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ORIGINAL ARTICLE

A 23 year experience with laparoscopic common bile duct exploration

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Abstract

Background: Laparoscopic common bile duct exploration (LCBDE) during laparoscopic cholecystectomy (LC) is as effective as two-stage endo-laparoscopic treatment, but with shorter hospital stay, lower cost and recurrent stone rate. Aim of this paper was to report the authors' experience with LCBDE during LC.

Methods: A retrospective analysis of patients who underwent LCBDE for ductal stones was performed. Recurrent stones were defined as CBD stones detected beyond 6 months from the procedure. Postoperative biliary stricture was defined as a symptomatic reduction of CBD diameter.

Results: Out of 3444 patients who underwent LC, 384 (11%) had CBD stones treated by trans-cystic duct exploration [214 (6%) patients, TCD-CBDE] or choledochotomy [170 (5%) patients, C-CBDE]. For TCD-CBDE and C-CBDE, mean operative time was 127 ± 69 and 191 ± 74 min, respectively. Major morbidity rate was 3% (n = 6) in TCD-CBDE and 6% (n = 11) in C-CBDE. The incidence of residual stones was 5% (n = 20) and complete ductal clearance rate was 95% (n = 364). After long-term follow-up (mean 189 ± 105 months) the recurrent stone rate was 2%.

Discussion: In expert centers, LCBDE during LC is safe and effective with low short and long term morbidity rates.

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Introduction

Laparoscopic cholecystectomy (LC) is the standard treatment for patients with symptomatic gallstones. In patients <60 years of age undergoing LC the prevalence of common bile duct (CBD) stones is 8–15% but it increases to 15–60% in elderly patients.[1] Although 3–5% of patients with ductal stones are asymptomatic and spontaneous passage through the papilla has been reported,[2] this may not be without risk of complications. The European Association for Endoscopic Surgery (E.A.E.S.) recommends all patients with symptomatic gallstones should be assessed for the presence of CBD stones and treated[1] based on the patient's risk classification as defined by the American Society of Anesthesiologists (ASA).[3] However the most appropriate management of CBD stones is still debated.

Two-stage endo-laparoscopic management of gallstones and CBD stones (pre- or postoperative Endoscopic Retrograde Cholangio Pancreatography – ERCP, with endoscopic sphincterotomy – ES, and LC) has been widely adopted as standard practice replacing traditional open choledocholithotomy and cholecystectomy. Laparoscopic CBD exploration and stone removal during LC was introduced more than 20 years ago but has not found widespread acceptance amongst the surgical community. In a clinical trial set up by the E.A.E.S.,[4] one-stage laparoscopic CBD exploration and stone removal during LC has proven to be equivalent to the two-stage approach, but with a shorter hospital stay. This finding was confirmed in a recent meta-analysis of randomized trials.[5] Moreover, reports from both the U.S.A.[6] and from Europe[7] have demonstrated significantly lower costs after one-stage laparoscopic CBD exploration and LC (LC-LCBDE) due to a shorter hospital stay, as compared to a two-stage procedure. One-stage LC-LCBDE can be performed by a trans-cystic or a direct choledochotomy approach. The two techniques however are not equivalent but

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have different indications and require different levels of laparoscopic expertise.

The aim of this paper was to report the authors' experience with one-stage LC-LCBDE, paying particular attention to the differences in indications, technical aspects and operative management of the trans-cystic or direct choledochotomy approach. The aim was not to make a direct comparison between the two techniques because the categories of patients who undergo the two procedures are substantially different.

Methods

A retrospective analysis of prospectively collected data of patients who underwent LCBDE during LC with routine intraoperative cholangiography (IOC) from 1991 to 2014 was performed. Two General Surgery Departments (Ancona and Rome) followed the same treatment protocol:[8] all patients admitted for symptomatic cholelithiasis were evaluated for the presence of CBD stones during LC. In the event of ductal stones being confirmed at IOC, concurrent trans-cystic (TCD-CBDE) or transverse choledochotomy CBDE (C-CBDE) was performed. Previous failed ERCP attempts and/or the presence of jaundice were not considered a contraindication for laparoscopic treatment. A detailed informed consent form approved by the institutional Ethics Committee was signed by all patients enrolled in the study. Population, pathological, operative and follow-up data were prospectively collected and, for the purpose of the present study, the patients' series was retrospectively divided in two groups according to the procedure that was performed and based on intention to treat principle.

