

## Original Article

# Role of ERCP in the Management of Predicted Mild Acute Biliary Pancreatitis

Yuk-Pang Yeung, Siu-Fai Lo and Andrew Wai-Chun Yip, Department of Surgery, Kwong Wah Hospital, Kowloon, Hong Kong.

**OBJECTIVE:** The role of endoscopic retrograde cholangiopancreatography (ERCP) in mild acute biliary pancreatitis is controversial. This study examined the results of ERCP in patients with predicted mild disease and analysed biochemical and imaging findings in relation to the occurrence of choledocholithiasis.

**PATIENTS AND METHODS:** There were 172 consecutive patients, admitted between January 1998 and December 2000, with the diagnosis of acute pancreatitis. All patients were investigated using transcutaneous ultrasonography and ERCP if biliary aetiology was suspected. Serum bilirubin and alkaline phosphatase were measured, together with abdominal ultrasonographic findings, as potential predictors for choledocholithiasis.

**RESULTS:** Biliary calculus was the aetiology in 62.8% of patients (108/172). Among these 108 patients, 79.6% (86/108) suffered from mild disease. There were only 80 patients who underwent ERCP, and the incidence of choledocholithiasis was 45% (36/80). Although significant correlation was shown between all three measured parameters (bilirubin, alkaline phosphatase and ultrasonographic abnormalities) and choledocholithiasis, their individual sensitivities, specificities and predictive values were low. Nonetheless, if all three tests were normal, the incidence of ductal stones was significantly lower than that in cases with abnormalities in any one of these parameters (4.8% vs 59.3%).

**CONCLUSION:** Routine ERCP is not recommended for patients with mild, acute biliary pancreatitis when there is no biochemical derangement or ultrasonographic evidence of a dilated biliary system. [*Asian J Surg* 2003; 26(4):197-201]

## Introduction

Management of acute pancreatitis is a hotly debated topic. Gallstone disease remains the leading aetiology, and the therapeutic approach in this laparoscopic era relies heavily on the efforts of endolaparoscopic surgeons. In recent years, there has been a tendency towards selective rather than routine performance of endoscopic retrograde cholangiopancreatography (ERCP) in mild acute biliary pancreatitis, as the selective policy saves on the costs and risks of unnecessary ERCP procedures. A recent prospective randomized study reported that up to 76% of ERCPs in mild biliary pancreatitis were unnecessary.<sup>1</sup> In an attempt to look at this issue in our own

population, a retrospective study of patients treated in our institution between January 1998 and December 2000 was conducted to identify, if any, a subgroup of patients who would not require routine ERCP investigation.

## Patients and methods

Acute pancreatitis was diagnosed if serum amylase was four-fold greater than normal, in the presence of a compatible clinical picture. Concurrent cholangitis was diagnosed if body temperature was elevated to greater than 38.5°C, with jaundice and/or a positive blood or bile culture. The diagnosis of biliary pancreatitis was based on demonstration of calculi within the

Address correspondence and reprint requests to Dr. Yuk-Pang Yeung, Department of Surgery, Kwong Wah Hospital, 25 Waterloo Road, Kowloon, Hong Kong.

E-mail: yeungyp@yahoo.com • Date of acceptance: 24<sup>th</sup> October, 2002

biliary tract or gallbladder by imaging studies and the absence of other known causes of pancreatitis such as hyperlipidaemia, hypocalcaemia and abdominal trauma. History of alcoholism was not considered an exclusion criterion in our study.

Upon admission, all patients were kept fasting and their blood pressure, pulse and urine output were monitored hourly. Body temperature was recorded every 4 hours and blood cultures were taken when body temperature exceeded 38°C. Intravenous fluid was given according to patients' hydration status. Blood tests were performed on admission, 48 hours after admission, and every other day until the attack subsided. Transcutaneous abdominal ultrasonography was performed within 24 hours of admission in most cases. The common bile duct (CBD) was considered dilated if it was more than 7 mm in diameter on ultrasound. We adopted Ranson's criteria for predicting the severity of pancreatitis.<sup>2</sup> In all predicted severe cases (Ranson's score > 2) or in those with concomitant cholangitis, ERCP was performed within 72 hours of admission.<sup>3,4</sup> For mild cases, ERCP was performed in the next earliest endoscopy section, which was usually more than 72 hours after admission. Patients with severe acute pancreatitis were transferred to the intensive care unit for close monitoring and treatment.

Following complete resolution of symptoms, cholecystectomy, if not already performed, was scheduled in the next available elective operating section. All patients discharged were monitored for any recurrent symptoms or attacks.

Serum bilirubin and serum alkaline phosphatase were measured and abdominal ultrasonography was performed for all patients, as these parameters were considered potential indicators for choledocholithiasis.<sup>5-8</sup> Their measurements were analysed for any correlation with the ERCP findings. Statistical analysis was performed using SPSS version 8.0 for Windows (SPSS Inc., Chicago, IL, USA). Values of *p* that were less than 5% were considered significant.

