

Direct Peroral Cholangioscopy using a Small-Caliber Gastroscope: A Case Series

Athanasiros D. Sioulas, Iosif Beintaris, Dimitrios Polymeros, Chrysoula Malli,^{*} Ioannis S. Papanikolaou, George Dimitriadis and Konstantinos Triantafyllou

Hepatogastroenterology Unit, Second Department of Internal Medicine and Research Institute, Attikon University General Hospital, Medical School, Athens University, Athens, Greece

Abstract: Cholangioscopy is a valuable tool that permits direct endoscopic visualization of the bile ducts contributing to precise diagnosis and facilitating therapeutic interventions. This series demonstrates our current experience with direct peroral cholangioscopy by means of an ultraslim gastroscope. We also discuss feasibility as well as, advantages and limitations of this promising technique.

Keywords: Cholangioscopy, ultraslim gastroscope, ERCP, feasibility, CBD stones.

INTRODUCTION

Direct peroral cholangioscopy (DPOC) permits the direct visualization of the bile ducts and is primarily used for the detection and treatment of bile duct stones and the evaluation of indeterminate biliary strictures [1]. Endoscopic equipment currently available for cholangioscopy includes "mother-baby" systems, catheter-based systems and the recently introduced ultraslim gastroscope (USG). We present our experience with a case series of patients who underwent DPOC using an USG (GIF-XP180N, Olympus Medical Systems Corporation, Tokyo, Japan) as part of an endoscopic retrograde cholangiopancreatography (ERCP) procedure. Technical feasibility, as well as observed advantages and disadvantages, are also discussed.

CASE 1

A 64-year-old woman was admitted in the hospital with right upper quadrant (RUQ) colicky pain, nausea and vomiting. Her past medical history was unremarkable except for a laparoscopic cholecystectomy due to symptomatic cholelithiasis 5 years ago. Physical examination was only significant for mild RUQ tenderness. Initial work-up revealed leukocytosis (WBC: 11.500/mm³, PMNs: 76%) and increased liver function tests (AST: 150 U/L, ALT: 135 U/L, γGT: 158 U/L, ALP: 183 U/L) with normal bilirubin levels. Ultrasound showed a dilated (diameter: 1.4 cm) common bile duct (CBD) with evidence of stones in it. The second day after her admission the patient

underwent an ERCP under deep sedation provided by an anesthetist. Cholangiography revealed 2 stones sized approximately 1.0 and 1.2cm respectively. An endoscopic sphincterotomy (ES) was performed, further controlled extended to 13.5mm using a controlled radial expansion (CRE) balloon dilator (Boston Scientific, Tokyo, Japan) and the stones were removed with a balloon catheter. Following CBD clearance, the duodenoscope was withdrawn and an USG (outer diameter: 4.9 mm, working channel diameter: 2 mm, working length: 110cm) was advanced through the dilated ampulla of Vater into the CBD. No residual stones or sludge were demonstrated (Figure 1). The whole procedure was uncomplicated and the patient was discharged after 48 hours.



Figure 1: Cholangioscopy shows completely cleared CBD after ERCP.

CASE 2

An 86-year-old diabetic female patient presented complaining of fever, RUQ pain and progressive jaundice over the past 36 hours. Laboratory and

*Address correspondence to this author at the Hepatogastroenterology Unit, Second Department of Internal Medicine and Research Institute, Attikon University General Hospital, Medical School, Athens University, 1, Rimini Street, 124 62 Haidari, Greece; Tel: 0030 210 5832087; Fax: 0030 210 5326422; E-mail: ktriant@med.uoa.gr

radiological examinations favored the diagnosis of acute cholangitis secondary to choledocholithiasis. Despite the initial management with intravenous hydration and broad-spectrum antibiotics the patient showed no improvement, so an urgent ERCP was performed the next day. Under deep sedation an ES was done followed by a CRE balloon-mediated controlled expansion to a diameter of 12mm and removal of 4 various-sized CBD stones along with pus and sludge. A subsequent balloon-occluded cholangiography revealed complete CBD clearance. However, the USG was then advanced to the hepatic hilum and repetitive normal saline solution irrigation and suction were done delivering tiny remnants. A completely clear CBD was eventually achieved (Figure 2). Postoperatively, the patient exhibited a rapid symptomatic and laboratory improvement and was discharged home after 5 days.

