ERCP's Role in the Management of Acute Biliary-pancreatic Pathology in the Laparoscopic Era

J. C. Martín del Olmo, PhD, M. Toledano, MD, J. I. Blanco, PhD, C. Cuesta, MD, M. Carbajo, PhD, C. Vaquero, PhD, L. Inglada, PhD, R. Atienza, PhD, F. Martín, PhD

ABSTRACT

Objectives: Laparoscopic cholecystectomy (LC) combined with endoscopic retrograde cholangiopancreatography (ERCP) has been widely used in the management of the acute biliopancreatic pathology. Nevertheless, controversy remains about the appropriate timing for retrograde cholangiopancreatography.

Methods: A retrospective study was undertaken on a consecutive series of 117 patients with acute biliary-pancreatic pathology, who underwent laparoscopic cholecystectomy between April 1995 and April 1999. Criteria for preoperative endoscopic retrograde cholangiopancreatography were defined, and the patients were divided into 3 groups based on the presence or absence of a preoperative retrograde cholangiopancreatography indication: (1) ERCP+LC group: patients with retrograde cholangiopancreatography indicated and performed (n = 30); (2) LC group: patients without retrograde cholangiopancreatography criteria treated only by LC (n = 47); (3) LC-ERCP group: patients with retrograde cholangiopancreatography criteria but not performed (n = 40).

Results: The groups were similar in age, sex, ASA, and clinical diagnosis. No statistical differences occurred in operative times (73.8 min, 68 min, 67 min), major complications (3.3%, 4.25%, 12.5%), and mean postoperative stay (3.7 ± 4; 4.7 ± 2; 5.7 ± 2). Postoperative retrograde cholangiopancreatography had to be used, respectively, in 0%, 10.6%, and 7.5%. The best predictive criteria for common bile duct pathology were choledocholithiasis on an ultrasound scan and the presence of cholangitis. The other criteria tested had a low predictive value.

Conclusions: Preoperative endoscopic retrograde cholangiopancreatography followed by early laparoscopic chole-cystectomy can be performed safely in acute biliary-pancreatic pathology, avoiding 2-stage treatment of these patients and minimizing hospital stay and inconvenience to the patients. Nevertheless, this therapeutic/diagnostic tool must be used selectively.

Key Words: Acute cholecystectomy, Laparoscopic cholecystectomy, Retrograde cholangiopancreatography, Cholecystitis, Choledocholithiasis, Laparoscopic cholecystectomy.

INTRODUCTION

It has been soundly established that laparoscopic cholecystectomy (LC) can be performed safely in patients with acute biliary-pancreatitis.[1-4] Discussion persists, however, about the appropriate timing for endoscopic retrograde cholangiopancreatography (ERCP) and when it is indicated.

In recent years, different studies have advocated early ERCP before LC.[5,6] However, many centers still prefer a more conservative approach, keeping this diagnostic/therapeutic tool for postoperative complications.[7,8] Three main reasons exist for this type of management. First, many surgeons believe that early preoperative ERCP can worsen the process. Second, it has been postulated that many patients experience spontaneous passage of choledochal stones, making ERCP unnecessary. The third reason is the increased in-hospital stay, which is necessary with preoperative ERCP.

The objective of this study was to retrospectively compare the safety and effectiveness of preoperative versus selective postoperative ERCP in the management of patients with acute biliopancreatic pathology (ABPP).

MATERIALS AND METHODS

Between April 1995 and April 1999, a consecutive series of 117 symptomatic patients with ABPP were admitted to our center. All patients were investigated with a full blood count, liver function test, amylase, urea, electrolytes, coagulation, and conventional radiology. An ultrasound scan was performed between 24 and 48 hours after admission.

When used, preoperative ERCP was performed between 24

Department of General and Digestive Surgery, Medina del Campo Hospital, Valladolid, Spain (all authors).

Address reprint requests to: J. C. Martín del Olmo, Department of General and Digestive Surgery, Medina del Campo Hospital, Cta. De Peñaranda, km2, 47400 Medina del Campo, Valladolid, Spain. Telephone: 34 983 83 00, Fax: 34 983 83 80 07, E-mail: jcmolmo@wanadoo.es

and 96 hours after admission. As soon as all these tests were completed, surgery was performed according to the standard laparoscopic technique. Intraoperative cholangiography was not used. All the patients were treated in 1 stage, in an urgent way (<72 hours after onset of symptoms) or intermediately (>72 hours after onset of clinical manifestations), without a delay in elective LC.