## Results

### *All pancreatitis patients*

There were 172 consecutive patients treated between January 1988 and December 2000 in the Department of Surgery, Kwong Wah Hospital, Hong Kong, with a diagnosis of acute pancreatitis. The aetiology of pancreatitis in 108 patients (62.8%) was related to biliary stones. The aetiologies of acute pancreatitis are listed in Table 1. There were 80 male and 92 female patients, with a median age of 64 years (range, 26-93

years). Of the 172 patients, 128 (74.4%) had predicted mild disease (Ranson's score, 0-2) and 44 (25.6%) had predicted severe disease (Ranson's score > 2). There were 64 (37.2%) patients who suffered from one or more of the following medical conditions: hypertension, ischaemic heart disease, diabetes mellitus, chronic obstructive lung disease and previous stroke. Concomitant cholangitis occurred in 26 patients (15.1%), all of whom were in the predicted severe acute pancreatitis group.

### *Mild biliary pancreatitis patients*

Of the 108 patients with biliary pancreatitis, 86 (79.6%) presented with predicted mild disease and recovered uneventfully. Of these 86 patients, ERCP was successfully performed in 80, five patients refused ERCP and one underwent surgery due to other intra-abdominal pathology. Of the 80 patients who underwent ERCP, 36 (45%) had ductal stones, all of which were successfully removed endoscopically. There was no ERCP-associated mortality. Two cases of post-sphincterotomy bleeding were controlled by endoscopic means. The overall complication rate was 2.5% (2/80).

The clinical and biochemical characteristics of patients with or without ductal stones are listed in Table 2. The sensitivity, specificity and predictive values of serum bilirubin, serum alkaline phosphatase and abdominal ultrasonography in predicting choledocholithiasis are provided in Table 3.

Of the 80 ERCP patients, 44 subsequently underwent cholecystectomy, with the presence of gallstones confirmed in all cases, followed by uneventful recovery. Of the remaining 36 patients, 14 had had a previous cholecystectomy, nine refused surgery, eight had subsequent surgery performed in other hospitals, and five were not offered surgery because of their significant medical comorbidities. In the group of patients

**Table 1.** Aetiology of acute pancreatitis

Aetiology	Patients n (%)
Biliary stone	108 (62.8)
Alcoholism	16 (9.3)
Hyperlipidaemia	12 (7.0)
Post-ERCP	6 (3.5)
Pancreas divisum	2 (1.2)
Biliary papillomatosis	1 (0.6)
Idiopathic	27 (15.7)
Total	172 (100)

ERCP = endoscopic retrograde cholangiopancreatography.

**Table 2.** Clinical and biochemical characteristics of patients with or without ductal stones (n = 80)

Patient data	Absence of ductal stones (n = 44)	Presence of ductal stones (n = 36)	p
Sex, M/F	10/34	18/18	0.087
Median age, yr (range)	63 (31–77)	69 (49–88)	0.11
Elevated serum ALP, n	20	31	< 0.01
Elevated serum bilirubin, n	10	28	< 0.01
Dilated ducts on US			
No	38	12	< 0.01
Yes	6	24	

ALP = alkaline phosphatase; US = ultrasonography.

**Table 3.** Sensitivity, specificity and predictive values of serum bilirubin, serum alkaline phosphatase and abdominal ultrasonography in predicting choledocholithiasis

Measured parameters	Serum bilirubin (%)	Serum alkaline phosphatase (%)	Transcutaneous ultrasonography (%)
Sensitivity	77.8	86.1	66.7
Specificity	77.3	54.5	86.4
Positive predictive value	73.7	60.8	80.0
Negative predictive value	81.0	82.8	76.0

without choledocholithiasis, there was no subsequent clinical presentation to us in relation to possibly missed CBD stones during ERCP.

There were 22 patients with normal serum bilirubin and alkaline phosphatase upon presentation, and their ultrasound studies showed no evidence of biliary dilatation. Of these 22 patients, 21 underwent ERCP and further treatment in our hospital, and only one (4.8%) had choledocholithiasis. On the contrary, if any one of the three parameters were abnormal, the incidence of biliary pathology was 59.3%.

## Discussion

Gallstone disease was the most common cause of acute pancreatitis in our study population (62.8%). The role of urgent or early ERCP is undoubted in severe biliary pancreatitis.<sup>3,4</sup> However, the diagnostic yield in mild biliary pancreatitis is highly variable, at 0% to 58% in recent literature.<sup>5,6</sup> In our study, 45% of mild pancreatitis patients had choledocholithiasis, and all bile duct stones were removed in one ERCP session with no mortality and low morbidity (2.5%). Therefore, for both diagnostic and therapeutic purposes, we believe that ERCP is an important adjunct in the treatment of acute biliary pancreatitis.

