delayed group versus 5% in early group). The duration of surgery and the postoperative hospital stay in the early group was significantly shorter than that of the delayed group (39±9 minutes versus 55±12 minutes and 3±2.1 days versus 7±3.5 days respectively). Post-operative complications were 5% in the early group versus 30% in the delayed group.

**Conclusion:** It is recommended to perform LC early after ERCP as it is associated with low conversion rate, short operative time, short hospital stay and low incidence of postoperative morbidity.

**KEY WORDS:**

Laparoscopic cholecystectomy  
Endoscopic sphincterotomy.

Choledocholithiasis

**INTRODUCTION:**

Approximately 10% to 20% of patients under going cholecystectomy for cholelithiasis have coexisting common bile duct stones (CBDS)<sup>1,2</sup>. The current standard of treatment for calculi obstructive jaundice is endoscopic removal of the stones. Endoscopic sphincterotomy (ES) is widely accepted as the treatment of choice for patients with CBDS. Stone extraction is successful in up to 97% of patients<sup>3</sup>. After endoscopic removal of bile duct stones, the need for

cholecystectomy in patients with concomitant gallstones is disputed.

Many authors contend that endoscopic management of bile duct stones with gallbladders left in situ is definitive treatment<sup>4,5</sup>. However, retrospective and prospective series have suggested that further biliary complications occur in more than 24% of patients after varying periods of follow up, and the rate of subsequent cholecystectomy is high and the cumulative risk for death is 21% within

5years (vs. 5.8% for patients allocated to planned cholecystectomy)<sup>6,7</sup>. In addition, the interval between laparoscopic cholecystectomy (LC) and ES may vary from days to months. The literature has a little data as regard the proper timing of cholecystectomy after endoscopic retrograde cholangiopancreatography (ERCP)<sup>8,9</sup>. Vries et al.,<sup>10</sup> compared the course of LC in 3 time interval groups; LC<2, 2-6, and >6 weeks after ES. On the other end of spectrum Roberto et al<sup>11</sup>, performed LC as soon as possible after ES. The results are controversial.

In this prospective study, the aim is to evaluate the effect of timing of laparoscopic cholecystectomy on the conversion rate and the postoperative complications in patients of calculous obstructive jaundice after ES.

#### **PATIENTS AND METHODS:**

The study included 40 patients considered for elective LC after ERCP for calculous obstructive jaundice from August 2010 to June 2011 at The Department of General Surgery, Minia university hospital. A written informed consent was given by all patients. All patients underwent clinical examination, ultrasound scanning of the abdomen and liver function tests. Common bile duct stones were strongly suspected if one or more of the following indications were present: jaundice and/or cholangitis, or asymptomatic CBDS identified by abdominal ultrasonography. Patients with acute cholecystitis or gallstone pancreatitis or failed ERCP were excluded from the study. For all the studied patients, ES and endoscopic stenting was performed after obstructive choledocholithiasis had been proved during ERCP. Patients were subjected to randomization by means of sealed envelopes, 20 patients underwent early laparoscopic cholecyst-

ectomy which mean that LC is done in the duration from<sup>1-7</sup> days from the time of ERCP (Group 1). The other 20 cases underwent delayed laparoscopic cholecystectomy which means that LC is done after 4 weeks from the time of ERCP (Group 2).

Preoperative treatment included intravenous fluids and appropriate antibiotics (cephalosporin with metronidazole). These agents were continued for at least 48 hours in the postoperative period. LC was performed by using the standard 4-trocar technique with the patient under general anesthesia with endotracheal intubation. Placement of the umbilical trocar was made under direct vision by making (10-12 mm) incision below the umbilicus and linea alba was elevated cephalad and divided. The peritoneum was punctured by the trocar under direct vision. Blunt dissection of cystic duct, cystic artery and removal of the gallbladder was done according to the standard technique. Drain was inserted in all patients. The operating time was calculated from the start of the incision until placement of the last suture. The operative time, hospital stay, conversion rate and post-operative complications were reported. Follow up was scheduled every 1, 3, 6 months and the patients were instructed to come if there is any other biliary manifestations. Biliary complications were defined as complications attributable to bile stones leading to cholecystitis, obstructive choledocholithiasis, or acute biliary pancreatitis.

