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• CLINICAL RESEARCH •

Prospective study of scoring system in selective intraoperative cholangiography during laparoscopic cholecystectomy

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Abstract

AIM: To evaluate of scoring system in predicting choledocholithiasis in selective intraoperative cholangiography (IOC) during laparoscopic cholecystectomy (LC).

METHODS: The scoring system of predicting choledocholithiasis was developed during the retrospective study in 264 cases, and was tested in 184 to evaluate its predictive value in choledocholithiasis.

RESULTS: The scoring system was developed in a retrospective study of 264 cases, the statistical analyses showed the predictive factors included sex, transaminase levels, alkaline phosphatase level, bilirubin level, and common bile duct diameter on ultrasonography. The scoring system was used in 184 cases prospectively, of which, 3 of 162 (1.9 %) cases scoring <3 had choledocholithiasis, 17 of 22 (77.3 %) cases scores≥3 had choledocholithiasis. A case of scores≥3 or more prospectively should be considered highly intraoperative cholangiography during laparoscopic cholecystectomy.

CONCLUSION: The scoring system can predict choledocholithiasis and is helpful in selection patietns for intraoperative cholangiography.

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INTRODUCTION

Laparoscopic cholecystectomy (LC) has been extensively accepted since Mouret first successfully finished the procedure in 1987[1]. Whether intraoperative cholangiogram (IOC) during LC should be applied routinely is still controversial. Thus, we develop a scoring system to predict choledocholithiasis and recommend selection of IOC during LC.

MATERIALS AND METHODS

Retrospective study

Two hundred sixty-four cases of LC from January 1996 to June 1999 were analyzed. Before operation, choledocholithiasis in cases with cholecystolithiasis was not discovered by ultrasonography (US). During operation, 54 cases of cholecystolithiasis with choledocholithiasis and 210 cases of cholecystolithiasis without choledocholithiasis were confirmed by IOC. Sex, age, history of pancreatitis, jaundice, transaminase levels, alkaline phosphatase level, bilirubin level and diameter of common bile duct (CBD) on ultrasonography were evaluated as predictors of choledocholithiasis, and scoring system of selective IOC was designed.

Prospective study

From January 2000 to June 2001, the scoring system was carried out prospectively in 184 patients undergoing LC. Following evaluation, LC and IOC were performed, then the correlation of scoring results with choledocholithiasis was studied.

RESULTS

No choledocholithiasis in 264 patients undergoing LC was discovered by ultrasonography prior to operation. During LC, IOC found choledocholithiasis in 54 patients (Table 1).

Table 1 Factors predicting choledocholithiasis in 264 patients

Factor	No of cases with choledocholithiasis (54 cases)	No of cases without choledocholithiasis (210 cases)	Percentage (%)	*P*
Sex				
Male	27	40	40	<0.05
Female	27	170	14	
Age				
<55ys	34	112	23	
⩾55ys	20	98	17	<0.05
Pancreatitis				
Present	15	30	33	>0.05
Absent	39	180	18	
Jaundice				
Present	10	22	31	>0.05
Absent	44	188	19	
Transaminase				
Normal	31	201	13	
Elevated	23	9	72	<0.05
Alkaline phosphatase				
Normal	36	189	16	
Elevated	18	21	46	<0.05
Bilirubin				
Normal	31	205	13	
Elevated	23	5	82	<0.05
CBD diameter on US				
⩽8 mm	33	204	14	
>8 mm	21	6	78	<0.05

Multivariate analysis found that independent predictors of choledocholithiasis included sex, serum level of transaminase, alkaline phosphatase, and bilirubin, and CBD diameter on US. Therefore, the scoring system in regression analysis was established (Table 2).

Table 2 Scoring system of predicting choledocholithiasis

Factor	Criteria	Score
Sex	Female	0
	Male	1
Transaminase	Normal	0
	Elevated	2
Alkaline phosphatase	Normal	0
	Elevated	2
Bilirubin	Normal	0
	Elevated	3
CBD diameter on US	≤8 mm	0
	>8 mm	3
Total		11

The scoring system was used in 184 patients undergoing LC before operation. During LC, all of the patients were performed IOC(Table 3).

Table 3 Results of scores in 184 patients before LC

	Score											
	0	1	2	3	4	5	6	7	8	9	10	11
No of patients	107	49	6	3	1	2	1	3	2	2	2	6

During LC, choledocholithiasis was found in 20 patients by IOC, the relationship between scores and choledocholithiasis was showed in Table 4.