There is growing evidence to support the policy of selective ERCP in mild, acute biliary pancreatitis, based on biochemical and ultrasonographic criteria. A prospective study of 122 patients with acute gallstone pancreatitis demonstrated, in univariate analysis, significant differences in serum bilirubin and alkaline phosphatase levels between patients with and without CBD stones.<sup>7</sup> It was further shown, on multivariate analysis, that serum bilirubin on the second hospital day was the best predictor of persistent CBD stones.<sup>7</sup> Similar findings were also observed in another study in which none of nine patients with mild biliary pancreatitis and normal serum biochemistry had bile duct stones.<sup>6</sup> Sees and Martin also demonstrated in a retrospective study that CBD dilatation on ultrasound study was highly predictive of biliary stones in acute pancreatitis, though there were no other clinicobiochemical parameters that correlated with choledocholithiasis in that study.<sup>8</sup> The authors, therefore, concluded that ERCP is only indicated in mild biliary pancreatitis patients who present with an ultrasonographic finding of CBD dilatation.<sup>8</sup>

All three parameters (serum bilirubin, serum alkaline phosphatase and abdominal ultrasound) were particularly examined in our patients. For each, the sensitivity, specificity and predictive values were not high. It is, therefore, our suggestion that any single one of these tests is not powerful enough to predict choledocholithiasis. However, an important phenomenon occurs when we combine the three tests for analysis. If there was no elevated serum alkaline phosphatase or hyperbilirubinaemia, and there was no CBD dilatation on

ultrasound, the incidence of CBD stones was only 4.8% (1/21). However, if any one of these measurements was abnormal, the likelihood of choledocholithiasis was 59.3%, which was significantly higher than 4.8% when all three parameters were normal ( $p < 0.01$ ). Therefore, we recommend that the subgroup of patients with normal biochemical and ultrasound studies should no longer be indicated for routine ERCP. Other investigations that are less invasive than ERCP should be performed as ERCP is associated with considerable morbidity and mortality.<sup>9</sup>

Magnetic resonance cholangiopancreatography (MRCP) is non-invasive and there are more and more studies on the clinical usefulness of MRCP for the diagnosis of choledocholithiasis. Although a previous study suggested that CBD stones of less than 6 mm in diameter could easily be missed,<sup>10</sup> it was recently shown in another large prospective study that MRCP was highly accurate for the diagnosis of choledocholithiasis, with a sensitivity of 97.9% and a specificity of 89.0%.<sup>11</sup> MRCP appears to be an accurate non-invasive technique to image the biliary system, but more studies are required to consolidate its role and accuracy in the diagnosis of choledocholithiasis.

Apart from MRCP, endoscopic ultrasonography (EUS) is also highly accurate in predicting CBD pathology.<sup>12-14</sup> According to Liu et al, among their 100 acute pancreatitis patients, they found that EUS was more sensitive than transcutaneous ultrasonography in detecting gallbladder stones.<sup>14</sup> More importantly, they demonstrated that EUS was as accurate as ERCP in detecting the presence of ductal pathology and that EUS was highly specific (98%) in showing the absence of choledocholithiasis.<sup>14</sup> However, EUS requires expertise and is highly operator-dependent. Therefore, it is our belief that MRCP should be the investigation of choice, and that ERCP and EUS are considered to be too invasive for patients suffering from only mild pancreatitis.

If cholecystectomy is required, intraoperative cholangiography is the alternative to ERCP or other preoperative imaging techniques to check for ductal stones. Sees and Martin demonstrated in a retrospective study that the policy of laparoscopic cholecystectomy (LC) and intraoperative cholangiography was superior to preoperative ERCP followed by LC, because the latter group had a significant prolonged hospital stay, especially if pancreatitis occurred following the ERCP procedure.<sup>8</sup> Nonetheless, the main criticism of this study was that there was a relatively high rate of post-ERCP pancreatitis (19%, 6/31), which might have significantly affected their analysis.

In another study conducted in Europe,<sup>15</sup> all (32) patients with mild pancreatitis were treated with LC and intraoperative cholangiography, irrespective of any predictors for CBD stones. Only two patients (6%) were found to have CBD stones and all were successfully treated laparoscopically. Therefore, the authors support the policy of omitting preoperative ERCP in patients with mild biliary pancreatitis.<sup>15</sup> However, the overall incidence of ductal pathology in this European study was very low when compared to the 45% in our series and the 24% in another recent report.<sup>1</sup> Therefore, it is imprudent to conclude that ERCP should be totally omitted in all cases of mild pancreatitis.

In another interesting report using a decision analysis model, Arguedas et al proposed several strategies for imaging the biliary system in acute pancreatitis patients before cholecystectomy, and the cost-effectiveness of each treatment strategy was examined.<sup>16</sup> They found that at a probability of CBD stones of less than 15%, intraoperative cholangiography was the least expensive strategy. Thus, they concluded that intraoperative cholangiography was the preferred and most cost-effective method to image the biliary system in mild biliary pancreatitis.<sup>16</sup> Taking into account our results and those from other reports,<sup>15,16</sup> it is reasonable to suggest that mild pancreatitis patients with normal biochemistry and preoperative ultrasound do not need routine preoperative ERCP or other imaging modalities, and cholecystectomy should proceed along with intraoperative cholangiography.

## Conclusion

Routine ERCP is not recommended for patients with mild acute biliary pancreatitis when there is no biochemical derangement or ultrasonographic evidence of a dilated biliary system.

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