

ORIGINAL ARTICLE

TIMING OF LAPAROSCOPIC CHOLECYSTECTOMY AFTER ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY

By

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Aim: To evaluate the effect of timing of laparoscopic cholecystectomy (LC) on the conversion rate and the postoperative complications in patients of calcular obstructive jaundice after endoscopic retrograde cholangiopancreatography (ERCP).

Methods: The study included all patients considered for elective LC after ERCP for calcular obstructive jaundice at The Department of General Surgery, Minia university hospital from January 2005 to January 2007. LC was planned and performed within 1 week (early group, 17 patients) or after 4 weeks (delayed group, 16 patients).

Results: The conversion rate was 5.8% in the early group versus 56.2% in the delayed group (Chi-square test, $P=0.006$). The mean operative time in the early group was 70 ± 33 versus 117 ± 45 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 ± 2.1 versus 7 ± 3.5 days in the delayed group (Unpaired student's *t*-test, $P=0.0003$). The postoperative complication rate was 11.7% in the early group versus 62.5% in the delayed group (Chi-square tests, $P=0.002$). The mean follow-up period was 12 ± 3.7 months.

Conclusion: The early LC after ERCP is preferred than delayed cholecystectomy because it has low conversion rate, short operative time, short hospital stay and low rate of postoperative complications.

Keywords: Endoscopic sphincterotomy, choledocholithiasis, cholecystitis.

INTRODUCTION

Approximately 10% to 20% of patients undergoing cholecystectomy for cholelithiasis have coexisting common bile duct stones (CBDS).^(1,2) The current standard of treatment for calcular 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.⁽³⁾ 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.⁽⁴⁻⁵⁾ 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 5 years (vs. 5.8% for patients allocated to planned cholecystectomy).⁽⁶⁻⁷⁾ In addition, the interval between LC and ES may vary from days to months. The literature has a little data as regard the proper timing of cholecystectomy after ERCP.⁽⁸⁾ Costi et al⁽⁹⁾ reported that 79% of the patients were operated upon 5 to 10 days after ES with a wide range from one day to 49 days. Vries et al⁽¹⁰⁾ 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⁽¹¹⁾ 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 calcular obstructive jaundice after ES.

PATIENTS AND METHODS

The study included all patients considered for elective LC after ERCP for calculi obstructive jaundice from January 2005 to January 2007 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 gallbladder and the bile ducts 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 was performed after obstructive choledocholithiasis had been proved during ERCP. A sphincterotome (Microvasive; Boston Scientific) was introduced over the guide wire and into the bile duct. Contrast (Urovideo) was administered through the sphincterotome to perform endoscopic retrograde cholangiography (ERC). When a CBDS was identified, sphincterotomy was carried out. A retrieval balloon (8.5- or 11.5-mm) or a stone retrieval basket was then used to remove the stone(s). Occlusion cholangiography was done at the end of every ERCP to ensure that no missed stones. If the CBD could not be cleared of stones, an endoscopic stent (Plastic Biliary Stents; Boston Scientific) was introduced to secure the bile flow. After two weeks, ERCP was repeated to remove the CBDS.

Laparoscopic cholecystectomy was planned and performed within 1 week (early group) or after 4 weeks (delayed group). This was done randomly by the use of sealed envelopes after ERCP. 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 using the Hasson technique. Blunt dissection of cystic duct and cystic artery 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 outcome of ERCP, complications of ERCP with ES and LC, and the rate of conversion from LC to an open procedure, hospital stay and mortality were recorded. Follow up was scheduled every 3, 6, 12 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. The recurrence of CBDS was defined as development of stones not earlier than 6 months after complete removal of previous bile duct stones⁽¹²⁾. Missed CBDS were defined as detection of stones earlier than 6 months after ERCP.

All the procedures were done by single surgeon (the author).

Statistical analysis: Collected data were tabulated. Numerical data were expressed by the mean \pm standard deviation and categorical data were expressed as number and percent (%). T-student test was used to compare numerical data, and Chi-square test was used to compare categorical data. P value was considered to be significant if it was <0.05 .

