

# One-stage versus sequential endoscopic retrograde cholangio-pancreatography and laparoscopic cholecystectomy in patients with symptomatic gallstones and suspected common bile duct stones

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## Abstract

*Introduction: The advantage of endoscopic and minimally invasive techniques has revolutionized the management of bile duct stones. Yet several controversies still surround the optimal means of investigation and treatment.*

*Aim: The aim of this study was to assess the feasibility of one-stage ERCP and LC and to compare the results with that of sequential ERCP and LC.*

*Patients and methods: Sixty patients complaining of calcular cholecystitis and suspected to have CBD stones were randomized into two groups by computer-generated random allocation software. Group I included 30 patients who underwent one-stage ERCP and LC. Group II included 30 patients who were treated with sequential ERCP and LC.*

*Results: Success rate in Group I was 26/28 (93%) while in Group II it was 24/27(89%). Failure rate in Group I was in 2/28(7%) while the failure rate in Group II was 3/27 (11%). The mean operative time in Group I was  $136 \pm 11.56$  min while it was  $145 \pm 12.89$  min in Group II. One patient in Group I developed mild attack of pancreatitis while in Group II, 2 patients developed pancreatitis, the first one on the second day post ERCP and the other patient developed an attack of pancreatitis during the interval period waiting for LC. No significant difference between both groups as regards successes and failure rates, operative time and post operative complications. The mean hospital stay in group I was  $1.8 \pm 0.23$  days while in group II it was  $4.7 \pm 0.85$  days and this was a statistically significant difference between both groups.*

*Conclusion: Single stage ERCP and LC can be safely performed with no technical difficulties. The advantages of the one stage procedure include one-stage treatment of cholelithiasis and choledocholithiasis, avoidance of another anesthetic session in short period and shorter hospital stay.*

*Keywords: Combined ERCP and LC, CBD stones.*

## Introduction:

Laparoscopic cholecystectomy (LC) has become the treatment of choice for patients with symptomatic cholelithiasis. Common bile duct (CBD) stones are found in 7–20% of patients with symptomatic gallstones. Treatment is essential because the presence of stones in the bile duct is related to severe complications (jaundice, acute pancreatitis or acute cholangitis and/ or post-cholecystectomy biliary leakage).<sup>1</sup>

The management of the CBD stones remains controversial because many different surgical strategies are available; one of these strategies

is the laparoscopic treatment (laparoscopic common bile duct exploration).<sup>2</sup> However, choledocholithiasis cannot usually be managed with a laparoscopic approach and combined endoscopic sphincterotomy and laparoscopic cholecystectomy is a potential solution to this problem.<sup>3</sup>

Endoscopic retrograde cholangiopancreatography (ERCP) performed either before or after laparoscopic cholecystectomy remains the most common approach but debate remains as to the best timing for ERCP in patients with suspected choledocholithiasis.<sup>4,5</sup>

Preoperative diagnostic and therapeutic ERCP are performed under general anesthesia for suspected CBD stones in symptomatic gallstone patients. Almost all patients undergo subsequent LC at another anesthetic session (sequential ERCP and LC).<sup>6</sup> With advances in surgical care, one day surgeries has become one of the most common and welcome approaches.<sup>7</sup>

A single stage approach combining LC and ERCP in the same anesthetic session has been described (one-stage ERCP and LC). The objectives of this approach are to reduce the number of anesthetic sessions, the length of hospital stay and hospital costs. Also ERCP followed by immediate laparoscopic cholecystectomy could decrease the risk of cholangitis and recurrent pancreatitis.<sup>8</sup>

The interval between ERCP and LC may vary from days to months. Usually, LC is performed 6 to 9 weeks after ERCP/ES. The performance of LC after ES is associated with a higher conversion rate than experienced by patients with uncomplicated cholelithiasis.<sup>9</sup>

The expected drawback of one stage approach is the post-ERCP bowel dilatation that might interfere with the LC operation leading to more operative complications. The aim of this study was to assess the feasibility of one-stage ERCP and LC and to compare the results with that of sequential ERCP and LC.<sup>6</sup>

#### **Patients and methods:**

This study was conducted between December 2006 and April 2009. After obtaining a clear informed consent, sixty patients complaining of calcular cholecystitis and suspected to have CBD stones were randomized into two groups by computer-generated random allocation software. Group I included 30 patients who underwent one-stage ERCP and LC. Group II included 30 patients who were treated with sequential ERCP and LC.

