

## Management of common bile duct stones in a single operation combining laparoscopic cholecystectomy and peroperative endoscopic sphincterotomy

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**Abstract** The diagnosis and treatment strategy to apply to common bile duct stones (CBDS) is always a controversial subject. The aim of this study was to evaluate the treatment of CBDS in a "one-stage" operation by laparoscopic cholecystectomy (LC) and peroperative endoscopic sphincterotomy (ES). Between January 1994 and April 2000, 60 patients, 24 men and 36 women (sex ratio, 1.5), with a median age of 57 years (range, 26 to 84 years), were treated for suspected or confirmed CBDS. The CBDS were uncomplicated in 53 patients (88%) and associated with a complication in 7 patients (12%); namely, cholangitis (in 3 patients) and acute pancreatitis (in 4 patients). The peroperative ES was performed immediately after the LC during the same operative time, with peroperative cholangiography being systematically performed. The mean operative time for LC was 60 min (range, 40–90 min). The general anesthesia was prolonged by 40 min in order to perform an ES (range, 30–60 min), including the time required for endoscopic equipment installation. The peroperative ES was unsuccessful in 2 patients (3%) due to the impossibility of catheterizing the papilla. In the first patient, postoperative ES was successful. In the second patient, the small CBDS was left to pass spontaneously. In 1 patient, because of multiple calculi in the CBD, open surgery was performed immediately after the ES. In 2 patients, a residual stone was found by cholangiography on the sixth postoperative day, and spontaneous evacuation occurred 2 weeks later. Final ductal clearance was achieved in 100% of the patients. There was no mortality and the incidence of postoperative minor complications was 3% (2 patients). The duration of postoperative hospitalization was 4.6 days (range, 3–11 days). The one-stage treatment procedure is, to us, an alternative to the minimally invasive treatment of CBDS. This method is rapid, reliable, and safe. It now needs to be evaluated in larger studies, keeping in mind that the limiting characteristic is the proximity and the availability of the endoscopic team.

**Key words** Choledocholithiasis · Laparoscopy · Intraoperative endoscopy

### Introduction

While conventional surgery remains the reference treatment for common bile duct stones (CBDS),<sup>1</sup> minimally invasive techniques are becoming more and more popular. These methods consist of the extraction of the CBDS either by laparoscopy,<sup>2–4</sup> or by endoscopic sphincterotomy (ES),<sup>5–9</sup> but there is no consensus at the moment as to which procedure is the best. Since the start of laparoscopic surgery, we have opted for sequential treatment combining a preoperative ES with laparoscopic cholecystectomy (LC).<sup>10</sup> In order to optimize this treatment and to avoid two successive interventions, we decided to perform both at the same time (one-stage treatment).

### Patients and methods

Between January 1990 and April 2000, in a total of 2780 laparoscopic cholecystectomies, 60 patients, 24 men and 36 women (sex ratio, 1.5), with a median age of 57 years (range, 26 to 84 years), were treated by LC combined with peroperative ES for suspected CBDS. The CBDS were uncomplicated in 53 patients (88%) and associated with a complication in 7 patients (12%); namely, cholangitis (in 3 patients) and acute pancreatitis (in 4 patients).

According to the American Society of Anesthesiology (ASA) classification, the patients were divided as follows: ASA I, 33 patients (55%); ASA II, 17 patients (28%); ASA III, 10 patients (17%).

The diagnosis of CBDS was suspected on the basis of clinical (jaundice, recurrent biliary colic, and dark urine), laboratory (anicteric cholestasis; alkaline phosphatase more than 100 IU/L and gamma-glutamyl-transferase ( $\gamma$ -GT), more than 50 IU/L, and elevated serum amylase, more than 150 IU/L), and ultrasonographic (dilation of the common bile duct, more than 10 mm) findings.

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### Therapeutic procedures

A peroperative ES was planned in patients with features compatible with CBDS, limited only by the availability of the gastroenterology team. The peroperative ES was performed immediately after the LC, but only if the per-operative cholangiogram confirmed the presence of CBDS. Following the LC, the patient was positioned in the left lateral position in order to perform the ES. In six patients, a transcystic drain was left in place during the LC (to ensure complete evacuation of the CBDS postoperatively) when there were more than three stones and/or when the stones were larger than 6 mm.

Peroperative ES was planned in 142 patients and performed in 60 patients (42%).

## Results

### Success rate of CBDS clearance after ES

In the absence of a transcystic drain, clearance of the CBD was achieved either by a sufficiently large sphincterotomy allowing spontaneous stone expulsion or by operative stone extraction using a Fogarty drain.

In the presence of a transcystic drain, cholangiography was performed on the sixth and twenty-first postoperative days.

The peroperative ES was unsuccessful in two patients (3%) due to the impossibility of catheterizing the papilla with a duodenal diverticulum. In the first patient postoperative ES was successful. In the second patient, the small CBDS was left to pass spontaneously.