#### **STATISTICAL ANALYSIS:**

Gathered data were processed using SPSS version 15 (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as means  $\pm$  SD while qualitative data were expressed as numbers and percentages (%). Student t test was used to test significance of

difference for quantitative variables while Chi Square and Fisher's exact tests were used to test significance of difference for qualitative variables. A probability value (p-value) < 0.05 was considered statistically significant.

### RESULTS:

Over 10 months period, 40 (27 females and 13 males) patients with calculary biliary obstruction subjected to treatment in Minia University Hospital by endoscopic retrograde cholangio-pancreatography (ERCP) and then early laparoscopic cholecystectomy (Group 1; n=20) or delayed laparoscopic cholecystectomy (Group 2; n=20). Patients in both groups (early and delayed) were matched to each other as regarding age, sex, laboratory and ultrasonographic characteristics.

The mean age was 38.8 years and 40.2 years in early and delayed groups respectively. Females were more than males, in the early group there were 14 female patients and 6 male patients and there were 13 female patients and 7 male patients in the delayed group. All patients were presented with jaundice, 38 of patients (95%) explained intermittent attacks of colicky pain while the other 2(5%) patients did not explain pain. Intermittent fever was presented by 12(30%) of patients while the other 18 patients (70%) did not explain fever. Dark discoloration of urine was noticed by 38 (95%) of patients while the other 2 patients did not explain any change. Changes in the consistency and color of stool were not observed by any of the patients in our study. Ultrasound was done in all cases of our study, stones were found in the 40 patients in CBD. The main diameter of the CBD was  $11.2\pm 1.3$  in group (1), and it was  $10.9\pm 1$  in group (2). The cause of the decrease in the diameter of the CBD in the delayed group; group (2), was that the LC is done late after 4

weeks giving more time for the performed ERCP and the inserted stent to relieve the obstruction. Total Bilirubin was elevated in all the 40 patients, mean level of total bilirubin in the early group (Group 1) was  $8.9\pm 1$  mg%, and it was  $3\pm 1.6$  mg% in the delayed group (Group 2). Alkaline phosphatase was found elevated in all cases of our study, mean level in the early Group was  $223\pm 32$  U/L and it was  $156\pm 43$  U/L in the delayed Group. Demographic data and patients characteristics as regard US finding and laboratory findings are summarized in (Table 1).

Duration of laparoscopic cholecystectomy in group 1 was from (1-7) days, and it was after 28 days in group 2. During the waiting period, 6 of 20 patients of group 2 (30%) developed recurrent biliary symptoms. Biliary colic was recorded in 4 patients (20%) and needed and responded on medical treatment. Cholangitis was detected in 2 patients (10%) and required hospital readmission with improvement on medical treatment. No cases of pancreatitis were diagnosed. The mean operative time in the early group was  $39\pm 7$  versus  $55\pm 12$  min in the delayed group (Unpaired student's t-test,  $P=0.0015$ ). The mean length of hospital stay in the early group was  $3\pm 2.1$  versus  $7\pm 3.5$  days in the delayed group ( $P=0.0003$ ). The conversion rate was 1 case (5%) in the early group versus 4 cases (20%) in the delayed group. It was significantly higher in the delayed group. The different causes of conversions were listed in table 2. The commonest reason was inflammatory adhesions in 4 patients and intraoperative bleeding that occurred in 1 patient. The postoperative complication rate was 1 case (5%) in the early group versus 6 cases 30% in the delayed group ( $P=0.002$ ).

The occurrence of bile leak was in 1 patient in the early group versus 2 patients in the delayed group. All were treated by conservatively as there was preoperative stenting that had done by ERCP in all cases prior to LC. No cases of postoperative bleeding were detected in early group versus 1 patient in the delayed group. He was diagnosed within 6 hours after LC. The bleeding stopped by two units of fresh frozen plasma and one unit of blood transfusion. No cases of subphrenic abscess were detected in both groups.

The incidence of wound infection was detected in two patients in delayed group but no patient in the early group. Recurrent CBD stones was detected in one case of the delayed group but not detected in the early group. There was no mortality related procedure in both groups. The patients characteristics as regard operative time, hospital stay, conversion rate, different causes of conversion and post-operative complications in both groups are summarized in (Table 2).

