

## POST-CHOLECYSTECTOMY COMPLICATIONS AND ERCP

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### ABSTRACT

**Objective:** To document the spectrum of post-cholecystectomy complications obtained at ERCP in a local population.

**Methodology:** The procedures were carried out at the Radiology department, in collaboration with the department of gastroenterology, Fauji Foundation hospital, Rawalpindi and Valley clinic over a 15-year period from 1 June 1992 to 30<sup>th</sup> May 2006. We reviewed the diagnostic outcomes of post-operative ERCPs. A total of 160 patients underwent ERCPs, all being performed by a single gastroenterologist. Sphincterotomy was performed, when indicated, to establish the drainage of obstructed bile ducts and to permit the spontaneous passage of small residual bile duct calculi. Dormia basket was used to retrieve stones from the CBD in other cases.

**Results:** A total of 160 ERCPs were performed. There were 130 female and 30 male patients in this study. The principal indication for performing ERCP was residual bile duct calculi (n=62) suspected on ultrasonographic examination; followed by worsening post-operative jaundice. The most common finding at ERCP was the presence of retained CBD stones. The second most common finding was ligation of CBD during cholecystectomy. Endoscopic sphincterotomy was performed in 62 cases. Retained stones were suspected in 32 cases on ultrasonographic examination while ERCP established the presence of CBD stones in 32 cases in all.

**Conclusion:** The most common etiological diagnostic finding was residual biliary stones; followed by iatrogenic bile duct obstruction. Postoperatively, ERCP should be the preferred method for removing bile duct stones. Sphincterotomy at ERCP is a safe and effective method of managing residual CBD stones. This study again emphasizes the role of ERCP in the diagnosis of post-operative complications.

**KEY WORDS:** Retained CBD stone, ERCP, Sphincterotomy, Post cholecystectomy complications.

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### INTRODUCTION

The important untoward complications following a cholecystectomy include retained calculi in the Common Bile Duct (CBD) or remnant of cystic duct, unrecognized iatrogenic bile duct injuries, post-operative strictures involving the CBD or common hepatic duct, leakage of bile from the slipped cystic duct ligature, profuse and persistent discharge of bile from the biliary drains, biliary enteric fistulae, obstruction of common bile duct by clips with consequent deepening jaundice; and cholangitis. Endoscopic Retrograde Cholangio-Pancreatography (ERCP) plays an important role in the diagnosis of biliary tree pathology.

It is also advisable in the evaluation of recurrence or persistence of symptoms following a cholecystectomy. The current study was designed to look at some of the above complications from a diagnostic point of view.

Magnetic Resonance Cholangio-Pancreaticography MRCP is a non-invasive and sensitive investigation. It is not widely available. ERCP in comparison with MRCP affords an added therapeutic advantage.

Surgery is less than an ideal treatment for removing left over gall stones as it is associated with appreciable morbidity and mortality. Postoperative ERCP is indicated for patients with retained CBD calculi.<sup>1</sup>

The preoperative incidence of choledocolithiasis amongst patients undergoing cholecystectomy is reported to be 10-15%.<sup>2</sup> However, the retention of CBD calculi after open cholecystectomy is between 5-15%.<sup>3</sup> ERCP is very sensitive in detecting common bile duct calculi. Occasionally small calculi may escape detection. The sensitivity and the specificity of ERCP for identifying CBD calculi is over 90%.<sup>4</sup> The percentage of laparoscopic cholecystectomy is showing a rising trend.<sup>2,5</sup> The rate of ERCP has also gone up with the advent of laparoscopic cholecystectomy.<sup>3</sup>

Laparoscopic common bile duct exploration in the expert hands and therapeutic ERCP are comparable in achieving calculi clearance effectively and safely but ERCP is less cumbersome than surgical exploration. Endoscopic sphincterotomy is now replacing conventional surgery for retained common duct calculi. Retained biliary calculi can be removed without any problems by endoscopic sphincterotomy with or without stone extraction using dormia basket/balloon catheters. For calculi of less than 5mm in diameter, spontaneous extraction can work effectively, and those of less than 12mm in diameter can be removed via basket and balloon. If calculi are 13-25mm in diameter, mechanical lithotripsy is indicated. The majority of CBD calculi will pass spontaneously if the papillotomy is adequate. ERCP is a preferable alternative to surgical removal of retained gallstones.