All patients enrolled in this study were diagnosed to have gallstones by ultrasound examination and suspected to have CBD stones depending on scoring system (score 4 or more) using the following parameters:<sup>10</sup>

- History of jaundice within 6 months (score 2).
- History of pancreatitis within 6 months (score 0.5).

- Bilirubin >+10% upper limit of normal (score 1.5).
- LFTs >+10% upper limit of normal (score 1).
- (One or more of AP, ALT or AST).
- Amylase >+10% upper limit of normal (score 0.5)
- Dilated CBD on U/S • 6 mm (score 1.5).
- Stone in CBD on U/S (score 3).

Exclusion criteria included patients with acute pancreatitis, acute cholangitis or failed ERCP.

ERCP in Group I was performed by the surgeons in the operating room under C arm and general anesthesia. If CBD stones were found, endoscopic sphincterotomy (ES) was then performed and the stones were extracted using Dormia basket or balloon catheter. If negative ERCP, ES and balloon trawling was done. After clearance of the CBD, changing the patient into supine position and laparoscopic cholecystectomy was performed using the standard four port technique and CO<sub>2</sub> insufflation. Naso-gastric tube was inserted in all patients to evacuate air from the stomach.

ERCP in Group II (the sequential group) was also performed under general anesthesia. Following ERCP, patients underwent LC either in the same admission or another admission within 2 months. The duration between the two procedures was defined as the treatment interval which ranged from one day to 2 months. LC in Group II was also performed using standard four port technique and CO<sub>2</sub> insufflation.

Success rate (successful LC after ERCP), operative time, complications and length of hospital stay in both groups were recorded.

#### **Results:**

At the start of this study, 60 patients were included divided equally into two groups but throughout the study, 5 patients (2 patients from Group I and 3 patients from Group II) were excluded due to failed ERCP (either failed cannulation or failed stone extraction as the stone was big in size so open procedure was used). So the number was reduced to 55 patients. The demographic data was shown in **Table(1)**.

*Table (1): The demographic data of patients in both groups.*

	Age			Sex		
	min	max	Mean $\pm$ SD	male	female	total
Group I	23	62	42 $\pm$ 9.57	13	15	28
Group II	28	65	45 $\pm$ 8.49	14	13	27

No significant difference between both groups.

### Operative results:

Success rate in Group I was 26/28 (93%) while in Group II it was 24/27(89%). Failure rate in Group I was in 2/28(7%). The Two cases had succeeded ERCP but failed LC, one case due to sever adhesions and the other case due to bleeding. No cases were converted due

to intestinal distension from ERCP. The failure rate in Group II was 3/27 (11%). In those cases, ERCP succeeded but LC failed due to sever adhesions. Although the failure rate was higher in Group II but it was not significantly different **Table(2)**.

*Table (2): Success and failure rate in both groups.*

	Group I	Group II	P value
Success of LC after ERCP	26	24	>0.05
Success of ERCP and failure of LC	2	3	
Negative ERCP	2	1	

The mean operative time in Group I was 136 $\pm$ 11.56 min while it was 145 $\pm$ 12.89 min

in Group II with no significant difference between both groups **Table(3)**.

*Table (3): The operative time in both groups.*

	Minimum	Maximum	Mean SD	P value
Group I	85 min	175 min	136 $\pm$ 11.56 min	>0.05
Group II	110 min	190 min	145 $\pm$ 12.89 min	

### Complications:

One patient in Group I developed mild attack of pancreatitis on the second day due cannulation of pancreatic duct during ERCP, the patient was managed conservatively and discharged from the hospital on the 5th day. In Group II, 2 patients developed pancreatitis, the first one on the second day post ERCP and was managed conservatively and discharged

from the hospital on the 4th day. The other patient developed an attack of pancreatitis during the interval period waiting for LC and was admitted to the hospital and managed conservatively and discharged from the hospital after 5 days. There was no significant difference between both groups as regards post operative complications **Table(4)**.