**Table (1):** Demographic data and patients characteristics as regard US finding and laboratory findings in the studied groups.

P value	Group (2)	Group (1)	Variable
NS*	40.2	38.8	Mean age (years)
NS**	13/7	14/6	Sex (Females/males)
NS*	10.9±1	11.2±1.3	US. CBD diameter
0.0001*	3±1.6	8±1.9	Total Bilirubin (gm/dl)
0.000012**	156±43	223±32	Alkaline phosphatase (IU)

NS: not significant. \* Unpaired student's t-test. \*\* Chi-square tests.

**Table (2):** Operative and postoperative outcome of the studied patients.

P value	Group (2)	Group (1)	Variable
0.006**	4 (20%)	1 (5%)	Conversion rate (%)
	3 (15%)	1 (5%)	Extensive adhesions
	1 (5%)	0 (0%)	Intraoperative bleeding
0.0015*	55±12	39±7	Mean operative time (min.)
0.0002*	7±3.5	3±2.1	Mean length of hospital stay (days)
0.002**	6 (30%)	1 (5%)	Postoperative complication rate:
NS**	1 (5%)	0 (0%)	Postoperative bleeding
NS**	2 (10%)	1 (5%)	Bile leak
0.03**	2 (10%)	0 (0%)	Wound infection
NS**	1 (5%)	0 (0%)	Recurrent CBD stones

NS: not significant. \* Unpaired student's t-test. \*\* Chi-square tests.

**DISCUSSION:**

The development of ERCP in the late 1980s and of laparoscopy in the 1990s changed the management of gallbladder and CBDS. Sequential ERCP and LC became the gold standard in treatment of cholithiasis<sup>10</sup>. Few studies have investigated the time interval between the two procedures and produce conflicting results. Certain studies<sup>10,12</sup> found that short interval is associated with fewer complications and lower conversion rate to open cholecystectomy while others found no association<sup>13</sup>. In the present study; we evaluated the difference between patients who underwent LC within (1-7) days after ERCP and those who underwent LC after 4 weeks of ERCP.

In the present study, the duration of laparoscopic cholecystectomy in group 1 ranged from 1 to 7 days, and it was after 28 days in group 2, this timing was agree with Hassanen<sup>14</sup> who operated the two groups at same times, and with Salman and colleagues<sup>12</sup> who operated the early group within 72 hours of ERCP and the delayed group at any time after 72 hours. Reinders and colleagues<sup>15</sup> had operated the early group within one week and the second group from 2 weeks to 4 weeks.

In the present study, we used one week to be a land mark for early LC. The choice of one week was based on two factors. The first is the assumption that the marked inflammatory reaction of hepatoduodenal ligament and anatomical structures of Calot's triangle was due to chemical inflammation due to injection of the contrast in the biliary tree during ERCP and this will reach to its maximum after the first week with possible secondary bacterial infection. The second factor was to get the advantage of doing LC during the same

hospital admission and consequently short hospital stay.

In the present study, the arbitrary choice of one week as a land mark for early LC is supported by the following results; the low conversion rate, the short operative time and the short hospital stay and low incidence of recurrent biliary complications and this was also agree with Reinders and colleagues<sup>15</sup>.

In the present study, during the waiting period in the delayed group, 6 of 20 patients (30%) developed recurrent biliary symptoms such as biliary colic, cholangitis, similar attacks have been reported by Hassanen<sup>14</sup> who reported (37.5%) recurrent biliary symptoms in the same group of 18 patients.

In the present study, the mean operative time in the early group was  $39 \pm 7$  min. and in the delayed group was  $55 \pm 12$  min, i.e. the mean operative time in the early group is shorter than that of the delayed group and this was agree with other authors who found significant reduction in operative time in the cases whom they had done early<sup>10,12,16</sup>. The operating time was longer in patient underwent delayed cholecystectomy possibly due to scarring and fibrosis of the biliary tree and Calot's triangle which make the surgeon very cautious during dissection of the junction between cystic duct, common hepatic duct and CBD.

In the present study, the mean length of hospital stay in the early group was significantly lower than that of the delayed group and this also was agree with other authors who found significant reduction in the hospital stay in the cases whom they had done early<sup>12,14</sup>. The patients in the delayed

group have significantly longer hospital stay than patients in the early group, may be partially due to increased number of patients who underwent open cholecystectomy and the more encountered postoperative complications in the delayed group.