## PATIENTS AND METHODS

This clinical study, performed over a 15-year period, was designed for patients, who underwent cholecystectomy and were suspected of a complication following the procedure. A total of 160 patients, who underwent cholecystectomy open or lap, were subsequently referred for diagnostic and therapeutic ERCP. Patients were referred from various hospitals and clinics in and around Rawalpindi. They had symptoms and signs, suggestive of CBD obstruction following cholecystectomy.

All ERCPs were performed by a single gastroenterologist in two centres, Fauji Foundation Hospital and Valley Clinic Rawalpindi. Of these 160 patients, 140 had ERCP as outpatients and were transferred back to their referring hospitals.

All patients undergoing ERCP after cholecystectomy at the FFH Rawalpindi and Valley Clinic were entered into a database. Parameters included age, gender, indication for the procedure, success, findings at ERCP, diagnostic yield, pre-ERCP ultrasound and other investigations, results, therapeutic intervention, and any immediate complications noted. All ERCPs were performed in the Radiology Department. Biliary ducts were visualized by fluoroscopy.

Five minutes before the procedure, the patient was administered pentazocin or diazepam intravenously to achieve sedation. The duodenum was accessed using a side viewing duodenoscope. The scope (Olympus JF 20, TJF20, and TJF 140) was inserted orally and advanced into the duodenum. Once the position of the ampulla of Vater was determined, a diagnostic cholangiogram was obtained and standard endoscopic sphincterotomy undertaken if indicated. The length of the sphincterotomy was kept 0.8-1.5 cm. Choledocholithiasis was treated according to the size of calculi. Calculi were extracted by either dormia basket/balloon catheters. Coagulation profile was checked prior to carrying out the ERCP in order to avert undue bleeding while performing sphincterotomy. Ultrasonographic records

were available for all the patients. Liver function was measured in all patients. Cholangiography was repeated after the stone was removed to confirm the bile duct clearance.

During the procedure, all patients were monitored with pulse oximetry. The resuscitation equipment was kept at the bedside. Appropriate radiographs were obtained in all cases.

## RESULTS

One hundred and sixty symptomatic patients with previous cholecystectomy were subjected to ERCP in order to determine the cause of the symptoms. As regards demographics, the mean age of the patients was 52 years. The age range of the patients was 20-72. Out of a total of 160 patients, there were 30 males and 130 females. The youngest patient was twenty years old. There were 63 patients <50 years. Males were an average six years older than females.

The indications for ERCPs were as follows; dilated common bile duct without calculi on sonographic examination (n=42), dilated common bile duct with calculi on sonographic examination (n=38), post cholecystectomy jaundice (n=33), persistent discharge of bile in the drains (n=28). Upper abdominal pain (n=9), pancreatitis (n=1), cholangitis (n=1), bilious ascites (n=8). Previous biliary surgical procedures were; conventional cholecystectomy (n=153), laparoscopic cholecystectomy (n= 7). Of 96 patients who underwent ERCP, 62 had retained stones with solitary calculus in 34 and multiple calculi in 28 cases. This accounted for 33% of patients.

Ligation of the common bile duct was noted in 21 cases, cystic duct stump leakage in 4, CBD stricture at the site of cystic duct in 8, extrinsic compression of CBD in one and worm infestation was seen in one. There were 13 cases of dilated CBD without demonstrable filling defects. Drainage of biliary tree was accomplished with endoscopic sphincterotomy in 62 cases. While extraction of calculi was attempted in 20 cases, complete removal was successful in 90%. Biliary tree could not be opacified in nine cases.

Forty two patients had normal cholangiographic findings. Thirty per cent of dilated ducts found on ultrasonography were negative for stones. A total of 74 therapeutic endoscopic procedures were performed for 160 patients. One case developed post-ERCP pancreatitis. The common bile duct was successfully cannulated and adequate opacification obtained in 151 (95%). Pre-cut sphincterotomy was used in three cases.

