

Management of Common Bile Duct Stones: a Ten-Year Experience at a Tertiary Care Center

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ABSTRACT

Background: The authors present their experience with the treatment of cholecystocholedocholithiasis.

Methods: From August 1995 to August 2005, we treated 3750 patients with symptomatic gallbladder stones, and 12.7% of these patients also had a choledocholithiasis. This percentage with reference to the literature is certainly due to intraoperative cholangiography (IOC) performed routinely. During the follow-up, the percentage of residual versus recurrent stones was evaluated.

Results: Only 2 patients (3.1%) of the laparoscopic choledochotomy and cholecystectomy group had retained stones discovered at 5 and 11 months after surgery. These patients received ERCP with good results. No patients had leaks or fistulas. Only one patient died from a massive pulmonary embolism (1.6%).

Conclusion: We believe that the key to successful management of patients with CBD stones is a well-standardized institutional procedural algorithm consistent with the available local resources and technologies.

Key Words: Choledocholithiasis, T-tube, Laparoscopic cholecystectomy.

INTRODUCTION

Despite advances in endoscopy and laparoscopic surgery, common bile duct (CBD) stones still represent a serious challenge to surgeons. Before the advent of laparoscopic surgery, approximately 10% of patients with symptomatic gallstones and nearly 15% of patients with acute cholecystitis had concomitant CBD stones.^{1,2} The development of techniques for laparoscopic cholecystectomy has permitted earlier, less traumatic interventions that have resulted in a decrease in the prevalence of simultaneous gallstones and CBD stones.³ However, patients with CBD stones still represent a significant proportion of the worldwide patient population suffering from gallstones, and the treatment of this condition is not uniform and often varies from country to country.

The aims of this retrospective study were (1) to provide an update on the incidence of choledocholithiasis and an assessment of the frequency and prevalence of CBD stones during our 10 years of experience with laparoscopic biliary surgery; (2) to review the therapeutic procedures used during this period in relation to the entity and extent of the disease; and (3) to review the health status of patients during a 5-year follow-up.

METHODS

Between August 1995 and August 2005, 475 patients with CBD stones were treated at our institution. They represent 12.7% of the total number of patients (3750, gallbladder stones = 3275 [87.3%]) who underwent cholecystectomy according to the method shown in **Table 1**. The male-to-female ratio was 4:9, and the mean age of patients was 48 years (range, 34 to 89). The approach to the treatment, which depended on the type of choledocholithiasis, is detailed in **Table 1**. Intraoperative cholangiography (IOC) was performed routinely in all patients, leading to discovery of 52 unsuspected cases (10.9%). At the end of the operation, clearance of the biliary tract was assessed by IOC, and by endoscopic exploration through the cystic duct or the choledochotomy when necessary. When a choledochotomy was performed, regardless of the procedure used, a T-tube with a diameter just 1 mm to 2 mm lower than the choledochal lumen was left in place. The

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Table 1.

Treatment of Common Bile Duct Stones in 475 Patients Between August 1995 and August 2005*

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|--|-----|
| Endolaparoscopic Treatment: 316 (66.5%) | |
| ERCP + ES + LC | 100 |
| ERCP + ES in operated patients | 47 |
| ERCP + ES in patients with gallbladder in situ | 35 |
| LC + transcystic approach | 64 |
| ERCP + papilla dilation | 3 |
| LC + IOC + papilla dilation | 2 |
| LC + choledochotomy + Kehr | 63 |
| Endolaparoscopic rendez-vous | 2 |
| Endolaparoscopic Treatment: 159 (33.5%) | |
| Cholecystectomy + transduodenal sphincterotomy | 12 |
| Cholecystectomy + choledochotomy + T-tube | 44 |
| Cholecystectomy + choledocho-jejunojejunostomy | 62 |
| ERCP + SE + choledochotomy | 41 |
| *ERCP = Endoscopic retrograde cholangiopancreatography; IOC = intraoperative cholangiography; LC = laparoscopic cholecystectomy. | |

T-tube was removed after 3 weeks following a cholangiography (via the T-tube).

