

ORIGINAL ARTICLE

นิพนธ์ต้นฉบับ

Laparoscopic common bile duct exploration through a choledochotomy for the management of choledocholithiasis

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Taveesin Tanprayoon et al. Laparoscopic common bile duct exploration through a choledochotomy for the management of choledocholithiasis

In the era of minimally invasive surgery, there are several options in the management of choledocholithiasis. Endoscopic sphincterotomy combined with laparoscopic cholecystectomy is an effective regimen, but requires 2 separate procedures. Laparoscopic common bile duct (CBD) exploration treats both the gallstones and CBD stones in a single operation, but greater laparoscopic skills are required.

The authors reported 29 consecutive patients who underwent elective or semielective laparoscopic CBD exploration through a choledochotomy over a 2.5 year-period. The operative technique was described. Two patients (7 per cent) had to be converted to an open operation. The median operative time was 210 minutes (135-380 minutes). There were no mortalities. Retained stones in the CBD occurred in 3 of the first 5 patients and in 1 of the last 24 patients. The patients were discharged on a median of 6 days (3-21 days) after operation.

As an increasing number of surgeons are acquiring skills in advanced laparoscopic techniques, laparoscopic CBD exploration has the potential of becoming the standard treatment for choledocholithiasis. Laparoscopic choledochotomy will probably be more suitable for the majority of Thai and Asian patients than the transcystic duct approach since the CBD stones are usually large and multiple and the CBD dilated. However, other therapeutic options must also be considered for each individual patient so that the safest and most efficacious treatment can be given.

Index: Laparoscopic surgery, choledocholithiasis

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การผ่าตัดเปิดท่อน้ำดีด้วยกล้องส่องช่องท้อง ในการรักษานิวในท่อน้ำดี

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ในยุคของการผ่าตัดด้วยกล้องในปัจจุบันมีแนวทางรักษานิวในท่อน้ำดีอยู่หลายวิธี การดึงนิ่วออกจากท่อน้ำดีด้วยกล้องส่องในดูโอดีนัม (endoscopic sphincterotomy) ร่วมกับผ่าตัดถุงน้ำดีด้วยกล้องส่องช่องท้องเป็นวิธีที่ใช้ได้ผล แต่ผู้ป่วยต้องได้รับการรักษา 2 ครั้ง และส่วนมากโดยกลุ่มแพทย์ 2 คนะคือ อายุรแพทย์ระบบทางเดินอาหารและศัลยแพทย์ การผ่าตัดถุงน้ำดีร่วมกับนิ่วในท่อน้ำดีด้วยกล้องส่องช่องท้องเป็นวิธีใหม่และรักษาผู้ป่วยครั้งเดียวจบ แต่ต้องอาศัยศัลยแพทย์ที่มีประสบการณ์ ผู้ป่วยอยู่ในสภาพดีพอที่จะวางยาสลบและท่อน้ำดีต้องมีเส้นผ่าศูนย์กลางใหญ่กว่า 1 ซม

ผู้เขียนได้บรรยายวิธีผ่าตัดเปิดท่อน้ำดีด้วยกล้องส่องช่องท้องในการรักษานิวในท่อน้ำดีและรายงานผลของการรักษาในระยะต้นในผู้ป่วย 29 ราย เป็นหญิง 18 รายและชาย 11 ราย อายุเฉลี่ย 55.6 ปี (18-83 ปี) ผู้ป่วยส่วนมากมาด้วยอาการท่อน้ำดีอักเสบเฉียบพลันหรือปวดท้องแบบ biliary colic การผ่าตัดใช้เวลา 135-380 นาที (median 210 นาที) ผู้ป่วย 2 รายได้รับการเปิดท่อน้ำดีต่อเนื่องจากหนึ่งรายมีพังผืดมากและอีกหนึ่งรายมีท่อน้ำดีบวมมาก ผลการผ่าตัดเป็นที่น่าพอใจ ไม่มีผู้ป่วยเสียชีวิตหลังผ่าตัด ผู้ป่วย 3 ใน 5 รายแรกมีนิ่วหรือเศษนิ่วตกค้างอยู่ในท่อน้ำดี ในผู้ป่วย 24 รายหลังพบนิ่วตกค้างเพียง 1 ราย ผู้ป่วยสามารถออกจากโรงพยาบาล 3-21 วันหลังผ่าตัด (median 6 วัน)

