ASSESSMENT OF INDICATORS FOR PREDICTING CHOLEDOCHOLITHIASIS BEFORE LAPAROSCOPIC CHOLECYSTECTOMY

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Background: The objective of this report was to study the sensitivity of indicators used for predicting bile duct stones and their endoscopic removal before laparoscopic cholecystectomy.

Patients and Methods: A retrospective study was conducted on 104 patients who successfully underwent endoscopic retrograde cholangiopancreatogram (ERCP) before laparoscopic cholecystectomy at Riyadh Medical Complex between 1992 and 1994 (1412H-1414H). Six indicators—jaundice, biliary pancreatitis, stones in bile duct on sonography, dilated bile duct (>7 mm) on ultrasonography, dilated bile duct with deranged liver function test, and deranged liver function test without jaundice—were used for suspecting choledocholithiasis and endoscopic removal before laparoscopic cholecystectomy.

Results: Ultrasound correctly predicted bile duct stone in 75%, followed by dilated bile duct with deranged liver function test (46%). Clinical jaundice and biliary pancreatitis were equally sensitive indicators (42% each). Sensitivity of only dilated bile duct on ultrasonography in predicting duct stone was 36%. Deranged liver function without jaundice was the least sensitive (22%) of the predictors. Overall, these indicators correctly diagnosed bile duct stones in 34% of patients.

Conclusion: Until laparoscopic exploration of bile duct or a noninvasive technique, such as magnetic resonance cholangiopancreatogram (MRCP), is widely available, these predictors will help in selecting patients with bile duct stones for preoperative removal. Other workers have suggested combining these indicators to improve the predictive value.

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Laparoscopic cholecystectomy has rapidly become the procedure of choice for symptomatic gallstone disease. This has led to a fundamental change in the management of common bile duct stones. During the prelaparoscopic era, biliary duct stones and cholelithiasis were managed during the same operation, using intraoperative cholangiogram and common bile duct exploration. The laparoscopic exploration of choledocholithiasis, although available, is limited to a few centers, due to limited experience with this demanding technique.[1-4] Therefore, until the laparoscopic manipulation of bile duct is widely available, surgeons have relied on the endoscopic retrograde cholangiopancreatography (ERCP) and sphincterotomy for preoperative clearance of common bile duct stones.

Clinical, biochemical and sonographic criteria have been used to predict the presence of duct stones.[5] Since the introduction of laparoscopic cholecystectomy in our hospital, a similar policy of preoperative ERCP in patients with suspected bile duct stones has been adopted. This retrospective study was undertaken to evaluate the sensitivity of indicators used for predicting duct stones and endoscopic removal before laparoscopic cholecystectomy, and suggests ways to improve the selection criteria for identification of choledocholithiasis.

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Patients and Methods

The medical records of consecutive patients who had laparoscopic cholecystectomy or attempted laparoscopic cholecystectomy and subsequently converted to open cholecystectomy during the three-year period 1992-1994 (1412H-1414H) at Riyadh Medical Complex (RMC) were retrieved. Patients who were directly submitted to open cholecystectomy were not included in the study. From these records, those who were referred for ERCP and endoscopic removal of suspected bile duct stones were selected for analysis. The data collected on these patients included age, sex, mode of presentation, biochemical profile, sonographic findings, ERCP findings and complications related to this procedure. Analysis of this data formed the basis of this report.

TABLE 1. *Patient groups according to the indicators used for pre-operative ERCP and their findings (n=104).*

Indicators	Findings
Bile duct stones on ultrasonography (n=4)	Stones removed in 3 patients (75%)
Dilated bile duct on ultrasonography (>7 mm) + deranged LFTs (n=13)	Stones removed in 6 patients (46%)
Acute pancreatitis (n=12)	Stones removed in 5 patients (42%)
Clinical jaundice (n=12)	Stones removed in 5 patients (42%)
Dilated bile duct on sonography (>7 mm) (n=14)	Stones removed in 5 patients (36%)
Deranged LFTs (n=49), elevated alkaline phosphatase, SGOT, SGPT	Stones removed in 11 patients (22%)

LFT=liver function test; SGOT=serum glutamic oxaloacetic transaminase; SGPT=serum glutamate pyruvate transaminase.

All patients had full clinical examination, blood counts, biochemical analysis, including serum amylase estimation when indicated, and abdominal ultrasound examination. Patients were grouped according to the six indicators used for suspecting bile duct stones: 1) biliary pancreatitis—serum amylase >1000 IU/L on admission; 2) jaundice, clinically and biochemically; 3) dilated bile duct (>7 mm) on ultrasonography; 4) stones in bile duct on sonography; 5) deranged liver function (elevated alkaline phosphatase, SGOT, SGPT) test in the absence of clinical jaundice; and 6) dilated bile duct (>7 mm) on sonography with deranged liver function.