In cases in which the cystic duct was utilized to remove the stones, a transcystic drain was left only in 64 patients (13.4%) when IOC showed biliary system hypertension. Endoscopic retrograde cholangiopancreatography (ERCP) followed by LC was used in 100 patients (21%) who had had a previous laparotomy for a different disease.

The endolaparoscopic rendezvous was used in 6 patients (1.2%), when clearance during the operation was incomplete.

The choledochojejunostomy was performed in 62 patients (13%) for recurring stone disease in the biliary system (16) with dilation of the choledoch 2 cm (21), or for failure of ERCP (12) in which a recurrence of stenosis of Vater's papilla occurred after ES (13).

RESULTS

The 3-, 6-, and 12-month follow-ups for all patient groups included blood tests and ultrasound with MR cholangiography performed in patients with positive hepatic blood tests. Mean hospital stay was 3 days for LC and the transcystic clearance group, the rendezvous group, and ERCP

plus LC group; 6 days for LC and the choledochotomy by laparoscopy group, and 7 days for patients who underwent laparotomy. Only 2 patients (3.1%) in the laparoscopic choledochotomy and cholecystectomy groups had retained stones that were discovered at 5 months and 11 months, respectively, after surgery. They were treated by ERCP with good results. No patient had biliary leakage or fistulas, and the T-tube placed in 116 patients was removed 3 weeks after a cholangiography that showed the immediate passage of the contrast medium into the duodenum.

One 81-year-old male patient (of the biliary-digestive anastomosis group) died following a massive pulmonary embolism (1.6%). He had had 2 previous ERCPS with stenosis of the papilla and cholangitis. Mortality for biliary surgery was nil.

DISCUSSION

On the basis of our 10-year experience, we believe that a careful preoperative evaluation of patients who have symptoms of CBD stones is crucial. In this context, the use of MR cholangiography in cases of suspected CBD stones can confirm not only the presence of stones but also can provide essential information concerning the anatomic location and number of stones, their size, mobility, and the anatomy of the biliary tree. This assessment allowed us to select with confidence the most appropriate approach, laparoscopic or open, as well as the type of operation to perform.

We would also strongly recommend the routine use of intraoperative cholangiography to assess the biliary system during the operation. We found this to be a valuable practice that permitted us to detect retained stones (0.4%) and the occasional stone of the choledoch (10.9%) in our experience.

In such cases, we generally elected to remove the stones in one stage to avoid exposing the patient to the risk of a second (potentially unsuccessful ERCP) procedure for CBD removal.⁴

The cystic duct was used as the principal means of access for exploration of the CBD while the laparoscopic choledochotomy was reserved for patients with large stones, cholangitis, and intrahepatic stones.

To prevent such complications as biliary leaks and fistulas, we generally use T-tube drainage in all patients with CBD stones. T-tube drainage after CBD exploration provides biliary decompression and prevents biloma formation in

the subhepatic space. The T-tube also makes postoperative cholangiography possible, and if residual stones are found, they can be removed by choledochoscopy via the T-tube.

Although use of the T-tube is reportedly associated with complications, such as bile peritonitis due to T-tube dislocation,^{5,6} we have not experienced any complications in our patient series. The T-tube, however, does have the disadvantage of requiring a prolonged hospital stay. Some of these complications and disadvantages may be offset by drainage with a C-tube, which developed during the popularization of laparoscopic surgery.^{7,8} We utilized C-tube drainage in 6 patients who underwent laparoscopic choledochotomy. No comorbidity was observed in these patients.

We performed the rendezvous technique in 6 patients in whom it was impossible to remove all the stones through the cystic duct. This is a complicated procedure that requires a large operating room, an expert endoscopist, the use of additional monitors, and strict control of the anaesthesia. These factors and the risk of complications associated with the technique have limited its wide application.⁹

Although CBD stones are traditionally managed by endoscopic techniques, there are some patients in whom the size of stones, the concomitant existence of distal strictures, the larger diameter of the choledoch, or the multiple recurrence of the stones in the biliary tree represent the principal indications for choledochojejunostomy with a Roux-Y segment of the jejunum.¹⁰ We performed this procedure in 22 patients.