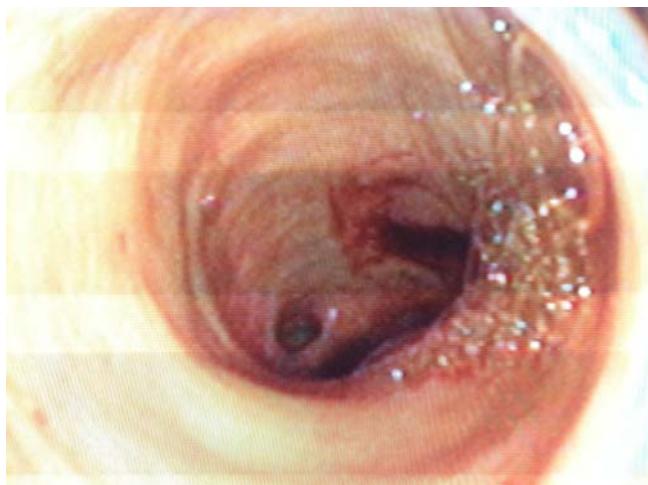


Figure 2: Cholangioscopy shows completely cleared extrahepatic ducts up to the hepatic hilum.

CASE 3

A 69-year-old man was hospitalized in the Department of Surgery of our Hospital suffering from acute cholangitis. His personal history was significant for hypertension and an open cholecystectomy and choledochoduodenostomy performed 15 years ago due to recurrent bile duct stones. An ERCP was performed and the cholangiography revealed multiple small stones and mild dilation of the CBD. Based on these findings, a wide ES followed by a balloon-mediated CBD clearance was achieved. Subsequently, an USG was advanced through the bulbar CBD opening, proximal to the ampulla of Vater and reached the intrahepatic ducts. Direct cholangioscopy demonstrated the presence of biliary sludge, which was also removed with a suitable balloon catheter (Boston Scientific,

Tokyo, Japan). No complications were noted and the patient recovered rapidly and left the hospital a few days later.

CASE 4

An 82-year-old woman presented with a 7-day history of jaundice, itching, dark urine and clay-colored stools. She also reported anorexia and 11-kgr weight loss over the past 5 months. Blood tests showed elevated liver enzymes (AST: 238 U/L, ALT: 212 U/L, γGT: 1154 U/L, ALP: 383 U/L, TBil: 10.2 mg/dL, DBil: 8.8 mg/dL) and a Ca19-9 value of 320 U/ml. Ultrasound revealed a markedly dilated CBD (max. diameter: 13mm) and intrahepatic ducts and the subsequent MRI/MRCP was suggestive of an inoperable middle-CBD cholangiocarcinoma. CBD cannulation with ERCP was performed followed by a wide ES and a CRE balloon-mediated expansion to a diameter of 12mm (Figure 3). Aiming to obtain tissue diagnosis we proceeded to cholangioscopy with the USG and biopsied the lesion with suitable forceps (Cook Medical Europe LTD, Limerick, Ireland). Eventually, a metal stent was placed into the CBD to allow biliary drainage and the patient was referred for further palliative management. Of importance, histological evaluation was compatible with a moderately differentiated cholangiocarcinoma.



Figure 3: Contrast cholangiography showing CBD stenosis with proximal dilation. Tissue was obtained from the lesion during cholangioscopy.

CASE 5

A 62-year-old male patient with a history of chronic pancreatitis due to excessive alcohol consumption presented with fever, jaundice and RUQ pain. Physical examination and laboratory tests suggested the diagnosis of acute cholangitis. Ultrasound revealed

dilation of the CBD (approximately 11mm) with no visuable stone in it. Conservative management resulted in no improvement so an ERCP was decided. Contrast cholangiography showed a smooth stricture of the peripheral CBD and subsequently an ES and CRE balloon-mediated controlled expansion to a diameter of 12mm were performed. Despite multiple efforts we failed to insert the USG into the CBD in order to obtain biopsies from the stricture. Excess scope looping and limited available time due to patient's poor health condition are possible explanations. Eventually, two plastic stents were placed in parallel in the CBD to relieve biliary obstruction.