In one patient, because of multiple calculi in the CBD, after a large ES, endoscopic extraction was impossible, and open surgery was performed immediately after the ES.

In two patients, a residual stone was found by cholangiography on the sixth postoperative day, and spontaneous evacuation occurred 2 weeks later.

Final ductal clearance by peroperative ES was achieved in 100% of the patients.

### Duration of procedures

The average duration of the LC was 60 min (range, 40–90 min). The average time for the prolongation of the general anesthesia was 40 min (range, 30–60 min) in order to reposition the patient and perform the ES. Mean operative time for LC was 60 min (range, 40–90 min).

### Conversion to open surgery

Two patients (3%) had conversion due to cholecystitis (ES was performed after the open surgery) and to multiple calculi in the CBD.

### Mortality

No deaths occurred after the one-stage treatment.

### Morbidity

Postoperative complications were observed in two patients (3%) (acute pancreatitis which resolved without problems).

### Duration of postoperative hospitalization

Hospitalization was, on average, 4.6 days (range, 3–11 days). Table 1 shows the mean duration of hospitalization for this and the other operative strategies.

## Discussion

The diagnosis and treatment strategy to apply to CBDS is always a controversial subject. While traditional surgery remains the reference treatment, with well codified technique and good established results for more than 20 years, the current tendency is mainly towards minimally invasive methods with an exclusively laparoscopic approach to stone extraction,<sup>2–4</sup> or the multidisciplinary option called “sequential treatment”, with ES combined with LC.<sup>5–11</sup> The results of the two techniques, recently published in a multicenter randomized study, are superimposable, with 90% stone clearance, mortality almost zero, and morbidity less than 10%.<sup>12</sup>

Laparoscopic extraction techniques for CBDS, either via the transcystic or via the transcholedochal route, allow a one-stage minimally invasive treatment of CBDS. The results of laparoscopic extraction, however, depend on the surgeon’s experience in laparoscopic surgery of the CBD. In the best series, the success rate is 90%, with conversion and morbidity rates less than 10% and the percentage of residual lithiasis, 5%.<sup>2–4,12</sup>

Concerning the sequential treatment, ES was first proposed preoperatively, followed by LC. This imposes on the patient a two-stage treatment and accumulates the risks of the two techniques,<sup>7,8,11–13</sup> with a longer

**Table 1.** Mean hospital stay (MHS, in days) after surgery as a function of treatment modality

Type of treatment	<i>n</i>	MHS (range)
“One-stage treatment” (LC + perop ES)	60	4.6 (3–11)
Sequential (preop ES + LC)	222	5.1 (2–16)
LC + postop ES	14	7.3 (4–10)
ES only	15	8.4 (2–26)
Laparoscopic extraction	85	6.9 (3–21)
Traditional surgery	95	16 (6–65)

**Table 2.** Evolution with time in treatment modalities for CBDS

Type of treatment	1990–1993 <i>n</i> (%)	1994–1997 <i>n</i> (%)	1998–2000 <i>n</i> (%)	Total <i>n</i> (%)
“One-stage treatment” (LC + perop ES)	5 (2.5)	34 (17)	21 (24)	60 (12)
Sequential (preop ES + LC)	116 (56)	85 (43)	21 (24)	222 (45)
LC + postop ES	3 (1.5)	7 (4)	4 (4)	14 (3)
ES only	4 (2)	9 (3)	2 (2)	15 (3)
Laparoscopic extraction	24 (12)	37 (19)	24 (28)	85 (18)
Traditional surgery	55 (26)	25 (14)	15 (17)	95 (19)
Total	207	197	87	491

CBDS, Common bile duct stones; LC, laparoscopic cholecystectomy; perop, peroperative; ES, endoscopic sphincterotomy; preop, preoperative; postop, postoperative

hospital stay, because, on average, LC is not performed until 2 or 3 days after the endoscopic procedure. Moreover, the rate of detection of CBDS during endoscopic retrograde cholangiography (ERC) is relatively low, varying between 50% and 60%.<sup>7,8,10,11,13,14</sup>

The recent arrival of peroperative ES performed immediately after LC (one-session treatment) has the advantages of maintaining minimally invasive treatment, requiring only one operation for CBDS and one general anesthesia, and avoiding unnecessary ERC,<sup>15–18</sup> which is performed only in patients in whom CBDS have been confirmed with the peroperative cholangiography.

We introduced the one-stage treatment in our practice in 1993, and it has progressed from 17% in the period 1994–1997 to 24% in the period 1998–2000 (Table 2). This therapeutic modality seems to be well adapted for patients in whom there is clinical or biological suspicion of choledocholithiasis before CBDS operation.<sup>19</sup> When one or several common bile duct stones are found during LC, ES can be performed under the same general anesthesia by the endoscopic team (which has been contacted in advance). For the treatment of unsuspected CBDS discovered during routine intraoperative cholangiography, we allow spontaneous expulsion when there is one stone with a diameter smaller than the papilla’s passage and we perform laparoscopic CBDS extraction when the stone has a greater diameter and the CBD is large; when the CBD is not dilated, postoperative ES is used.