To develop a retrospective study, criteria for preoperative ERCP were defined and included all patients with pancreatitis, cholangitis, an abnormal liver function test (ALFT), dilated common bile duct (DCBD), and choledocholithiasis. Based on these criteria, the patients were divided into 3 groups: (1) ERCP+LC group: patients in which preoperative ERCP was indicated and performed before LC (n = 30); (2) LC group: patients without ERCP criteria treated by LC (n = 47); (3) LC-ERCP group: patients with ERCP criteria but treated alone by LC (n = 40).

Statistical Analysis

Nonparametric data were analyzed with the Mann-Whitney U test for discrete variables. The complications were compared with the Fisher exact test. A p value <0.05 was regarded as significant.

RESULTS

No difference existed in age, sex ratio, and American Society of Anesthesiologists' (ASA) classifications of the series **(Table 1)**. The clinical presentation of the 3 groups is shown in **Table 2**. As would be expected, evident differences existed in the LC group versus the 2 others.

Hospital stay and operative times are shown in **Table 3**. No differences occurred in mean operative time and mean postoperative stay, but total hospital stay was longer in the ERCP + LC group ($p < 0.0001$) and in the ERCP-LC group ($p < 0.07$) versus the LC group.

Preoperative ERCP was performed between 24 and 96 (mean 78.4) hours after admission. The findings of the cholangiogram are shown in **Table 4**. All ERCP procedures were successfully completed. Two cases of upper gastrointestinal bleeding (UGB) occurred as complications of this technique. The mean delay between preoperative ERCP and LC was 4.6 days.

One death occurred in the ERCP+LC group (3%) due to intraperitoneal bleeding after surgery complicated with adult respiratory distress syndrome (ADRS). Major and minor complications are cited in **Table 5**. The incidence of major complications was 4.25% in the LC group (1 case of biliary fistula and 1 of retained stones), 12.56% in the ERCP-LC group (2 biliary fistula, 2 bile duct injuries, and 1 case of intraabdominal abscess), and 3.3% (hemoperitoneum) in the ERCP+LC group. In 6 cases (5.25%), the laparoscopic procedure was converted to open surgery.

In the ERCP+LC group, 16 (53.3%) of 30 preoperative ERCP patients had positive findings (choledocholithiasis), and if we consider patients with papillitis and biliary sludge, the total incidence of common bile duct (CBD) pathology is about 70%. However, when we considered the relative value of each individual criterion to serve as a CBD pathology predictor, choledocholithiasis on an ultrasound scan had an effectiveness of 83%; and in the case of cholangitis, it was 100%. The value of the other criteria used was abnormal liver function test, 66.6%; dilated common bile duct, 33.3%; and pancreatitis, 28.6%. This aspect did not change significantly (46%) when pancreatitis was associated with ALFT.

Three (7.5%) patients in the LC-ERCP group needed postoperative treatment with ERCP: choledocholithiasis, papillitis, and biliary fistula were the indications. In the LC group, 5 patients (10.6%) required postoperative ERCP, 3 for choledocholithiasis, 1 for papillitis, and 1 for biliary fistula. In the

Table 1.
Patient Status

Group	Age (yr/median)	Sex Ratio (F/M)	ASA I	ASA II	ASA III	ASA IV
ERCP + LC	69.25	15/15	13	12	5	0
LC	61.92	34/13	22	21	4	0
LC - ERCP	62.5	24/16	16	21	3	0

Table 2.
Clinical Presentation

	ERCP + LC	LC	LC - ERCP
Pancreatitis	7 (23.3%)	0	9 (22.5%)
Cholecystitis	7 (23.3%)	31 (66%)	15 (37.5%)
Obstructive jaundice	9 (30%)	0	0
Cholecystopancreatitis	5 (16.6%)	0	11 (27.5%)
Biliary colic	0	16 (34%)	5 (12.5%)
Cholangitis	2 (6.6%)	0	0

Table 3.
Operative Time and Length of Stay

	ERCP + LC	LC	LC - ERCP
Operating time (min)*	73.8 ± 27	68 ± 778	67 ± 511
Postoperative hospital stay (days)*	3.7 ± 4	4.7 ± 2	5.7 ± 2
Total hospital stay (days)†	10.8 ± 3	8.4 ± 3	10.46 ± 40.0001

*p = ns.
†ERCP+LC vs LC, p = 0.0001; LC-ERCP vs LC, p = 0.07.