การผ่าตัดนิ่วในท่อน้ำดีด้วยกล้องส่องช่องท้องจะมีบทบาทมากขึ้นในอนาคตและอาจกลายเป็นวิธีรักษาหลัก วิธีเปิดท่อน้ำดีและดึงนิ่วออก น่าจะมีที่ใช้มากกว่าวิธีดึงนิ่วออกทาง cystic duct เนื่องจากนิ่วในท่อน้ำดีในชาวไทยและชาวเอเชียส่วนมากมีขนาดใหญ่ เป็นหลายเม็ดและท่อน้ำดีมักจะโป่ง อย่างไรก็ตามแพทย์ควรพิจารณาผู้ป่วยเป็นรายๆไปและเลือกวิธีรักษาที่ปลอดภัยและมีประสิทธิภาพที่สุด

In just over half a decade, laparoscopic cholecystectomy has established itself as the new gold standard for symptomatic gallstones, relegating open cholecystectomy to cases in which laparoscopic cholecystectomy is not feasible.^(1,2) In keeping with the tenet of minimally invasive surgery, the management of choledocholithiasis has evolved during the laparoscopic era. In the early days of laparoscopic cholecystectomy, patients with associated common bile duct (CBD) stones were usually managed by endoscopic sphincterotomy combined with laparoscopic cholecystectomy.^(3,4) This approach required 2 procedures with an interval of 1-2 days apart and, usually, had to be undertaken by 2 therapeutic teams. With increasing skills in advanced laparoscopic techniques, choledocholithiasis began to be managed by a totally laparoscopic cholecystectomy combined with CBD exploration, thus treating the patients by a single procedure.^(5,6) There are basically two techniques of laparoscopic CBD exploration, the transcystic duct approach and through a choledochotomy. The transcystic duct approach requires the insertion of a small calibre choledochoscope or a stone basket through the cystic duct for the extraction of the bile duct stones under direct vision or fluoroscopic control.^(7,8) The alternative approach is laparoscopic choledochotomy in which the stones are extracted directly through an opening in the CBD, the technique is equivalent to the traditional open CBD exploration. The authors wish to present the operative technique and the early results of laparoscopic choledochotomy undertaken for CBD stones over a 2.5 year-period.

Materials and methods

From June 1991 to January 1996, 49 patients with choledocholithiasis were treated by the authors on an elective and semielective basis. Patients with choledocholithiasis requiring emergency treatment or were unfit for general anaesthesia were excluded from this series. The first 20 patients were managed by endoscopic sphincterotomy which was successful in 16 patients (80 per cent), 15 of whom subsequently underwent laparoscopic cholecystectomy successfully. The 29 patients in the latter part of this series all underwent laparoscopic CBD exploration through a choledochotomy.

Initially all patients had a preoperative endoscopic retrograde cholangiopancreatogram (ERCP), but later on in the series only patients in whom other causes of jaundice had to be excluded underwent ERCP. Preoperative preparation was similar to laparoscopic cholecystectomy. An intravenous dose of a broad-spectrum antibiotic was given at the start of operation. After induction of general anaesthesia a nasogastric tube and Foley catheter were inserted. The positions of the 4 ports were similar to a routine cholecystectomy, but the right midclavicular port was of 12 mm in diameter. An additional left midclavicular port was sometimes necessary to retract the duodenum downwards during choledochotomy (*figure 1*). A zero-degree laparoscope was used during the the initial phase of the operation, but this was replaced by a 30-degree scope for the CBD exploration. An operative cholangiogram was routinely performed unless a recent ERCP clearly showed the presence of CBD stones. At the completion of the operative cholangiogram the cystic duct was clipped or ligated, but left attached to the CBD for traction purposes. The anterior surface of the supraduodenal portion of the CBD was exposed by blunt dissection. Bile could be aspirated at this stage and sent for culture. A longitudinal choledochotomy 1.0-1.5 cm in length was created with a cautery hook and cutting current, extravasated bile was aspirated with a suction placed behind the CBD.