In our series, this one-stage treatment failed only twice (3%), related mainly to a duodenal diverticulum preventing catheterization to the CBD. On the other hand, clearance of the CBD was obtained in 100% of patients. The postoperative hospital stay was 4.6 days.<sup>3–11</sup>

This treatment for CBDS has been used by others: Basso et al.,<sup>21</sup> in 54 patients; Deslandres et al.,<sup>17</sup> in 26 patients; Montori et al.,<sup>22</sup> in 23 patients; De Palma et al.,<sup>16</sup> in 15 patients; Cox et al.,<sup>15</sup> in 13 patients; and

**Table 3.** Results of the “one-stage” technique reported in the literature

Reference	<i>n</i>	Ductal clearance rate (%)
De Palma <sup>16</sup>	15	100
Deslandres <sup>17</sup>	26	100
Cox <sup>15</sup>	13	70
Basso <sup>21</sup>	54	82.7
Montori <sup>22</sup>	23	100
Cemachovic <sup>23</sup>	57	94
Present study	60	100

Siddiqui et al.,<sup>18</sup> in 5 patients, with similar results to those presented here (Table 3). It must be noted that peroperative ES increases the duration of anesthesia by only 30 to 60 min, as compared with isolated LC,<sup>15,16,23</sup> also counting the time required for the installation of endoscopic equipment and changing the patient’s position.

In addition to the advantage of treating CBDS with one anesthesia, the one-stage treatment also permits, when there is failure of endoscopic extraction of the CBDS, changing of the strategy, to perform, if necessary, a conversion to laparotomy and to proceed to a classical surgical exploration of the CBD. Transcystic drainage put in place during the LC can guide the endoscopist to more easily find the papilla in patients with duodenal diverticula, and, therefore, increase the success rate.<sup>15</sup>

In fact, one of the main difficulties with this technique lies in the coordination between the endoscopist and the surgeon when planning the procedure. Indeed, it is sometimes difficult to respect the timetables of each participant, knowing that the duration of the operation can vary depending on technical difficulties encountered during the operation. To facilitate this, each case of suspected CBDS should be discussed with the gastroenterology team. Certain authors propose performing the ES just after anesthetic induction, i.e., before the

LC. This procedure does not, in our opinion, offer any advantages and does not correspond with the objectives of one-session treatment, because it involves the risk of performing unnecessary ERC.<sup>24</sup>

In addition to the complicated choice of therapeutic strategy, the actual debate also concerns the diagnosis of the CBDS. With the recent development of magnetic resonance (MR)-cholangiography, the diagnosis of CBDS can be done preoperatively and noninvasively, with particularly high-performance results,<sup>25</sup> which is not the case with echography and/or intravenous cholangiography, with their low reliability for detecting CBDS.<sup>26</sup> Which examinations should be done preoperatively in patients with suspicion of CBDS? In fact, the examinations used for the diagnosis of CBDS are linked to the therapeutic strategy that should be adopted from the beginning. Surgeons who are used to performing laparotomy when they encounter CBDS during LC do not have to perform any preoperative investigation. The same applies to laparoscopic surgery of the CBDS, but it must be kept in mind that laparoscopic exploration of the CBD needs specific equipment and lengthens the duration of the operation in a not negligible way compared with a standard LC. For this reason, as well as for logistic reasons, in the operative theater, it is convenient to have a precise preoperative diagnosis, and MR-cholangiography is the ideal examination for this indication.

Concerning the peroperative endoscopic treatment, the obligation to have an endoscopy team available on the day of the operation has prompted us at present to perform preoperative MR-cholangiography in order to confirm the clinical and biological suspicion of CBDS, knowing that this examination is not mandatory; ERC is performed only if the CBDS are confirmed by the peroperative cholangiography.

In the era of laparoscopic surgery, the treatment of CBDS must, whenever possible, be performed in one stage and with the patient under general anesthesia. This can be achieved either by carrying out an exclusively laparoscopic procedure or by using peroperative ES. The choice depends not only on the preference of the surgeon but also on the availability of experienced endoscopists willing to undertake such treatment as part of a multidisciplinary approach. As far as conventional surgery is concerned, it remains indispensable when the above-mentioned procedures are unsuccessful, or in the presence of multiple common bile duct stones, or when there are contraindications to laparoscopy.<sup>1,27</sup>

## Conclusion

The one-stage treatment procedure is, to us, an alternative to the minimally invasive treatment of CBDS. This

method is rapid, reliable, and safe. It now needs to be evaluated in larger studies, keeping in mind that the limiting characteristic is the proximity and the availability of the endoscopy team.

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