In the present study, the conversion rate was significantly reduced in the early group than that of the delayed group; a significantly higher conversion rate was encountered when LC was performed 4 to 6 weeks after ERCP, as compared with 1 week after ERCP<sup>10</sup>. Reports of LC performed within days after ERCP show conversion rates as low as those for patients with uncomplicated cholelithiasis<sup>16</sup> and our study was also agree with Bostanci and colleagues<sup>17</sup> who found significant reduction in the conversion rate in the cases whom they had done early.

The conversion rate in our study was 5% in the early group and 20% in the delayed group. In the present study, the conversion rate was mostly due to inflammatory adhesions and this was agree with Bostanci and colleagues<sup>17</sup>. In the present study, the delayed LC was associated with a technically demanding operation as evidenced by a high conversion rate and prolonged operative time. We found that the inability to safely display and identify the junction of cystic duct, common hepatic duct and CBD correctly secondary to marked inflammation and dense adhesions was the main reason of conversion. The Inflammatory reaction is supposed to reach its peak after the first week and this was agree with other studies in literature<sup>17,18</sup>.

In the present study, the postoperative complication rate was 2.5% in the early group and it was 15%

in the delayed group, i.e. higher in the delayed group than the early group and this was agree with Reinders and colleagues<sup>15</sup>.

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## مقارنة استئصال المرارة بمنظار البطن في وقت مبكر مقابل إجراؤه في وقت متأخر بعد عمل منظار القنوات المرارية و البنكرياس

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**خلفية البحث:** إن الوقت المحدد لاستئصال المرارة بمنظار البطن بعد إجراء منظار القنوات المرارية و البنكرياس (ERCP) في المرضى الذين يعانون من انسداد القنوات المرارية لا زال محل خلاف و جدل .

**الهدف من البحث:** مقارنة استئصال المرارة بمنظار البطن في وقت مبكر مقابل إجراؤه في وقت متأخر بعد عمل منظار القنوات المرارية و البنكرياس (ERCP) فيما يتعلق بمعدل التحويل إلى الجراحة العادية بدلا من المنظار، ومعدل الاعتلال بعد العملية الجراحية و مدة الإقامة في المستشفى.

**المرضى وطرق البحث:** أجريت هذه الدراسة على 40 مريضا خضعوا لاستئصال المرارة بمنظار البطن بعد إجراء منظار القنوات المرارية و البنكرياس (ERCP) سبب اليرقان الانسدادي و قد تم تصنيف المرضى عشوائيا إلى مجموعتين: المجموعة الأولى ضمت 20 مريضا و تم إجراء العملية الجراحية في وقت مبكر (في غضون أسبوع واحد بعد ERCP)، في حين تم إجراء العملية الجراحية في المجموعة الثانية و التي ضمت 20 مريضا آخرين في وقت متأخر ( بعد 4 أسابيع).

**نتائج البحث:** كان معدل التحويل إلى الجراحة العادية 5% عند إجراء الجراحة في وقت مبكر مقابل 20% عندما أجريت الجراحة في وقت متأخر . كانت مدة الجراحة والإقامة في المستشفى بعد العملية الجراحية عند إجراء الجراحة في وقت مبكر أقصر بكثير عنها عندما أجريت الجراحة في وقت متأخر (9 ± 39) دقائق مقابل 12 ± 55 دقيقة و 2.1 ± 3 أيام مقابل 7 ± 3.5 يوما على التوالي. (وبعد العملية الجراحية كان معدل المضاعفات 5% عند إجراء الجراحة في وقت مبكر مقابل 30% عندما أجريت الجراحة في وقت متأخر).

**الاستنتاج:** من المستحسن القيام باستئصال المرارة بمنظار البطن في وقت مبكر بعد إجراء منظار القنوات المرارية و البنكرياس (ERCP) نظرا لمعدل التحويل المنخفض إلى الجراحة العادية، بالإضافة إلى الحاجة إلى وقت قصير لإجراء الجراحة، كما أن مدة البقاء في المستشفى قصيرة مع انخفاض معدل الاعتلال بعد العملية الجراحية.