

# Laparoscopic management of common bile duct stones: our initial experience

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## SUMMARY

**The management of choledocholithiasis has changed radically since the introduction of laparoscopic cholecystectomy. However, perceived technical difficulties have deterred many surgeons from treating common bile duct stones laparoscopically at the time of cholecystectomy. This has led to reliance on endoscopic retrograde cholangiopancreatography followed by endoscopic sphincterotomy to deal with common bile duct stones. We retrospectively reviewed the charts of patients who had laparoscopic common bile duct exploration at Downe Hospital between December 1999 and August 2001. Among 149 laparoscopic cholecystectomies done by our group in this period, 10 patients (6.7%) underwent laparoscopic CBD exploration, three by the transcystic technique and seven by choledochotomy. Three patients (2%) had unsuspected stones found on routine per-operative cholangiogram. The mean operative time was 2.34hrs (range 1.50-3.30hrs). The mean hospital post-operative stay was 3 days (range 1-6 days). Post-operative morbidity was zero. Stone clearance was achieved in all cases. We conclude, laparoscopic exploration of the common bile duct is relatively safe and straightforward method. The key skill required is the ability to perform laparoscopic suturing with confidence.**

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## INTRODUCTION

The incidence of choledocholithiasis in patients with cholelithiasis is reported at 5%-10%, with 4% to 5% incidence of unsuspected choledocholithiasis when routine cholangiography is performed.<sup>1-4</sup> During the era of open cholecystectomy the management of choledocholithiasis was relatively straightforward but with the advent of laparoscopic cholecystectomy the treatment of common bile duct (CBD) stones, whether recognised pre-operatively or per-operatively remains controversial. Treatment options include selective pre-operative endoscopic retrograde cholangiopancreatography (ERCP); conversion to open choledochotomy,<sup>5</sup> post-operative ERCP with endoscopic sphincterotomy (ES) and a one-stage laparoscopic clearance of CBD stones.<sup>6</sup> Many surgeons performing laparoscopic cholecystectomy remain uncomfortable with laparoscopic exploration of the common duct, and therefore, ERCP with ES is commonly used to treat choledocholithiasis. There are several disadvantages with ERCP. Selective pre-op ERCP for suspected CBD stones results in a large number

of negative studies<sup>7</sup> and it also fails to address the issue of unsuspected CBD stones found at per-operative cholangiography. Conversion to open surgery after positive cholangiography adds its own morbidity. Post-operative ERCP with ES for those stones discovered at surgery has a clearance rate of around 90% in experienced hands.<sup>8</sup> It also places the patient at risk of the complications of sphincterotomy including pancreatitis, perforation and bleeding.<sup>9-12</sup> The morbidity of ERCP with ES has been described as around 10% and the mortality around 1-2%.<sup>8</sup> Laparoscopic CBD exploration can be the option for choledocholithiasis, as it is possible to solve the problem in a single procedure. It also has the advantage of leaving the sphincter of Oddi anatomically intact and avoids the morbidity

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associated with laparotomy. This study presents our initial experience of laparoscopic CBD exploration over a period of eighteen months in a small district general hospital.

#### PATIENTS AND METHODS

We reviewed the charts of 10 patients who have undergone laparoscopic CBD exploration between December 1999 and August 2001. Prior to this period patients with suspected CBD stones had ERCP/ES, and patients with CBD stones found on routine per-operative cholangiography during laparoscopic cholecystectomy were usually subjected to immediate laparotomy and choledochotomy. Since December 1999 laparoscopic CBD exploration has been carried out in ten patients. The exploration of the common bile duct requires some additional instruments: a 30° telescope, per-operative cholangiogram cannula (we use a Steriseal Homer 1530 per-operative cholangiogram cannula set) 3mm and 5mm flexible choledochoscope/cystoscopes with a second light source, processor and monitor as well as some means of retracting a floppy duodenum. A per-operative cholangiogram is routinely performed in all patients (not just in patients with suspected stones) using an image intensifier in real time. We have found that the best position for the cannula is between the epigastric and mid clavicular ports.

The appropriate method of exploration of the duct is decided.

A) *Via the cystic duct.* [3mm'scope] Small stones can be cleared either by extracting them with a Dormia basket or flushing/pushing them through the papilla, thus avoiding opening the common bile duct.

B) *Direct exploration of the common bile duct.* This involves exposing the anterior wall, making a small transverse choledochotomy and inserting the 5mm 'scope. Stones are easily identified and removed by a dormia basket (size 5.5F). Large stones are best located in the mesh of the basket before extending the choledochotomy to prevent leaking of irrigation fluid. After stone clearance, the choledochotomy wound is closed with a 4-0 continuous absorbable suture.