Complications in these patients are generally few and similar to those of other surgical procedures of the digestive system, such as wound infection, anastomotic leak, and intraabdominal abscess. Mortality after this operation is mainly related to nonsurgical complications, such as myocardial infarction, pulmonary embolus, and heart failure in patients with underlying cardiovascular diseases.¹¹ In our experience, complications were seen in one elderly patient who died from a massive pulmonary embolism.

Long-term (60 months) follow-up of patients undergoing choledochojejunostomy showed that most of them were completely asymptomatic after surgery. The proportion of patients presenting with symptoms during this period ranged from 5% to 18%.¹² However, most of these patients presented with symptoms due to underlying conditions unrelated to the operation.

CONCLUSIONS

During the past 2 decades, the management of patients with ductal calculi has become multidisciplinary, with the endoscopists extracting the ductal calculi and the surgeons subsequently performing cholecystectomy. Numerous factors must be considered in selecting the most appropriate treatment for each case, such as the patient's general condition, and the number, size, and anatomic location of the bile stones. The experience and skill of surgeons and endoscopists are also important components of the treatment.

Our 10-year experience indicates that in cases of retained or recurrent stones the choice of treatment is ERCP.

When large or multiple stones are present in the choledoch, we generally prefer the laparoscopic procedure using the T-tube through a choledochotomy, but we do not hesitate to convert to open surgery whenever necessary, because this is not a sign of failure but, rather, of wisdom.

When we discover the stones during the cholecystectomy, our preference is to continue with the laparoscopic procedure, leaving a transcystic drain in case of incomplete clearance of the choledoch. This will facilitate complete clearance by ERCP.

We generally reserved the biliary anastomosis for patients with recurring multiple stones or for choledoch dilated more than 1.5cm, especially in elderly patients.

Lastly, we believe that the key to successful management of patients with CBD stones is a well-standardized institutional procedural algorithm consistent with the available local resources and technologies.

References:

1. Pitt HA. Role of open choledochostomy in the treatment of choledocholithiasis. *Am J Surg.* 1993;65:483–486.
2. Hermann RE. The spectrum of biliary stone disease. *Am J Surg.* 1989;158:171–173.
3. Csendes A. World progress in surgery: common bile duct stones. *World J Surg.* 1998;22:1113–1115.
4. Pach AE. Endoscopic retrograde cholangiopancreatography in the management of choledocholithiasis. *Surg Endosc.* 2000; 14:219–226.
5. Bose SM, Mazmadar A, Prakash VS, Kocher R, Katariya S, Pathak CM. Evaluation of predictors of choledocholithiasis: comparative analysis of clinical, biochemical, radiological, radio-

nuclear and intraoperative parameters. *Surg Today*. 2001;31:117–122.

6. Kusano T, Isa T, Shimoji H, Mijazato H, Muto Y, Furukawa M. Results of retrograde transhepatic biliary drainage after a common bile duct exploration for choledocholithiasis. *Hepato-gastroenterology*. 1999;46:2776–2780.

7. Gheraibeth KIA, Heiss HA. Biliary leakage following T-tube removal. *Int Surg*. 2000;85:57–63.

8. Kitano S, Bandoh T, Yoshida T, Shuto K. Laparoscopic C-tube drainage via cystic duct following common bile duct exploration. *J Hepatobiliary Pancreat Surg*. 1995;2:146–149.

9. Khoo DE, Walsh CJ, Cox MR, Murphy CA, Motson RW. Laparoscopic common bile duct exploration: evaluation of a new technique. *Br J Surg*. 1996;83:341–346.

10. Freeman ML, Nelson DB, Sherman S, Haber GB, Dorsher PJ. Complications of endoscopic biliary sphincterotomy. *N Eng J Med*. 1996;335:909–923.

11. Braasch JW, Tompkins RK (eds). *Surgical Disease of the Biliary Tract and Pancreas*. St. Louis, MO: Mosby; 1944;176–177.

12. Lygidakis NJ. Choledochoduodenostomy versus T-tube drainage after choledochotomy. *Am J Surg*. 1983;145:636–639.