



Laparoscopic Common Bile Duct Exploration Using a Disposable Bronchoscope

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Abstract

Laparoscopic common bile duct exploration (LCBDE) remains underutilized in the management of common bile duct (CBD) stones. The exact cause of this under-utilization remains unclear; however, identified barriers to LCBDE implementation include lack of training and unavailability of dedicated instruments. LCBDE is an attractive alternative for stone retrieval in patients with Roux-en-Y gastric bypass given the anatomical difficulty in endoscopic retrograde cholangiopancreatography (ERCP). Direct visualization through choledochoscopy is the method of choice for LCBDE. However, dedicated choledoscopes are expensive and not widely available, which may lead surgeons to seek for alternatives at their particular environment. With the COVID-19 pandemic, disposable bronchoscopes have become widely accessible at our institution, raising the possibility of using one for direct vision of the biliary tract. We present the case of a 61-year-old male with past medical history of Roux-en-Y gastric bypass, who presented to the emergency department with a CBD stone. Successful LCBDE was achieved with the aid of a disposable bronchoscope for direct visualization of the biliary tract.

Keywords Laparoscopic common bile duct exploration · Common bile duct stones · Bronchoscope

Introduction

More than 30 years after its introduction, laparoscopic common bile duct exploration (LCBDE) remains an underutilized technique for the management of common bile duct (CBD) stones [1]. Barriers to its implementation include limited experience, lack of training, and unavailability of dedicated instruments for choledocopy.

Boasting a minimally invasive nature and a CBD clearance rate of 77–98%, endoscopic retrograde cholangiopancreatography (ERCP) has become the preferred method for CBD extraction in many centers [2]. However, ERCP in patients with altered upper GI anatomy (such as post-Roux-en-Y gastric bypass) presents many challenges [3].

For its part, LCBDE has been reported to be a safe and effective procedure with the advantage of dealing with CBD stones and cholecystectomy in a single session. CBD clearance rates range from 87 to 100%, with morbidity reported at 5–19% [4]. LCBDE is an attractive alternative for stone retrieval in patients with Roux-en-Y gastric bypass given the anatomical difficulty in ERCP [5]. LCBDE can be done with “blind” techniques, where stones are extracted without direct visualization or with dedicated choledoscopes. Although no guidelines for a methodical implementation of these techniques exist, most literature concerning CBD clearance is based on choledochoscopy [6]. Direct visualization assures stone extraction during CBD manipulation eliminating fluoroscopy. Unfortunately, choledoscopes are expensive and not widely available, which may pressure surgeons to seek for alternatives at their particular environment [7].

Since the start of the COVID-19 pandemic, disposable bronchoscopes have become widely accessible at our

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Fig. 1 Contrast-enhanced abdominal CT scan reported a dilated CBD (19 mm) and a 10-mm stone in the distal portion

institution, raising the possibility of using one for direct vision of the biliary tract.

We present the case of a 61-year-old man with a past medical history of Roux-en-Y gastric bypass, who presented to the emergency department with a CBD stone. Successful LCBDE was achieved with the aid of a disposable bronchoscope for direct visualization of the biliary tract.

Case

A 61-year-old man with a past medical history of obesity and Roux-en-Y gastric bypass presented to the emergency department with jaundice. Laboratory analysis revealed an

elevated total bilirubin (7.6 mg/dL). Contrast-enhanced abdominal CT scan reported a 10-mm stone in the distal portion of the CBD (Fig. 1). The patient was taken to the operating room for LCBDE and cholecystectomy.

A LCBDE and cholecystectomy were performed with 10-mm ports in the umbilicus and epigastric region and two 5-mm ports in the right upper quadrant. Dissection of the CBD was made, and a LCBDE was performed through a 1 cm choledochotomy. At this point, the idea of using a disposable bronchoscope was suggested by a surgical team member. An Ambu® aScope Broncho Slim bronchoscope (Ambu® Inc., Columbia, USA) was brought to the operating room. With a 3.8 mm diameter, the instrument was introduced through the 5-mm port at the midclavicular line and through the choledochotomy. The suction channel was used for irrigation for more visibility. An impacted stone was identified at the lower third of the CBD (Fig. 2). A



Fig. 2 Impacted stone at the distal CBD visualized with Ambu® aScope Broncho Slim bronchoscope

