

ROLE OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY BEFORE AND AFTER LAPAROSCOPIC CHOLECYSTECTOMY

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Background: While the role of endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic sphincterotomy (EST) in the diagnosis and management of choledocholithiasis is well established, this study evaluates the usefulness of ERCP and EST in patients with symptomatic cholecystolithiasis and suspected choledocholithiasis before undergoing laparoscopic cholecystectomy (LC), and the role of ERCP-EST in the management of complications resulting from LC.

Materials and Methods: This paper reviews retrospectively our experience from 1992 to 1995. A total of 1221 LCs and 717 ERCPs were performed, out of which 257 ERCPs were performed on 225 patients who underwent LC (230 ERCPs before and 27 after). The age range was 10-85 years (mean 43.5). The study group comprised 148 females (66%) and 77 males (34%).

Results: The overall success rate for ERCP was 92% (96% for diagnostic and 88% for therapeutic). Choledocholithiasis was found at preoperative ERCP in 45% of cases. Prediction of choledocholithiasis was accurate in 46%, based on abnormal liver chemistry, and 70% when based on a combination of abnormal liver tests and dilated main bile duct (>7 mm) by ultrasound. In 40 cases of acute biliary pancreatitis, choledocholithiasis was found at ERCP in eight cases (20%). In the post-LC group, all eight cases with residual stones and seven of eight cases with bile leaks were successfully treated endoscopically. There were four cases with major duct injuries that required surgical management. The complications related to ERCP-EST included two cases of bleeding post-EST (one was controlled with injection therapy and the second one was managed surgically), and three cases of mild pancreatitis.

Conclusion: ERCP and EST are effective and safe in the diagnosis and management of choledocholithiasis, and facilitate LC for symptomatic cholelithiasis. The procedures are also valuable in the diagnosis and management of most complications resulting from LC.

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Key Words: Endoscopic retrograde cholangiopancreatography, endoscopic sphincterotomy, cholecystolithiasis, choledocholithiasis, laparoscopic cholecystectomy.

The increased demand for endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic sphincterotomy (EST) since the advent of laparoscopic cholecystectomy (LC) has been motivated mainly by the inability to perform laparoscopic exploration of the main bile duct (MBD) for stone removal. Laparoscopic exploration of MBD is evolving, but is still performed in few centers worldwide, mostly by transcystic methods and less commonly by choledochotomy.¹ MBD stones are present in 8% to 15% of patients under 60 years of age, and in 15% to 60% of patients over 60 years undergoing

and 90%. In expert hands and with the available necessary accessories, this rate rises to 95%, with a complication rate of about 10%, including a mortality rate of 1%.³⁻⁶ There is still an ongoing debate about whether to perform ERCP for suspected choledocholithiasis before or after LC.⁷ The aim of this study is to determine the usefulness of ERCP-EST in patients with symptomatic cholecystolithiasis and suspected choledocholithiasis prior to LC, and to determine the value of these procedures in the management of complications resulting from LC.

Materials and Methods

Between 1992 and 1995, 717 ERCPs and 1221 LCs were performed at King Fahad National Guard Hospital in Riyadh, Saudi Arabia. This is a tertiary care teaching institution and a referral center for hepatobiliary disease, with a liver transplant program. The case records of 225 patients who underwent 257 ERCPs (230 before LC and 27 after) were reviewed and pertinent data were recorded in a specially designed protocol. There were 148 females (66%), with an age range from 13 and 83 years (mean, 39

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cholecystectomy.² The overall success of ERCP-EST in the management of choledocholithiasis ranges between 80%

years) and 77 males (34%), with an age range from 10 to 85 years (mean, 51.7 years). All patients had symptomatic cholelithiasis. The indications for ERCP before LC were one or more of the following: abnormal biochemical tests of the liver at presentation; acute biliary pancreatitis; dilatation of the MBD (>7 mm) by ultrasound with or without choledocholithiasis; and a recent history of jaundice or abnormal liver tests. The indications for ERCP after LC included eight cases with residual stones, eight bile leaks, five cases with unexplained abnormal liver tests, and four cases of major bile duct injuries. Most of the procedures were performed two to three days after admission to hospital. The procedures were performed by three consultants and one skilled fellow, using standard duodenoscopes and under conscious sedation (demerol 50 mg and diazepam 2.5-7.5 mg intravenously). Needle-knife papillotomy was performed in 20 cases for therapeutic ERCP. Mechanical lithotripsy (Sohendra type, Wilson Cook) was used successfully in three cases. Failure to clear all stones from MBD for any reason was considered an unsuccessful outcome that invariably led to open cholecystectomy. LC was performed as early as possible following ERCP, usually after one or two days. Intraoperative cholangiography during LC was performed on patients with suspected choledocholithiasis.