#### RESULTS

During a period between December 1999 and August 2001, a total of 149 patients underwent laparoscopic cholecystectomy and ten of these patients (6.7%) had laparoscopic CBD

exploration. There were eight female and two male patients with an age range between 21-81 years (average 54.8 years). At the time of surgery, three patients had no evidence to suggest the presence of CBD stones. Of the other seven, three were jaundiced and four had a history of jaundice. Pre-operative ultrasound revealed stones in the common bile duct in five patients, (three of whom had known failed ERCP removal of stones) but in two patients the duct was reported as dilated without any obvious stones. The routine per-operative cholangiogram showed apparent filling defects in all ten cases, but subsequently stones were found only in nine.

#### Exploration via the cystic duct (3)

In one patient there was a stricture found at the lower end of the common bile duct following sphincterotomy four years previously. This was clearly identified using the 3mm scope via the cystic duct and needed no treatment. One patient had a small stone flushed into the duodenum, and the third patient had the stone extracted using a dormia basket thus avoiding any need to open the common bile duct.

#### Direct exploration of the CBD (7)

Through a 5mm transverse choledochotomy, stones were extracted using a Dormia basket, with the initial choledochotomy extended in two patients to remove very large stones. The choledochotomy wound was closed with a continuous 4-0 absorbable suture. In the first case there was a stent already in situ so the common bile duct was closed with a degree of confidence, a simple quarter inch drain being placed in the sub hepatic space. In the next patient it seemed logical to insert a stent via the 5mm scope. There was no bile leak in either of these two patients. In the following three cases the common duct was closed around a T-tube (technically easier than anticipated) and there was also no bile leak in these patients. As we gained confidence in the suturing technique we reverted back to placement of a simple drain and closure of the duct without a T-tube or a stent; in last two patients again there was no bile leak.

There were no intra or post-operative complications. The mean operative time was 2.34hrs (range 1.50hrs- 3.30hrs). The post-operative mortality rate was zero. The mean post-operative stay was 3 days (range 1-6 days); the patients with T-tubes being allowed home with

the tubes clamped and returning on day eight for out-patient removal after a T-tube cholangiogram.

## DISCUSSION

Several different ways have been described for treating CBD stones, which are diagnosed during laparoscopic cholecystectomy. It would seem logical that the best treatment should be a one-stage technique, with the least discomfort for the patient and with low morbidity. Laparoscopic trans-cystic or trans-choledocic exploration requires superior surgical dexterity<sup>13</sup> and the time required to carry out the procedure is significantly lengthened. Most authors therefore stress the need to perform ERCP as part of the treatment of the common bile duct stones. Some patients certainly require an endoscopic trans-duodenal approach, because of acute suppurative cholangitis, ampullary stone impaction, severe biliary pancreatitis or severe co-morbidities, but the rapid expansion of transduodenal techniques has reopened debates concerning the most appropriate management.<sup>14</sup> The use of ERCP and ES in competent hands gives important benefits to high-risk patients; decreasing morbidity and mortality and at times avoiding a major surgical procedure in carefully selected patients.<sup>15</sup> Benefits need to be balanced against the high incidence of failure rate reported variously between 3%-27% and the serious complications such as bleeding or pancreatitis in the early stage as well as and late stricture or recurrent stone formation.<sup>9-12</sup>

Laparoscopic CBD exploration provides an alternative therapeutic approach which is cost-effective and permits early recovery with a reduced period of short-term disability.<sup>12</sup> The results of a multi-center study reported by Cuschieri *et al* suggest that a single stage laparoscopic treatment is a better option.<sup>7</sup> When the laparoscopic approach for CBD exploration is selected, choices still exist. A trans cystic approach avoids opening the CBD but is limited in usefulness, requiring the cystic duct to be of sufficient size and shape to permit instrumentation and the stones to be small. Direct laparoscopic exploration allows the surgeon to perform a more complete and direct visual exploration of the duct system. As a consequence there is lower incidence of residual stones.<sup>16</sup> we have found the cystic duct approach to be useful in 3 out of 10 cases.

The key to this technique is having confidence to perform laparoscopic suturing, with the magnified image enabling an almost leak proof continuous

suture line to be achieved as experience progresses. A simple sub hepatic drain is sufficient in most cases but if there appears to be any narrowing at the lower end of the duct, T-tube placement or even per-operative stenting from above are useful techniques to keep in mind.

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