*Table (4): Post operative complications in both groups.*

	Group I	Group II	P value
Post ERCP pancreatitis	1	2	>0.05
Biliary leakage	0	0	
Abdominal distension	2	0	
Total	3	2	

The mean hospital stay in group I was 1.8±0.23 days while in group II it was 4.7±0.85 days and this was a statistically significant difference between both groups **Table(5)**.

*Table (5): Hospital stay in both groups.*

	Minimum	Maximum	Mean SD	P value
Group I	1 day	5 days	1.8±0.23 days	>0.05
Group II	2 days	8 days	4.7±0.85 days	

#### **Discussion:**

The advantage of endoscopic and minimally invasive techniques has revolutionized the management of bile duct stones. Yet several controversies still surround the optimal means of investigation and treatment.<sup>1</sup>

At the moment several therapeutic options are available, which include, the traditional laparotomy, endoscopic and laparoscopic techniques which can be combined in different ways.<sup>4</sup>

The choice is made on the basis of the operator's experience aiming to extend the benefits of minimally invasive surgery to this group of patients and so endoscopic bile duct stone clearance in conjunction with LC has been proposed either before or after LC.<sup>5</sup>

Some authors strongly advocate a cholecystectomy within 6 weeks of the initial biliary event as the conversion rate of LC after ERCP is higher than with a standard LC. They attribute this higher risk of conversion to an inflammation around the gallbladder, including the hepatoduodenal ligament, making a laparoscopic procedure more demanding.<sup>13</sup>

The aim of this study was to compare the results of one-stage ERCP and LC group and

the sequential group regarding success rate, postoperative complications, overall operative time and length of hospital stay.

In this study ERCP was done in the operating room by the same surgeon who did the laparoscopic cholecystectomy and this may facilitate the same session option, and eliminate any time delay in case the gastroenterologist was the one to do ERCP.

The baseline differences (in age, sex and the presentation of the patients between the two groups) were not statistically significant.

The success rate in the one-stage group (93%) was higher than in the sequential group (89%) but statically not significant. This disagrees with the study of Suvikapakornkul et al,<sup>6</sup> in which there were 52 patients with symptomatic gall- stones in whom CBD stones were suspected. Success rate of LC in the sequential group was 92% (35/38), and 64% (9/14) in the one-stage group (p = 0.03). In the study of Bekavac-Beslin et al,<sup>11</sup> there were 25 patients, laparoscopic cholecystectomy with perioperative ERCP and ES were performed for the treatment of cholelithiasis and choledocholithiasis. Success was achieved in all patients.

In this study the failure of LC in Group I which was attributable to ERCP was zero. The remaining failures in both groups were attributed to other causes than ERCP and there were no statistically significant difference between both groups. ERCP before LC in the one-stage group may have little effect on the subsequent performance of LC.

In this study there was no significant difference between both groups as regards postoperative complications (post ERCP pancreatitis, biliary leakage, abdominal distension and ileus). This comes with the results of Suvikapakornkul et al, and Matar.<sup>7</sup>

The median overall operative time in Group I was shorter than in the Group II: 136 minutes vs. 145 minutes, respectively (not significantly different). These results are very close to the results of Suvikapakornkul et al,<sup>6</sup> in which the median overall operative time was 137 minutes (range: 95 to 315 minutes) in the one-stage group and 155 minutes (range: 95 to 185 minutes) in the sequential group (p = 0.52).

In this study the hospital stay was significantly shorter in one stage group than in sequential group and this agrees with Matar, 2007.<sup>7</sup> In his study, the one stage group stayed in the hospital for a shorter time than the second group (2.1 days versus 9.3 days) which was statistically significant (p < 0.01).