RESULTS

Between January 2005 and January 2007, 33 patients (20 female and 13 male) with a mean age of 48 ± 15.9 years, underwent successful ERCP. The characteristics of included patients were shown in table 1. After ES, stone extraction was done by use of dormia basket in 18 patients (54.5%), balloon in 7 patients (21.1%), and mechanical lithotripsy in 8 patients (24.4%). Stenting was needed in 2 patients for two weeks due to incomplete clearance of CBDS. A second ERCP was done for the two patients after two weeks with successful clearance of CBDS. The included patients are randomly divided into two groups: the early group (17 patients) and the delayed group (16 patients). The two patients who needed endoscopic stenting were included in the delayed group. In the delayed group, the mean time of waiting period until LC was 28 ± 11 days. During the waiting period, 6 of 16 patients (37.5%) developed recurrent biliary symptoms. Biliary colic was recorded in 4 patients (25%) and needed hospital readmission and responded on medical treatment. Cholangitis was detected in 2 patients (12.5%) and required hospital readmission with improvement on medical treatment. No cases of pancreatitis were diagnosed.

The conversion rate was 5.8% in the early group versus 56.2% in the delayed group (Chi-square test, $P=0.006$), table 2. It was significantly higher in the delayed group. The different causes of conversions were listed in table 1. The commonest reason was inflammatory adhesions in 6 patients. The mean operative time in the early group was 70 ± 33 versus 117 ± 45 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 ± 2.1 versus 7 ± 3.5 days in the delayed group (Unpaired student's t-test, $P=0.0003$).

The postoperative complication rate was shown in table 2. It was 11.7% in the early group versus 62.5% in the delayed group (Chi-square tests, $P=0.002$).

The occurrence of bile leak was in 1 patient in the early group versus 2 patients in the delayed group. All were treated by endoscopic stenting except in one patient in delayed group who had a major common bile duct injury and was treated by laparotomy and hepaticojejunostomy.

Table 1. Patients' characteristics.

Variable	Early group (17)	Delayed group (16)	P value
Mean age \pm SD (Years)	48 \pm 11.4	49 \pm 9.1	NS*
Gender (Female/Male)	11/6	10/6	NS**
Mean time before operation (days)	6 \pm 1.1	28 \pm 11	0.013*
Laboratory data:			
Total bilirubin (mg %)	8 \pm 1.9	3 \pm 1.6	0.0001*
Alkaline phosphatase (U/L)	156 \pm 43	223 \pm 32	0.000012*
Ultrasonic findings:			
CBD diameter (mm)	11.2 \pm 1.3	10.9 \pm 1	NS*
Recurrent biliary symptoms rate	0	37.5%	0.019**
Causes of conversion:			
Inflammatory edema	1	2	NS**
Extensive adhesions	0	6	0.0002**
Intraoperative bleeding	0	1	NS**

NS, not significant.

* Unpaired student's t-test.

** Chi-square tests.

No cases of postoperative bleeding were detected in early group versus 2 patients in the delayed group. Both were diagnosed within 6 hours after LC. The bleeding stopped in the first patient by two units of fresh frozen plasma and one unit of blood transfusion. The second patient needed laparotomy to control the bleeding from liver bed with uneventful recovery. No cases of subphrenic abscess were detected in early group versus 4 patients in the delayed group (Chi-square tests, $P=0.01$). They were diagnosed within three weeks after LC. They were treated by percutaneous aspiration under ultrasonic guide. None of them required laparotomy. The incidence of wound infection was detected in 1 patient (5.8%) in the early group versus 5 patients (31.2%) in the delayed group (Chi-square tests,

$P=0.03$). There was no mortality related procedure in both groups.

The mean follow-up period was 12 \pm 3.7 months. Recurrent CBDS were detected in two patients in the early group and two patients in the delayed group. They were treated by ERCP and balloon extraction.

DISCUSSION

Technological developments have defined eras in the management of cholelithiasis. The development of ERCP in the late 1980s and of laparoscopy in the 1990s changed the management of gallbladder and CBDS. Leaving the gallbladder in situ after successful endoscopic treatment of common bile duct stones is, however, controversial.⁽¹³⁾

Table 2. Outcome of patients.