## DISCUSSION

Laparoscopic cholecystectomy is now the gold standard for the treatment of symptomatic gallstone disease. The postoperative complication rate of laparoscopic cholecystectomy is about 5-6%.<sup>1</sup> The total number of complications are fewer with laparoscopic than with open cholecystectomy depending upon the surgical expertise. Endoscopic intervention in postoperative complications can prevent surgical exploration of common bile duct. This should primarily be discussed between the surgeon and physician. A second laparotomy should only be performed, if endoscopic procedures have failed.

The role of ERCP in post-laparoscopic cholecystectomy problems was also evaluated in a series of consecutive patients who underwent cholangiographic assessment of the biliary channels over a two-year period.<sup>4</sup> Three major diagnostic groups were identified: leaks and bile duct injuries (n = 9), retained common bile duct stones (n = 18) and post-cholecystectomy pain (n = 13). Diagnosis and therapy of post-operative complications was successfully undertaken in 92% of cases. Three patients developed mild pancreatitis during this procedure. Up to 18 % of patients undergoing laparoscopic cholecystectomy may have concurrent choledocholithiasis.<sup>2</sup> Twenty-five per cent of bile duct stones are completely unsuspected. The common bile duct stones encountered during laparoscopic cholecystectomy can be retrieved immediately after surgery in the operative room using ERCP.<sup>6</sup>

Retained bile duct stones after cholecystectomy are a well recognized postoperative

complication. The reported incidence after laparoscopic cholecystectomy is between 0.5-2 percent. In one small series, the frequency of post laparoscopic cholecystectomy retained stones was 2.5%.<sup>1</sup> However, after open cholecystectomy the incidence varies from 5 – 15%.<sup>3</sup>

A large proportion of endoscopic findings in this study also comprised retained biliary calculi, 39% in all. Solitary stones were detected in 15 cases where as multiple calculi were noted in 13 cases. In another study, patients with retained common bile duct calculi accounted for 17% of the complications.<sup>6</sup> ERCP followed by sphincterotomy and calculi extraction is the preferred initial approach in suspected choledocholithiasis if the probability of a common bile duct stone is high.<sup>1,4,7</sup>

In our series, ERCP successfully dealt with retained CBD stones in 30 patients. Calculi smaller than 3 mm can pass spontaneously if the sphincter of oddi is not stenotic but this may be complicated by pancreatitis or cholangitis. Stones of less than 10mm in diameter can be treated via endoscopic papillary balloon dilatation. Those larger than 11mm in diameter are managed via endoscopic sphincterotomy with a 10-12mm papillary incision. Large CBD stones (>2cm diameter) in the current study, unsuitable, for simple extraction were seen in 10 cases. These large calculi can first be crushed with a biliary lithotripter. The residual stone fragments can be flushed with normal saline and recovered with basket or balloon.<sup>8</sup>

Endoprosthesis is considered a safe and effective method for managing CBD calculi in those difficult cases where endoscopic sphincterotomy and attempts at removing stones are unsuccessful.<sup>9</sup> The difficulty of calculi removal increases with calculi size. Therefore, large common bile duct calculi may be difficult to extract during a single session. A period of endoscopic biliary stenting may make subsequent removal easier as the stones get smaller with stenting.<sup>10</sup> Stents could be passed in two of our cases.

The second most common complication identified following cholecystectomy, in this study

was ligation of common bile duct, in 13% of subjects. Sixty-one per cent (54) of ERCPs were negative for calculi. Ultrasound is an unreliable method of imaging common bile duct stones postoperatively, although, it detects CBD dilatations in the majority of cases approximately 76%.<sup>1</sup> In the current study, ultrasound showed common bile duct dilatations in 42 patients with only 13 of these dilated bile ducts showing calculi on ERCP. There is a possibility that these patients passed calculi spontaneously. Ultrasound accurately diagnosed choledocholithiasis in nine patients only. Cystic duct leakage is rare but fairly easily diagnosed. Cystic bile duct leakage may result from incomplete closure or insecure clipping of the cystic bile duct stump.<sup>11</sup>

It may also be the consequence of injury to the cystic duct proximal to the clip by dissection or by inadvertent thermal injury either directly or by the spread of heat through the clip.<sup>12</sup> Leakage of bile has also been reported to originate from unnoticed division of accessory duct of Luscha.<sup>12,13</sup>