Table 4.
Preoperative ERCP

ERCP Criteria	Cholangiogram	Treatment*
Pancreatitis (7)	Papillitis (4)	SP
	Choledocholithiasis (2)	SP + CBD clearance
	Papillitis + biliary sludge (1)	SP + CBD clearance
ALFT (6)	Papillitis (1)	SP
	Choledocholithiasis (4)	SP + CBD clearance
	Papillitis + biliary sludge (1)	SP + CBD clearance
Choledocholithiasis (6)	Choledocholithiasis (5)	SP + CBD clearance
	Papillitis + biliary sludge (1)	SP + CBD clearance
DCBD (9)	Papillitis (4)	SP
	Choledocholithiasis (3)	SP + CBD clearance
	Papillitis + biliary sludge (2)	SP + CBD clearance
Cholangitis (2)	Choledocholithiasis (2)	SP + CBD clearance

*SP = sphincterotomy

Table 5.
Postoperative Complications

	ERCP+LC	LC	LC-ERCP	P Value
Major complications				
Retained stones	0	1	0	ns
Bile duct injury	0	0	2	ns
Biliary fistula	0	1	2	ns
Intraabdominal abscess	0	0	1	ns
Hemoperitoneum	1	0	0	ns
Minor complications				
Bilioma	0	1	0	ns
Atelectasis	2	2	0	ns
Upper gastrointestinal bleeding	2	0	2	ns
Heart failure	0	0	2	ns

ERCP+LC group, no patients required postoperative ERCP.

DISCUSSION

Laparoscopic cholecystectomy appears to be a safe and cost-effective treatment option for acute biliary-pancreatic pathology (ABPP) management.[2,3,9] However, the role and timing of ERCP in these patients remains controversial.[7,10,11]

In biliary-pancreatic surgery for benign conditions, options include pre- and postoperative ERCP. An NIH Consensus statement recommends preoperative ERCP based on suspicion of CBD stones.[12] However, ABPP supports special features. In recent years, the indications for preoperative ERCP have been amplified to include cholangitis, pancreatitis, ALFT, and DCBD in ultrasound scans.[10,11,13] Some of these are accepted by most authors and institutions, but others like pancreatitis, DCBD, and ALFT are discussed.[7,10,11]

The main problem in establishing some concrete criteria resides in the fact that they have an excellent negative predictive value so that patients without them will be free of CBD pathology in about 90% to 92% of cases,[14,15] 92.3% in our series. Nevertheless, their positive predictive value is inferior, between 15% and 58%.[15,16] In our series, we found in the ERCP+LC group an incidence of choledocholithiasis of 53.3%. The only good predictive factors for CBD pathol-

ogy and thus a good indicator for preoperative ERCP were choledocholithiasis in an ultrasound scan, confirmed with ERCP in the 83% of patients, and cholangitis (100% associated with choledocholithiasis). The value of the other criteria used was significantly lower: pancreatitis 28.6%, ALFT 66.6%, and DCBD 33.3%. This suggests that approximately 50% of the ERCP procedures were unnecessary.

Therefore, we are in agreement with those authors who recommend more restrictive criteria for preoperative ERCP in these patients.[7,10,17] Probably in patients with moderate gallstone pancreatitis, without cholangitis, and with a non-persistent or a moderate increase in liver function tests, selective postoperative ERCP will be a better option, decreasing hospital stay and medical costs and saving unnecessary endoscopic procedures. The same conclusion could be applied to DCBD criteria.

Furthermore, in our series, when we compared the outcome of the patients included in the ERCP+LC and LC-ERCP groups, the accomplishment of the preoperative ERCP based on these 3 criteria (pancreatitis, ALFT, DCBD) does not seem to modify the evolution of the process. Moreover, in the LC-ERCP group, no patients were admitted with a diagnostic suspicion of choledocholithiasis and cholangitis, only 3 (7.5%) needed postoperative ERCP. This confirms that pancreatitis, DCBD, and ALFT are not very useful as cri-

teria for performing a preoperative ERCP in ABPP.