Table 4 Relationship between scoring results and choledocholithiasis in 184 patients undergoing LC

Score	No of patients with choledocholithiasis	No of patients without choledocholithiasis	Percentage
<3	3	159	1.9
≥3[a]	17	5	77.3

[a]$P<0.05$ *vs* score of less than 3.

A significant difference in predicting value scoring 3 or more and that of less than 3 was found according to the χ^2 test. Thus, evaluation of LC patient with scoring system preoperatively would be helpful in predicting choledocholithiasis. If patient were scored more than 3, IOC should be performed during LC.

DISCUSSION

With the popularization of laparoscope, the age of microtraumatic surgery has come and great changes have occurred in surgical operation and surgical ideology[2]. Gallstone is one of the common primary diseases of biliary tract. LC has become a conventional method to treat patient with symptomatic gallstones. IOC is one of the accurate and safe procedure used in LC, is helpful in finding abnormality of pancreaticobiliary tract[3], avoiding common bile duct injury[4-8], and detecting choledocholithiasis[9-11], thus, some recommended a routine IOC during LC[4,5,12]. Because majority of gallstones patients do not have choledocholithiasis, IOC will increase the patient' s cost and exposure to X-ray, however, some researches found that the value of IOC were limited[13-15], it is unnecessary to perform a routine IOC during LC. However, there are still 10-15 % of cholecystolithiasis patients who have choledocholithiasis[16]. Preoperative ERCP and IOC may be helpful to find choledocholithiasis[17-20].

Mahmud suggested that, some gallstones might slip into the cystic duct or the common bile duct during LC, and IOC is valuable of determing the choledocholithiasis, ERCP and EST were regarded as effective methods detecting choledocholithiasis[21]. Edye retrospectively analyzed 31 patients with choledocholithiasis treated by EST, and ERCP showed completely cleared common bile duct, but IOC during subsequent LC revealed common duct residual stones in 8 of these 31 patients. The author suggested that even after presumed endoscopic clearance of the bile duct stone, many patients (26 %) still harbored stones in common bile duct at the time of cholecystectomy. Therefore IOC during LC was recommended even after successful ERCP[22]. Some studies revealed that preoperative ultrasound is neither sensitive nor specific for detecting common bile duct dilatation or the presence of residual stones[23]. Some studies assessed the use of endoscopic retrograde cholangiopancreatography (ERCP), IOC, intraoperative laparoscopic ultrasonography (IOUS)[24-27]. Bege manifested that combined endoscopic and laparoscopic management of cholecystolithiasis and choledocholithiasis were a viable option and were optimized by endoscopic ultraosonography[28]. The combined procedures of endoscopic sphincterotomy and LC included one-stage treatment of cholelithiasis and choledocholithiasis, elimination of potential return to the operating room when postoperative ERCP were unsuccessful[29,30]. Ichihara concluded that intraoperative real time cholangiograms were helpful in detecting bile duct injuries or anomalies, and unsuspected bile duct stones[31].

We recommend that IOC during LC should be performed selectively. Digital C-arm can provide real-time imaging and obtain a clear cholangiogram easily. The protocol of selective IOC is still debatable. Snow analyzed the results of 2034 LC, and found that there were no false negative, bile duct injuries, or other complications attributable to routine IOC or selective IOC, and suggested that selective IOC were an effective method of verifying suspected choledocholithiasis and were safer and less expensive than routine IOC[32]. Abboud performed a meta-analysis of published data to evaluate preoperative indicators of choledocholithiasis, which included cholangitis, jaundice, dilated CBD on ultrasound, hyperbilirubinemia, elevated levels of alkaline phosphatase, pancreatitis, cholecystitis, and hyperamylasemia. The results showed that these predictors could be applied as guidelines for whether to investigate for duct stones before cholecystectomy[33]. Kim also suggested selective IOC, and the risk levels of the presence of choledocholithiasis were determined by the independent predictor including preoperative clinical, biochemical and sonographic variables[34]. However, Koo reviewed 420 cases of elective LC, IOC was routinely performed and acted as the reference standard for the presence of choledocholithiasis, and found that there were no predictive tests that could sufficiently increase an observer' s probability estimate of the presence or absence of choledocholithiasis to allow for "selective" IOC decisions[35].

By logistic regression analysis, our studies showed that sex, transaminase levels, alkaline phosphatase level, bilirubin level and common bile duct diameter on ultrasonography were independent predictors of choledocholithiasis. A scoring system was therefore designed with a total score of 11. Our prospective studies also showed that patients scoring more than 3 were at significant risk to have choledocholithiasis, and IOC should be performed during LC.

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