Indications and preoperative work-up

Each patient undergoing LC for cholecystolithiasis was evaluated for the presence of associated bile duct stones by history, physical examination, laboratory results and imaging.

Ultrasonography (US) was used as first line imaging, but more recently pre-operative Magnetic Resonance Cholangio-Pancreatography (MRCP) was obtained in patients with suspicion of ductal stones (based on CBD dilatation on US and/or laboratory signs of bile stasis). Intra operative confirmation of ductal stones by IOC was carried out before undertaking CBD exploration, because spontaneous passage of stones through the papilla could have occurred in the time interval between admission and surgery.

Predictors of bile duct stones

Before elective LC, patients were classified into three groups, based on the positive predictors of ductal stones: (i) high risk group: presence of jaundice and/or cholangitis and/or choledocholithiasis detected on US/MRCP; (ii) intermediate risk group: presence of hyperbilirubinemia, elevated alkaline phosphatase or gamma-GT levels, multiple small gallstones and a dilated CBD on US, and (iii) low risk group: normal laboratory exams, no history of cholangitis or pancreatitis and normal sized CBD on US.

Patients were defined as technically challenging if at least two of the following criteria were present: male gender, BMI $\geq$35 kg/m^2, those who were likely to have multiple adhesions, and those with previous episodes of cholecystitis or pancreatitis.

Surgical technique

Surgery was performed by 3 surgeons (E.L., A.M.P., M.G.) who commenced their learning curve in advanced laparoscopic surgery in the 1990's, at the beginning of the present series. The learning curve for LCBDE was considered completed after performing 20 laparoscopic choledochotomy procedures and 10 laparoscopic transcystic common bile duct explorations.[9,10]

A standard four trocars approach was employed for LC[8] (Fig. 1). In obese patients a more cranial trocar position was employed.

After having obtained the "critical view of safety",[11] clips were applied on the cystic duct and artery and a cystic ductotomy was performed and IOC completed. After intraoperative demonstration of CBD stones, the choice between a trans-cystic or a choledochotomy approach was based on the ductal stones' characteristics and on the individual patient's biliary anatomy, as shown by IOC.

Trans-cystic approach

The indications for the trans-cystic duct approach were: (i) a dilated cystic duct, joining the CBD on its lateral side; (ii) <4 ductal; (iii) ductal stones <5 mm in size and smaller than the size of the cystic duct, located only in the CBD and not in the common hepatic duct. The surgical technique is shown in the linked video (https://www.youtube.com/watch?v=NXTQi2siVso).

External biliary drainage was employed if any instrumental manoeuvre on the papilla had been performed (trans-papillary passage of basket or scope) or there was incomplete clearance of the CBD stones.

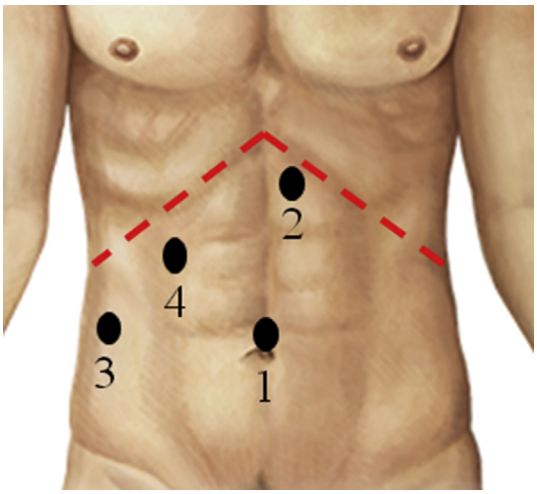

Figure 1 Trocar positions during laparoscopic common bile duct exploration

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