A standard 6 mm-diameter flexible choledochoscope, fitting tightly inside a rubber jacket to prevent gas leakage as well as damage to the scope, was inserted through the 12 mm epigastric port. The flexible tip of the choledoscope, protruding 6-7 cm beyond the rubber jacket, was manipulated through the choledochotomy to inspect the bile duct both proximally and distally. Stones in the bile duct were extracted with a stone-basket, balloon catheter, by flushing or externally milking the stones towards the choledochotomy. In difficult cases, combinations of these techniques were necessary. In the latter part of this series extraction of impacted stones was greatly facilitated by an electrohydraulic lithotripter. Large and multiple stones were placed in a pouch for extraction after the duct had been cleared or at the end of the operation. The gallbladder was then resected in the usual fashion. If the gallbladder was large or thick-walled it was placed above the liver for extraction at the end of the operation, thus avoiding gas

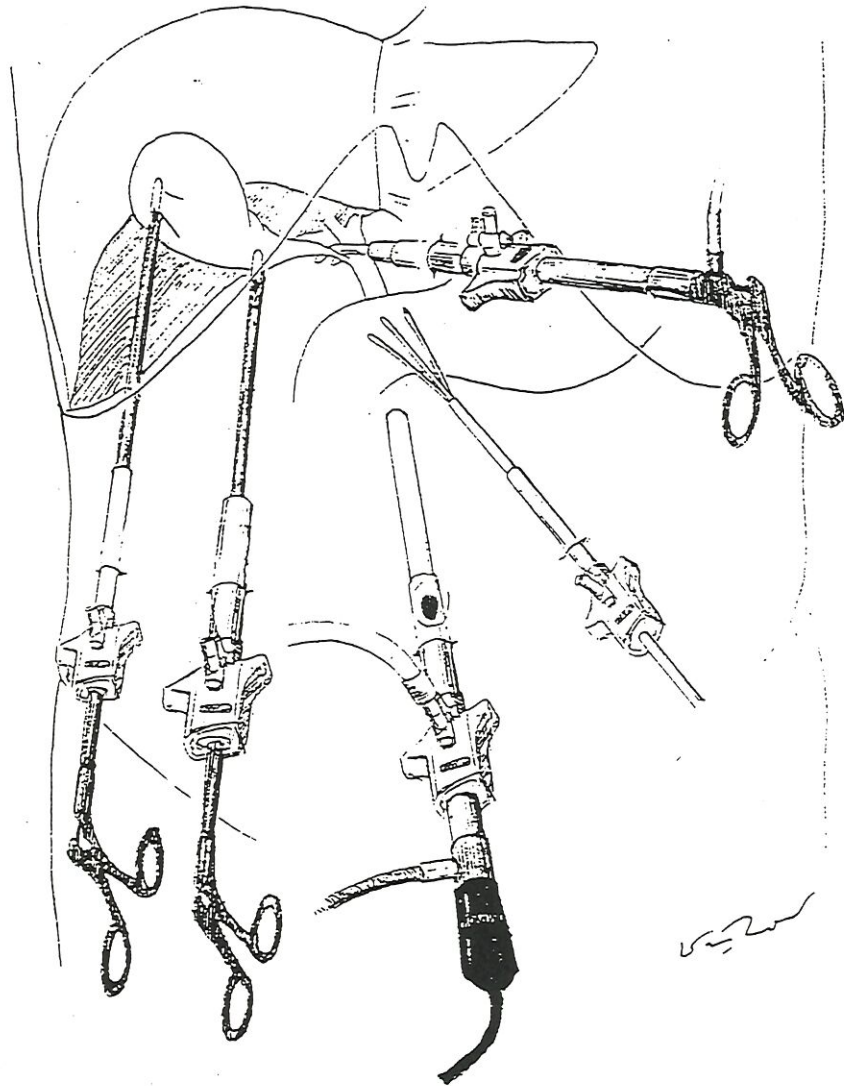


Figure 1. Position of the videocamera and instruments at the start of the operation

leakage should extension of the abdominal incision become necessary.

For the subsequent part of the operation, a 30-degree scope was inserted through the right midclavicular port. The surgeon moved to the patient's right side and used the umbilical and right anterior axillary ports for suturing the choledochotomy (*figure 2*). A guttered T-tube, size 16-18 F, was inserted through the epigastric port into the right subphrenic space and manipulated into the upper end of the choledochotomy. Closure of the choledochotomy started from above downwards employing either a running or interrupted 000 absorbable synthetic sutures. The first stitch was placed close against the T-tube to minimize bile leakage. At completion of the choledochotomy closure the free end of the T-tube was exteriorized through a small stab incision below the right costal margin and almost directly over the CBD. The T-tube was then flushed with saline to test for any significant leakage. A penrose or suction drain was positioned to drain the right subhepatic space and brought out through the right anterior axillary port. The gallbladder and the pouch containing stones, if still inside the abdomen, were extracted to complete the operation.