Results

During the three-year period, 753 patients were submitted for laparoscopic cholecystectomy. One hundred and eight (14%) of them were suspected to have biliary duct stones. They were submitted to preoperative ERCP for removal of duct stones. Successful cannulation was achieved in 104 patients (all the data given below relates to this group of patients). The ages of the patients ranged between 16 and 80 years (mean, 39.7), with the majority of them being female (78 patients, 75%). Table 1 presents the patient groups divided into indications and ERCP findings. Ultrasound-detected biliary duct stones had the best predictive value (n=4, 75%), followed by ultrasonographically detected dilatation of bile duct with deranged liver function (n=13, 46%). Stones were recovered from biliary tree in 42% each of patients presenting with biliary pancreatitis (n=12) and clinical jaundice (n=12). Ultrasound-detected biliary dilatation without derangement of liver function correctly predicted biliary duct stones in only 36% (n=14) of patients. Deranged liver functions test alone was the least sensitive indicator (n=49, 22%). Overall, stone recovery rate was 34% (n=35). One patient required two sessions to clear the common duct of all stones. Other abnormalities detected in 11 patients (10.5%) were papillitis (n=6), pancreatic divisum (n=2), papillary stenosis (n=1), Mirizzi's syndrome type I (n=1), and low insertion of cystic duct (n=1). Only one patient (0.9%) developed mild pancreatitis following ERCP. There was no mortality in the study group.

Discussion

Associated choledocholithiasis is present in 10%-15% of patients undergoing cholecystectomy.[6] This incidence rises with age and the duration of gallstone symptoms.[7,8] The increasing incidence of biliary duct stones with age was also noticed in our patients, except for the 50-59-year age group, for which no satisfactory explanation could be found.

Bile duct stones are associated with a high rate of severe complication,[9] such as cholangitis or pancreatitis. Therefore, they should always be removed. Since laparoscopic cholecystectomy has become the treatment of choice for symptomatic gallstone disease, the best clinical strategy to deal with choledocholithiasis is under debate.[10] Early reported results of laparoscopic choledocholithotomy are encouraging, but its availability is limited to a few centers.[1-3] This has resulted in an increasing trend in the use of ERCP to deal with bile duct stones. However, the controversy regarding its optimum timing, either before or after laparoscopic cholecystectomy, has not yet been settled.[11,12] Postoperative ERCP has been preferred by a few authors because it minimizes the cost and reduces morbidity.[11] The only drawback in this policy is that if ERCP is unsuccessful, it will lead to another operation. On the other hand, routine use of preoperative ERCP has been recommended,[13,14] but this has not received wide acceptance due to high cost and morbidity.

A widely adopted policy has been to select patients at risk for biliary duct stones for preoperative ERCP and bile duct clearance.[15-17] The criteria for selection have been based on clinical, biochemical and sonographic findings.[5,15-17] There has been renewed interest in intravenous cholangiography for detection of bile duct stones as newer contrast materials which are less allergenic and provide adequate imaging become available.[18] Magnetic resonance cholangiography is another new modality being used in the assessment of biliary tract disease. Preliminary results of MRCP are similar to those of more invasive ERCP,[19] but this imaging is not yet widely available.

Clinical jaundice, acute biliary pancreatitis, deranged liver functions, and dilated common bile duct or presence of stones in biliary tree on ultrasonography were used in this study as predictors of choledocholithiasis. They correctly predicted stones in bile ducts in 35 patients (34%). Other studies using very similar indicators[8] have reported stone detection rates of 32%-44%.[15,20,21]

Ultrasonography was the single most sensitive indicator, whereas deranged liver function tests in the absence of clinical jaundice alone were the least sensitive

criteria in the present study. Although most patients of gallstone-associated pancreatitis have been described to pass stones in the duodenum,[22] in this study, stones were recovered in 42% of patients with biliary pancreatitis. Others have also reported a yield of 37%-42% by ERCP in biliary pancreatitis.[21,23] This supports the view that preoperative ERCP may be beneficial in these cases.[21] Other abnormalities of biliary pancreatic duct were detected by preoperative ERCP in 11 patients (10.5%). Overall, the indicators used in this study correctly predicted abnormalities in 46 patients (44%).

One may contend that 58 patients (56%) with normal ERCP in the present series had to go through unnecessary discomfort and risk with preoperative ERCP. This could have been reduced by using strict predictive criteria. The use of an optimal model, by combining the predictive factors such as age, clinical jaundice, elevated alkaline phosphatase (ALP) and alanine aminotransferase (ALT), dilated CBD or presence of stones in biliary tree on sonography, will improve the sensitivity and patient selection for preoperative ERCP.[16,17] The added advantage of preoperative ERCP may be the knowledge of biliary tree abnormalities which might prevent the bile duct injuries.

In summary, stones detected by ultrasonography in bile duct, dilated bile duct with deranged liver function tests, clinical jaundice and recent attack of biliary pancreatitis, were found to be sensitive predictors of bile duct stone in this study. However, the selection of patients at risks for CBD stones can be improved by combining these clinical, biochemical and sonographic indicators as a model. Until laparoscopic choledocholithotomy is widely available, such patients can be safely managed by endoscopic removal of these stones before laparoscopic cholecystectomy.

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