Our results agree with Min et al,<sup>12</sup> in their study on one stage ERCP and LC, they achieved success rate 26/27 (96.3 %), the mean postoperative hospitalization was 3.32 ± 0.56 days and two cases were complicated transient hyperamylasemia so they concluded that intraoperative ERCP and endoscopic sphincterotomy combined with LC for treatment of cholelithiasis and choledocholithiasis is safe, effective and results in shorter hospitalization and fewer complications.

### Conclusion:

Single stage ERCP and LC can be safely performed with no technical difficulties. The advantages of the one stage procedure include one-stage treatment of cholelithiasis and choledocholithiasis, avoidance of another anesthetic session in short period and shorter hospital stay.

### References:

- 1- Targarona EM, Bendahan GE: Management of common bile duct stones: Controversies and future perspectives. *HPB (Oxford)* 2004; 6(3): 140-143.
- 2- Nardi M Jr, Perri SG, Pietrangeli F, Amendolara M, Dalla Torre A, Gabbrielli F, Nicita A, Lotti R, Piacentini F, Citone G: Sequential treatment: Is it the best alternative in cholecysto-choledochal lithiasis? *Chir Ital* 2002; 54(6): 785-798.
- 3- Boulay J, Schellenberg R, Brady PG: Role of ERCP and therapeutic biliary endoscopy in association with laparoscopic cholecystectomy. *Am J Gastroenterol* 2008; 87(7): 837-842.
- 4- Longhini A, Pellegrino R, Kazemian AR, Borelli P, Munarini G, Buccilli E, Marcolli G: Combined endoscopic and laparoscopic treatment of gallstones and bile duct stones. *Diagnostic and Therapeutic Endoscopy* 1999; 5: 223-229.
- 5- Thomas NG, Amaral JF: Timing of endoscopic retrograde cholangiopancreatography and laparoscopic cholecystectomy in the treatment of choledocholithiasis. *Journal of Laparoendoscopic & Advanced Surgical Techniques* 1999; 9(1): 31-37.
- 6- Suvikapakornkul R, Kositchaiwat S, Lertsithichai P: Retrospective comparison of one-stage versus sequential ERCP and laparoscopic cholecystectomy in patients with symptomatic gallstones and suspected common bile duct stones. *The Thai Journal of Surgery* 2005; 26: 17-21.
- 7- Matar ZS: Immediate versus interval laparoscopic cholecystectomy post ercp regarding safety, outcome and cost. *The Internet Journal of Surgery* 2007; 12(2): 1528-8242.
- 8- Enochsson L, Linberg B, Swahn F, Arnelo U: Intraoperative endoscopic retrograde cholangiopancreatography (ERCP) to remove common bile duct stones during routine laparoscopic cholecystectomy does not prolong hospitalization: A 2-year experience. *Surg Endosc* 2004; 18: 367-371.
- 9- Schiphorst AHW, Besselink MGH, Boerma D, Timmer R, Wiezer MJ, van Erpecum

- KJ, Broeders IAMJ, van Ramshorst B: Timing of cholecystectomy after endoscopic sphincterotomy for common bile duct stones. *Surg Endosc* 2008; 22: 2046-2050.
- 10-Soltan HM, Kow L, Toouli J: A simple scoring system for predicting bile duct stones in patients with cholelithiasis. *J Gastrointest Surg* 2001; 5(4): 434-437.
- 11-Bekavac-Beslin M, Mijic A, Supanc V, Hochst TH, Kuna T, Halkic N, Peric M: Laparoscopic cholecystectomy and perioperative ERCP. *Hepatogastroenterology* 2000; 47(35): 1221-1222.
- 12-Min G, Wen Z, Jian-ming S, De-fei H, Yi-ping M, Jian-guo W, Yao-dong W: Intraoperative ERCP and endoscopic sphincterotomy combined with laparoscopic cholecystectomy for treatment of cholelithiasis with choledocholithiasis. *Journal of ZI-jiang University (SCIENCE)* 2000; 4: 456-458.
- 13-de Vries A, Donkervoort SC, van Geloven AAW, Pierik EGJM: Conversion rate of laparoscopic cholecystectomy after endoscopic retrograde cholangiography in the treatment of choledocholithiasis Does the time interval matter? *Surg Endosc* 2005; 19: 996-1001.