In one study, out of a total of 1400 cases of laparoscopic cholecystectomy, one case of cystic bile duct leakage was encountered as a result of a stone slipping into the CBD and obstructing its lower end.<sup>14</sup> Ductal decompression obtained at ERCP is regarded as the treatment of choice for postoperative cystic duct stump leakage. ERCP showed a bile leak from the cystic duct in three patients and none had associated common bile duct stones in the present study. This is consistent with the findings in current world literature. Even in complete bile duct occlusions, the combined endoscopic-percutaneous transhepatic method can re-open the obstructed biliary tree and is a possible alternative to surgical exploration in selected cases.<sup>15</sup>

There were 8 cases of post operative CBD stricture in the current study. They were managed with endoscopic stenting. The primary management of the fistulae is endoscopic sphincterotomy and extraction of remaining gallstones in order to decompress the biliary passages, thereby, allowing closure of the



fistulae. There were two cases of biliary fistulae in our study. There was an appreciable delay in the diagnosis of some of these complications in our cases primarily because of the late referral. Endoscopic sphincterotomy is performed to enlarge the opening of the bile duct. The stones can be pulled out from the duct into the intestine. A variety of balloons and baskets mounted on specialized catheters can be passed through the ERCP scope allowing stone removal.

Most calculi <1cm in diameter will pass spontaneously in days or weeks following an adequate sphincterotomy, but most experts prefer to extract them directly. This immediately clarifies the situation and reduces the risk of impaction and cholangitis. However, this technique alone may fail in the presence of large calculi. Mechanical lithotripsy is the first choice, in the treatment of choledocholithiasis if initial trial with conventional Dormia basket fails. The resulting fragments can be pulled out through the sphincterotomy with basket.

A total of 74 therapeutic endoscopic procedures were performed for 160 patients in the present study. Seven patients with dilated CBD but without stones were also subjected to sphincterotomy to facilitate drainage from the biliary tree. Biliary sphincterotomy post-laparoscopic cholecystectomy is the cornerstone of therapeutic ERCP and is used worldwide.<sup>16,17</sup> The success rate is about 90%, with an overall complication rate of approximately 5% and mortality rate of less than 1% in expert hands.<sup>18</sup> These results accord favorably to most surgical series. Endoscopic sphincterotomy by expert endoscopists for removing common bile duct stones is considered safe even in younger patients with nondilated ducts.<sup>19</sup> The predominant therapeutic procedure carried out in this study was also biliary sphincterotomy, 62 cases in all. A sphincterotomy should be wide enough to admit a cannulotome or a basket to extract stones from the duct, but not beyond anatomical limits. Successful endoscopic cholangiography with relief of obstruction should be technically achievable in more than 90% of patients.

Lack of success with sphincterotomy could be either due to inadequate sphincterotomy that does not admit cannulotome or there is a papillary stenosis i.e narrow papilla of Vater. Failed access could also result from an impacted calculi at the lower end of CBD. In that case, a pre-cut sphincterotomy with a needle knife can provide access to the CBD. Finally, ligation of CBD is a difficult post cholecystectomy problem. This can not be helped by ERCP alone. Perhaps a combined procedure can help alleviate this problem.<sup>15</sup>

Some of the important complications associated with ERCP and sphincterotomy include difficult bile duct cannulation, pre-cut sphincterotomy, bleeding, severe necrotizing post-ERCP pancreatitis and injury to the gastrointestinal tract.<sup>4,20</sup> Bleeding complications of sphincterotomy are more common in the setting of pre-existing coagulopathy. Only one patient in the current study developed post ERCP Pancreatitis.

## CONCLUSIONS

ERCP is the investigation procedure of first choice in the diagnostic assessment of complex post cholecystectomy cases presenting with complications. Retained bile duct stones after cholecystectomy are an established entity. By far the most common etiologic diagnostic finding was residual biliary calculi, followed by complete iatrogenic bile duct obstruction. Endoscopic sphincterotomy and stone retrieval should be the first line treatment for postoperative choledocholithiasis. Diagnosis of post operative complications was successfully obtained in > 90% of cases. ERCP has the potential of saving the patient from exploration of CBD and a repeat surgical procedure with attendant morbidity and mortality.

Same-session ERCP and laparoscopic-cholecystectomy can perhaps be considered even in cases of preoperative choledocholithiasis.

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