If we consider the observations made in the ERCP+LC and LC groups, it is evident that the only variable negatively affected by preoperative ERCP is the total hospital stay. This is another reason to restrict the procedure when it is not soundly indicated.

Surgical treatment of choledocholithiasis was not carried out because all ERCP procedures (preoperative and postoperative) were successfully completed and the CBDs could be cleared. At any rate, we usually do not approach choledocholithiasis with laparoscopic surgery.

CONCLUSION

In the same way as several previous reports,[10,14] our data show that selection of preoperative ERCP based on specific criteria leads to acceptable results and is a valuable option for management of acute biliary pathology, but ERCP should be performed selectively. Based on our observations as well as those of others, our selection criteria for preoperative ERCP have become stricter over time, and have been restricted to choledocholithiasis and acute cholangitis.

References:

1. Bender JS, Zenilman ME. Immediate laparoscopic cholecystectomy as definitive therapy for acute cholecystitis. *Surg Endosc*. 1995;9:1081-1084.

2. Bickel A, Rappaport A, Kanievski V, et al. Laparoscopic management of acute cholecystitis. Prognostic factors for success. *Surg Endosc*. 1996;10:1045-1049.

3. Garber SM, Korman J, Cosgrove JM, Cohen JR. Early laparoscopic cholecystectomy for acute cholecystitis. *Surg Endosc*. 1997;4:347-350.

4. Willsher PC, Sanabria JR, Gallinger S, Rossi L, Strasberg S, Litwin DE. Early laparoscopic cholecystectomy for acute cholecystitis: a safe procedure. *J Gastrointest Surg*. 1999;1:50-53.

5. Materia A, Pizzuto G, Silecchia G, et al. Sequential endoscopic-laparoscopic treatment of cholecystocholedocholithiasis. *Surg Laparosc Endosc*. 1996;6:273-277.

6. Meyer C, de Manzini N, Rohr S, et al. Treatment of lithiasis of the common bile duct by endoscopic sphincterotomy and laparoscopic cholecystectomy. *Ann Chir*. 1994;48:31-36.

7. Chang L, Lo S, Stabile BE, Lewis RJ, Toosie K, de Virgilio C. Preoperative versus postoperative retrograde cholangiopancreatography in mild to moderate gallstone pancreatitis: a prospective randomized trial. *Ann Surg*. 2000;1:82-87.

8. Hawsali A, Lloyd I, Caccuci B. Management of choledocholithiasis in the era of laparoscopic surgery. *Ann Surg*. 2000;66:425-430.

9. Isoda N, Ido K, Kawamoto C, et al. Laparoscopic cholecystectomy in gallstone patients with acute cholecystitis. *J Gastroenterol*. 1999;34:372-375.

10. Geron N, Reshef R, Shiller M, Kniaz D, Eitan A. The role of endoscopic retrograde cholangiopancreatography in laparoscopic era. *Surg Endosc*. 1999;13:452-456.

11. Sharma VK, Howden CW. Metaanalysis of randomized controlled trials of endoscopic retrograde cholangiography and endoscopic sphincterotomy treatment of acute biliary pancreatitis. *Am J Gastroenterol*. 1999;11:3211-3214.

12. National Institutes of Health Consensus development conference statement on gallstone and laparoscopic cholecystectomy. *Ann Surg*. 1993;165:290-296.

13. Poole GH, Yellapu S. Acute laparoscopic cholecystectomy. *Surg Endosc*. 2000;14:106-109.

14. Barkun AN, Barkun JS, Fried GM, et al. Useful predictors of bile duct stones in patients undergoing laparoscopic cholecystectomy. *Ann Surg*. 1994;220:32-39.

15. Houdart R, Perniceni T, Darne B, Salmeron M, Simon JF. Predicting common bile duct lithiasis: determination and postoperative validation of a model predicting low risk. *Am J Surg*. 1995;170:38-43.

16. Welbourm CRB, Haworth JM, Leaper DJ, Thompson MH. Prospective evaluation of ultrasonography and liver function test for preoperative assessment of bile duct. *Br J Surg*. 1995;82:1371-1373.

17. Tham TCK, Lichtenstein DR, Vandervoort J, et al. Role of endoscopic retrograde cholangiopancreatography for suspected choledocholithiasis in patients undergoing laparoscopic cholecystectomy. *Gastrointest Endosc*. 1998;47:50-56.