Variable	Early group	Delayed group	P value
Conversion rate (%)	5.8%	56.2%	0.006**
Mean operative time (min)	70 \pm 33	117 \pm 45	0.0015*
Mean length of hospital stay (days)	3 \pm 2.1	7 \pm 3.5	0.0003*
Postoperative complication rate:			
Postoperative bleeding	0	2	NS**
Bile leak	1	2	NS**
Subphrenic abscess	0	4	0.01**
Wound infection	1	5	0.03**
Recurrent biliary stones	2	2	NS**

NS, not significant.

* Unpaired student's t-test.

** Chi-square tests.

Among patients with uncomplicated gallstone disease (without CBDS or need for ES), the conversion rate for LC is known to be 3% to 5%.⁽¹⁴⁾ In contrast, conversion to open cholecystectomy was necessary for more than 20% of the patients of complicated gallbladder disease.⁽²⁾ Possibly, the timing of LC after ES may have an influence on the difficulty of surgery. The surgeon who performed the cholecystectomy largely determined the exact time and date of surgery. Many surgeons believe that surgery is safer several weeks after ES.⁽¹¹⁾ The literature has little data for determining the optimal timing of cholecystectomy after ES. One study specifically considers the timing of LC after ES in relation to the conversion rate.⁽¹⁰⁾ A significantly higher conversion rate was encountered when LC was performed 2 to 6 weeks after ES, as compared with 1 week after ES.⁽¹⁰⁾ Reports of LC performed within days after ES show conversion rates as low as those for patients with uncomplicated cholelithiasis.⁽¹⁵⁾ In the present study, we have a low conversion rate when the operation was done within one week after ERCP. 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.⁽¹⁴⁾ In our 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.

The conversion rate is affected by the skills and learning curve of surgeons who are doing the LC. The surgeons performing LC during their learning curve are associated with a high conversion rate.⁽¹⁶⁾ In the present study, all patients in both groups were operated upon by a single surgeon. This eliminated the factor of different surgical skills which may affect the incidence of conversion rate.

Early LC after ES may prevent recurrent biliary complications, which are associated with increased postoperative morbidity and prolonged hospital stay.⁽³⁾ In the present study, the recurrent biliary manifestations may have been prevented by early LC (within 1 week after ES).

The role of surgery after successful ES for CBD stones remains controversial.⁽¹⁷⁾ Although it is traditionally considered an indication for cholecystectomy, several authors challenge the routine use of surgery after endoscopically accomplished CBD clearance.⁽¹⁸⁻¹⁹⁾ The rationale of this conservative attitude is that ES alone, besides treating choledocholithiasis, may prevent (or reduce) biliary complaints in a relevant number of cases.⁽²¹⁾ Therefore, many authors prefer to reserve LC only for patients experiencing untreatable, recurrent biliary symptoms or acute cholecystitis.⁽¹⁹⁻²⁰⁾

However, in our study the incidence of recurrent biliary symptoms were significantly higher in patients of delayed LC for 4 weeks. Interestingly, no cases of pancreatitis were diagnosed. This may be attributed to ablation of the biliary sphincter by ES which prevented the impaction of stones at sphincter of Oddi.

James et al,⁽²¹⁾ showed that 47% (27/59) of expectantly managed patients (wait and see) developed at least one recurrent biliary event after sphincterotomy during 2 years of follow up, compared with 2% (1/49) of patients who underwent laparoscopic cholecystectomy. However, after ES there is bile reflux from the duodenum to the biliary system and may lead to marked inflammatory reaction.⁽²²⁾ It was assumed that the infected bile after ES could contribute to wound infection, subphrenic abscess.⁽²³⁾ This was detected in 9/16 (56.2%) in the delayed group. Early LC is recommended after ERCP to lower such high infective complication rate.

Translation of the research to practice is the final aim of any research. In our Department, the early LC was the adopted policy and delayed LC was abandoned because it is associated with high conversion rate, prolonged operative time, prolonged hospital stay and high incidence of recurrent biliary symptoms.

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