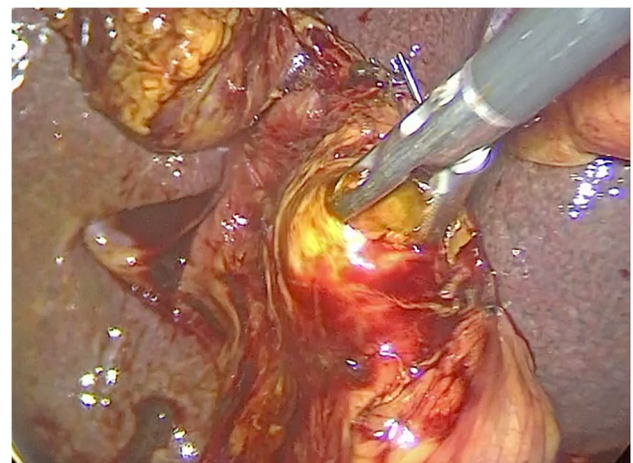
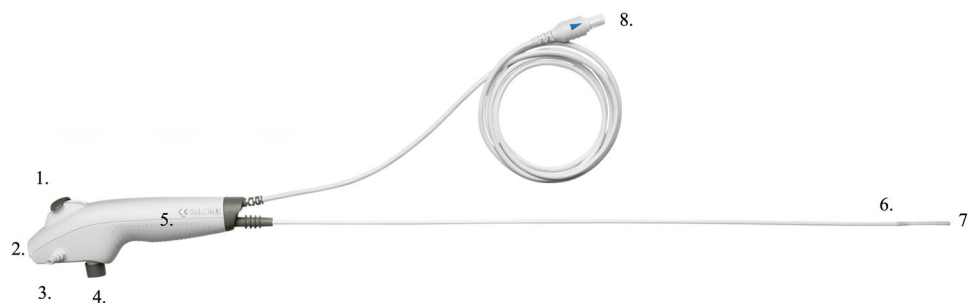


Fig. 3 Stone extraction through choledochotomy with laparoscopic instruments after stone mobilization

Fig. 4 Ambu® aScope Broncho Slim bronchoscope. (1) Control lever. (2) Working channel 1.2 mm. (3) Suction connector. (4) Suction button. (5) Handle grip. (6) Bending capabilities. (7) Distal end. (8) View 2 advanced connector



Dakota 0.63-mm stone retrieval basket (Boston Scientific, Washington DC, USA) was introduced through a 1.2 mm working channel on the scope, and the stone was mobilized and extracted with laparoscopic instruments (Fig. 3). The gallbladder was dissected with no further complications. The operating time was 180 min. The patient was discharged home 3 days after surgery without complications.

Discussion

Currently, there is no consensus on the ideal method for stone extraction for CBD stones in patients with Roux-en-Y gastric bypass, and most centers rely on their own experience [5]. Although transgastric or doubled-balloon ERCP have been reported as successful procedures in gastric bypass patients with CBD stones, these are not frequently performed at our institution [8].

LCBDE is an effective method for CBD stone extraction. Choledochoscopy is the most popular technique in LCBDE because it provides direct visualization. Nevertheless, choledoscopes are expensive and not widely available. Ambu® aScope Broncho Slim bronchoscope is a disposable instrument widely available at our center with a cost of \$539 USD per unit. It consists of a 3.8-mm flexible scope with a bidimensional high bending angle, a 1.2-mm working channel, and a suction channel (Fig. 4). Due to its slim caliber, the idea of using this instrument for a LCBDE seemed plausible. Limitations perceived using this instrument as compared to dedicated choledoscopes were (1) impaired visualization due to the inability to irrigate and vacuum at the same time through the bronchoscope. To improve visibility, the suction channel was used for irrigation; however, optimal view was compromised. (2) The bidirectional angles aided during the CBD cannulation through the choledochotomy but limited the instrument manipulation inside the bile duct. Dedicated choledoscopes have a multi-direction drive which facilitates maneuvering and stone handling. (3) The absence of an integrated system of a guide wire, dilatator, and introducer was considered a drawback for duct cannulation. Introducers in some dedicated choledoscopes give

direct guidance for instrument introduction to the biliary system. The lack of these features complicated the insertion of the bronchoscope. Despite these limitations, an impacted stone was mobilized with an extraction basket, a task hardly achievable with irrigation or Fogarty catheters. Operating time was 180 min, compared to a mean of 95–135 min in other studies where LCBDE was done with dedicated choledoscopes [9]. This difference could be explained by the limitations mentioned.

Laparoscopic common bile duct exploration is limited by sophisticated instruments not widely available; thus, alternatives should be sought. To our knowledge, this is the first case report of a laparoscopic common bile duct exploration with a disposable bronchoscope. Although not made for this procedure, it could be a feasible option for stone visualization and mobilization when dedicated choledoscopes lack.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12262-022-03642-7>.

Declarations

Conflict of Interest The authors declare no competing interests.

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