Results

The overall success rate for ERCP was 92%. The success rate for diagnostic ERCPs was 96% and that for therapeutic procedures was 88%. Choledocholithiasis was found in 45% of the evaluated patients at preoperative ERCP. Of 40 cases with acute biliary pancreatitis, ductal stones were found in eight (20%) at ERCP. Erosions at the papillary orifice or cleavage of the orifice were common endoscopic findings in patients with acute biliary obstruction in whom no ductal stones were found at ERCP. These endoscopic findings indicated that spontaneous passage of a stone had occurred. Results of the liver biochemical tests of the studied patients are shown in (Table 1). Based on abnormal liver tests the prediction of choledocholithiasis was accurate in 48% of cases. The prediction reached 70% when abnormal liver tests were combined with dilated MBD (>7 mm) on ultrasound. ERCP-EST after LC was successful in all eight patients with residual MBD stones, and seven of eight bile leaks were successfully treated endoscopically. The site of the leak was the cystic duct remnant in seven patients and the proximal MBD in one case. The endoscopic management consisted of EST and stent placement in four patients, EST and removal of one MBD stone in one case, and EST alone in the remaining three cases. Four major duct injuries diagnosed endoscopically required surgical management (Table 2). The complications related to the ERCP-EST were bleeding in two cases after needle-knife papillotomy. In the first case, the bleeding was controlled by endoscopic injection therapy, and in the second patient surgical

intervention was required. Three patients developed mild and self-limited pancreatitis after the procedures.

Discussion

LC is replacing open cholecystectomy as the primary modality for the management of symptomatic cholelithiasis. The drawbacks of LC were initially the increased risk of biliary injury related to the learning curve,^{2,8-12} and the inability in most centers to perform laparoscopic exploration of the MBD. This led to a dramatic increase in the number of ERCPs performed preoperatively for patients with suspected choledocholithiasis, in order to facilitate LC. Routine ERCP before LC as advocated by some practitioners is not generally recommended. The benefits of ERCP in detecting unsuspected ductal stones in about 3% of cases are less than the risks of the procedure-induced complications. Furthermore, routine ERCP before LC is associated with higher costs and could exhaust available resources.¹²⁻¹⁴ In our study, preoperative ERCP detected MBD stones in 45% of the patients. We found that a combination of abnormal liver tests and a dilated MBD (>7 mm) by ultrasound predicted choledocholithiasis in 70% of cases. This is in agreement with other published data.¹⁶⁻¹⁸ Mild acute biliary pancreatitis was a poor predictor of choledocholithiasis in our study. In the 40 cases evaluated, MBD stones were found in eight (20%) at preoperative ERCP. Intraoperative ERCP-EST for choledocholithiasis performed on a small number of patients has not found acceptance due to the associated difficulties.¹⁹ We believe that when choledocholithiasis is suspected ERCP should be performed before LC. This will ensure the removal of most of the stones before LC. It will also address the management of large MBD stones before surgery and detect unsuspected biliary pathology, such as tumors. The decision to defer stone removal until after LC anticipates high expertise in biliary endoscopy and the availability of additional sophisticated accessories (electrohydraulic lithotripsy, laser and extracorporeal shock wave lithotripsy). Moreover, this approach carries the potential risk of cystic stump leakage from stone impaction, and failure to extract the stones endoscopically will force a second open surgical intervention. The role of endoscopic sphincterotomy in the young population has yet to be established, as data on the long-term consequences of EST are lacking in this group. Endoscopic removal of small MBD stones through the intact papilla after or without pneumatic dilatation of the sphincter is being increasingly performed.^{20,21} Whether there will be long-term

TABLE 1. Results of liver biochemical tests in patients who had preoperative ERCP.

Test	Patients with choledocholithiasis (N=90) Mean±Sem	Patients without choledocholithiasis (N=110) Mean±Sem
BR (mg/dL)	3.86±2.80	1.7±1.06
AP (U/L)	334.9±141.5	217.8±98.5

GGT (U/L)	456.8±280.5	321.0±176.6
ALT (U/L)	275.11±180.5	272.0±166.9
AST (U/L)	191.3±134.7	199.3±136.4

BR=bilirubin; AP=alkaline phosphatase; GGT= γ -glutamyltransferase; ALT =alanine aminotransferase; AST=aspartate aminotransferase. Upper limits of normal: BR 1 mg/dL, AP 136 U/L, GGT 85 U/L, ALT 65 U/L, AST 37 U/L.

TABLE 2. ERCP after laparoscopic cholecystectomy.

Indication	No. of patients	Management
MBD stones detected on intraoperative cholangiogram	8	EST + stone removal in all 8 patients
Bile leaks 7 from cystic duct remnant 1 from proximal MBD	8	7 treated successfully: EST + stent in 4; EST + stone removal in 1; EST alone in 2 patients
Major MBD injuries	4	All required surgical management
Abnormal liver tests	5	MBD stones found in 2 cases: removed after EST

MBD=main bile duct; EST=endoscopic sphincterotomy.

consequences to the sphincter from this approach remains to be seen. Most complications related to LC, such as residual stones and biliary leaks, can be treated effectively by endoscopy. However, the role of endoscopic management of biliary strictures is controversial. Early strictures resulting from inflammation and edema are most likely to benefit from endoscopic treatment. Major injuries of the bile ducts usually require surgical management. With respect to the timing of ERCP and LC, LC should ideally follow ERCP after one or two days in order to avoid stone migration from the gallbladder into the duct, especially if EST has not been performed. ERCP can be performed as soon as one day after LC, as dislodgment of cystic duct clips is not a real risk.⁷ On the other hand, a longer delay increases the risk of stone impaction and reduces the success rate of managing biliary strictures.

In our study, the complications related to ERCP-EST were low. In summary, we found ERCP-EST to be valuable and safe in the diagnosis and management of choledocholithiasis in patients undergoing LC, and in the management of most complications resulting from LC.

Further refinement of noninvasive methods to predict choledocholithiasis will reduce the number of negative preoperative ERCPs. Also the number of ERCP-ESTs performed before or after LC will decrease when laparoscopic exploration of the main bile duct becomes more widely practiced.

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