The drain was removed when there was no bile drainage, usually on the second postoperative day. A T-tube cholangiogram was performed on the second or third postoperative day. If there were no retained stones and the contrast could flow freely into the duodenum, the T-tube was shortened, occluded, strapped to the patient's side and the patient discharged. The patient returned to the out-patient department to have the T-tube removed on the 12th-14th postoperative day.

Results

From August 1993 to January 1996, 29 patients underwent laparoscopic CBD exploration through a choledochotomy. There were 18 females and 11 males. The patient's age ranged from 18 to 83 years, mean 55.6 years. The presenting symptoms are shown in table 1.

Preoperative ERCP was undertaken in 15 patients. Operative cholangiography was performed in 22 patients, all were positive for stones. The number of CBD stones varied from 1 to over 15. The operative time varied from 135 to 380 minutes, median 210 minutes. Two patients (7 per cent) required conversion to an open procedure. One of these patients had such extensive adhesions around the gallbladder that conversion was decided upon before any attempt was made to dissect the CBD. The other patient had severe inflammation around the CBD and had to be converted to a minilaparotomy near the end of the laparoscopic procedure so that the choledochotomy could be sutured securely.

The patients were able to tolerate oral intake from 1 to 4 days postoperatively, a median of 2 days. Requirement for narcotic analgesic injections varied from 0 to 17 doses, a median of 3 doses. There were no mortalities. Postoperative complications are listed in table 2. There were 4 patients who had retained stones detected by postoperative T-tube cholangiogram. Three of these cases occurred in the first 5 operations. All the retained stones or fragments were successfully extracted endoscopically, 3 via the T-tube tract and one by endoscopic sphincterotomy. The 2 cases complicated by prolonged bile drainage were caused by a dislodged limb of the T-tube and by a retained stone in the lower CBD. The bile

Table 1. Presenting symptoms of 29 patients

	No. patients
Acute cholangitis	13
Biliary colic	10
Acute cholecystitis	2
Acute pancreatitis	2
Dyspepsia	2

diameter. The surgical team should be capable of performing intracorporeal suturing and choledochoscopic stone extraction. The technique described by the authors is relatively simple and does not require any additional expensive instruments other than the basic laparoscopic cholecystectomy set plus a pair of needle holders. The availability of a 30-degree scope can be helpful but not absolutely necessary. We have operated on several cases using only the 0-degree scope when exposure was adequate from downward retraction of the duodenum. Unlike the transcystic duct approach in which a small calibre choledochoscope or a ureteroscope is required to traverse the cystic duct, we have used a standard and more robust choledochoscope through out. An electrohydraulic lithotripter is a relatively heavy investment and is probably unnecessary initially, but it should be available in specialized centres to facilitate the extraction of impacted or large stones. Most importantly, the technique described by the authors is similar to that used for open CBD exploration so that basic surgical principles are not compromised. This procedure should be more applicable to the majority of Thai and Asian patients with choledocholithiasis than the transcystic duct approach since the stones are usually large and multiple, and the CBDs are usually dilated. The operative time, which is longer than its open counterpart,

should become shortened with greater experience, although other factors such as the number of CBD stones and the extent of adhesions also contributed to the operative time. The conversion rate of 7 per cent in this series is comparable to others.⁽⁷⁾ Conversion to an open procedure should be considered at any stage of the operation if difficulties are encountered and before any serious complications occur. There is a definite learning curve for this operation as evidenced by the high incidence of retained stones in the early part of the series. Perhaps a completion T-tube cholangiogram, in addition to greater experience, will reduce the rate of retained stones even further.

Although laparoscopic CBD exploration has the potential of becoming the standard treatment for choledocholithiasis, other therapeutic options must also be carefully considered for each individual patient so that he or she can be offered the safest and most efficacious treatment.⁽¹³⁾

Acknowledgments

The authors wish to thank the anaesthetists, operating room nursing staff and the surgical residents for their enthusiasm, dedication and perseverance. Without their full cooperation this procedure would have been impossible.

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