Percutaneous transhepatic small-caliber choledochoscopic lithotomy: a safe and effective technique for percutaneous transhepatic common bile duct exploration in high-risk elderly patients

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Abstract

Purpose. Endoscopic bile duct clearance is now the treatment of first choice for bile duct stones, particularly in elderly or high-risk patients. The purpose of this study was to objectively assess the safety, efficiency, and ease of use of percutaneous transhepatic choledochoscopy, using a small-caliber choledochoscope with a facilitated insertion technique, in high-risk elderly patients with choledocholithiasis.

Methods. Sixty-five consecutive patients with common bile duct stones scheduled for percutaneous transhepatic choledochoscopic lithotomy were studied prospectively. Choledochoscopy was carried out with a simplified introducer system, using a 2.8-mm choledochoscope with electrohydraulic lithotripsy.

Results. The common bile duct was successfully accessed and the stones removed in all 65 patients. The average time for the entire procedure was 45 min. There were no serious procedure-related complications.

Conclusions. Percutaneous transhepatic choledochoscopic lithotomy, using electrohydraulic lithotripsy, is an attractive alternative for patients with common bile duct stones when surgery or retrograde methods are not suitable.

Key words Choledocholithiasis · Choledochoscopy · Lithotomy · Electrohydraulic lithotripsy

Introduction

At present several therapeutic alternatives are available to treat choledocholithiasis, including percutaneous transhepatic choledochoscopic removal of stones, endoscopic sphincterotomy, laparoscopic choledochotomy, and open choledochotomy.1–4 Since the introduction of endoscopic sphincterotomy, endoscopy has been widely used in the treatment of biliary stones.1 Endoscopic bile duct clearance is now the treatment of first choice particularly in elderly or high-risk patients with bile duct stones and those who have previously had a cholecystectomy, or before laparoscopic cholecystectomy is attempted.3,4 Endoscopic sphincterotomy has been shown to be 90% effective in clearing common bile duct stones.5 However, in large studies endoscopic sphincterotomy has a reported complication rate of 5.8%–11%, and a mortality rate of 0.7%–1.4%.3,5 In addition, the endoscopic sphincterotomy procedure cannot be performed if the papilla is inaccessible because of anatomical abnormalities of the duodenum, or because there has been previous gastroduodenal or biliary surgery.5 Percutaneous transhepatic choledochoscopic lithotripsy is an attractive alternative to surgery for such patients.7 The percutaneous transhepatic procedure was time-consuming and invasive in the past, but it is now less complicated and invasive because of the use of an introduced small-caliber choledochoscope and electrohydraulic lithotripsy; thus, this procedure has become highly successful even in difficult cases.

The following study was initiated to evaluate the ease, efficiency, and safety of using a small-diameter choledochoscope for percutaneous transhepatic choledochoscopic lithotripsy.

Patients and methods

To evaluate the efficiency and safety of percutaneous transhepatic choledochoscopy with a small-caliber endoscope, a prospective study was initiated. Between March 1997 and January 2001, 65 consecutive patients were scheduled for percutaneous transhepatic choledochoscopy to be carried out using an introducer system and 2.8-mm flexible choledochoscope, the Olympus CHF-CB30L/S (Endoscope Division, Olympus, Tokyo, Japan) (Fig. 1). The patients with choledocholithiasis were 36 men and 29 women, 70 to 89 years old, with a
mean age of 73.9 years. All patients had common bile duct stones. These elderly patients had high-risk diseases, including severe cardiac disease, pneumonia, severe diabetes mellitus, renal failure, severe liver cirrhosis, and cerebral infarction (Table 1).

Each patient underwent percutaneous transhepatic cholangiography with drainage. All the transhepatic maneuvers were performed with the patients under local anesthesia with 10–15 ml of 1% lidocaine; in addition, pethidine (35–50 mg) and diazepam (5–10 mg) were administered intramuscularly. A single percutaneous tract was created through the right lobe in 57 patients and through the left lobe in 8 patients. The right access route was preferred because it lessened the examiner’s X-ray exposure. A single percutaneous tract was created through the right lobe in 57 patients and through the left lobe in 8 patients. The right access route was preferred because it lessened the examiner’s X-ray exposure. A single percutaneous tract was created through the right lobe in 57 patients and through the left lobe in 8 patients. The right access route was preferred because it lessened the examiner’s X-ray exposure. A single percutaneous tract was created through the right lobe in 57 patients and through the left lobe in 8 patients. The right access route was preferred because it lessened the examiner’s X-ray exposure.

The Olympus choledochoscope provides a 1.2-mm working channel and accommodates an electrohydraulic lithotripsy probe. The tip of this choledochoscope can be deflected unidirectionally to 120°. Manipulations were done by torquing the scope while deflecting the tip as needed. Choledochoscopy was performed under conditions of continuous irrigation with saline. The irrigation fluid was injected with a pump that was set at a flow rate of 50 ml/min.

Stones were fragmented with electrohydraulic shock waves produced by a 0.6-mm lithotripsy probe connected to an electronic generator (Amco, Tokyo, Japan). The electrode was brought into contact with the stone under endoscopic guidance. Shock waves were released in bursts of three to five impulses per second. The energy was set to 0.5–0.9 joules per impulse. Fragments of stones were cleared into the gut by irrigation or were pushed through with the choledochoscope. In the case of residual stones, a second and, if necessary, a third fragmentation session was performed 3–7 days after the first session to achieve complete bile duct clearance (Figs. 3–6). Once the clearance was complete, the sheath was clamped and gradually retracted over the next 1–2 days.

Table 1. Profile of 65 treated high-risk patients

<table>
<thead>
<tr>
<th>Diseases</th>
<th>No. of patients (%)</th>
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<tbody>
<tr>
<td>Severe cardiac disease</td>
<td>15 (23.1%)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>8 (12.3%)</td>
</tr>
<tr>
<td>Severe diabetes mellitus</td>
<td>13 (20.0%)</td>
</tr>
<tr>
<td>Renal failure</td>
<td>13 (20.0%)</td>
</tr>
<tr>
<td>Severe liver cirrhosis</td>
<td>13 (20.0%)</td>
</tr>
<tr>
<td>Cerebral infarction</td>
<td>3 (4.6%)</td>
</tr>
</tbody>
</table>

The patients’ ages ranged from 70 to 89 years.

Fig. 1. Small-caliber flexible choledochoscope, with 2.8-mm diameter and a 1.2-mm working channel (Olympus CHF-CB30L/S) that can accommodate a stone extraction basket or an electrohydraulic lithotripsy probe. This endoscope has unidirectional deflection of its tip to 120° and is manipulated by torquing the scope while deflecting the tip as needed.