DISCUSSION

Cholangiography is primarily used for the treatment of difficult bile duct stones and the evaluation of biliary strictures of either benign or malignant nature. Moreover, it permits direct biopsy sampling of bile duct lesions, as well as, preoperative assessment of the extent of extrahepatic cholangiocarcinomas. Direct vision identification of residual bile duct stones not seen during conventional cholangiography during ERCP is also of noteworthy value [1].

Cholangioscopy can be carried out as either two- or single-endoscopist technique. Endoscopic equipment for the former procedures involves "mother-baby" systems (Olympus America, Center Valley, PA, USA and Pentax, Orangeburg, USA) with the baby scope being inserted through the accessory channel of the mother one. Single-endoscopist cholangiography is performed with a catheter-based system (Spy Glass, Boston Scientific Endoscopy, Marlboro, MA, USA) or by means of an USG.

DPOC with an USG seems feasible in patients with dilated CBD. The scope is inserted into the duct by either the free-hand method or over a guidewire placed during ERCP. The latter is accomplished using an overtube balloon or an intraductal anchoring balloon [2, 3]. Recently, duodenal balloon-assisted DPOC with an USG was presented [4]. Once inserted, the USG allows direct inspection of the bile ducts and additional diagnostic and therapeutic interventions facilitated by miniature accessories passed through its working channel. To note, DPOC with an USG can be achieved even in patients with surgically altered GI anatomy, provided the suitable equipment [5]. USG can be inserted through either the peroral or transnasal route [6].

The present case series reports our current experience in DPOC with an USG. In our Department with a workload of approximately 200 ERCP procedures per year we perform cholangioscopies as an adjunct to ERCP aiming to ensure complete CBD clearance in patients with multiple and/or large stones and markedly dilated CBD. Patients remain under deep sedation and the endoscopist advances the USG via the mouth into the duodenum using the free-hand technique. Minimum gas insufflation is used to prevent intragastric scope looping. A J turn is then made in the second duodenal portion to position the tip of the scope in front of the papilla. Finally, the USG enters the dilated CBD with gentle pushing. Time from peroral insertion to biliary access, when that was achieved, ranged from 5 to 20 minutes.

In three cases the indication was detection and clearance of residual CBD stones. As Itoi *et al.* reported, the prevalence of residual CBD stones 6 days after stone retrieval with ERCP reaches the 24% of patients [7]. These stones are usually smaller than 5mm in diameter and possibly of limited clinical significance. Nevertheless, several studies indicate that diminutive stones may become the base for recurrent choledocholithiasis suggesting their early identification and removal [8, 9]. Methods proposed for detection of residual bile duct stones include intraductal ultrasonography (IDUS), balloon-occluded cholangiography and DPOC [10, 11]. Besides direct identification of residual stones, DPOC with an USG enables therapeutic procedures, such as lithotripsy, stone removal with commercially available balloon and/or basket catheters and CBD clearance using normal saline solution irrigation and suction [12]. Detecting and treating residual CBD stones after ERCP is, therefore, considered a strong indication for DPOC with an USG.

Moreover, DPOC with an USG is a valuable tool for the evaluation of CBD strictures. Not only does it allow their direct visual identification, but also tissue sampling for histopathological confirmation, as done in our fourth case. That is of great importance given the low diagnostic yield of ERCP-based methods in terms of establishing a malignancy diagnosis [1].

As our limited experience indicates, DPOC with an USG has several advantages. First, it provides high-quality images of the biliary tree (Figures 1, 2). Second, it allows a variety of diagnostic and therapeutic procedures through its 2mm in diameter working channel. This is facilitated by several commercially available suitable devices including biopsy forceps,

stone retrieval balloons and baskets, polypectomy snares and hemostatic devices [13]. Third, it is radiation-free minimizing the hazard to the endoscopist and staff. Fourth, it is a feasible technique only applied by a single endoscopist.

On the other hand, the aforementioned method bears some disadvantages. Scope insertion can be problematic when large loops form within the gastric fundus or deeper duodenum, necessitating sophisticated maneuvers. As noted, several techniques have been implicated to facilitate scope insertion to the CBD, namely overtube balloon-assisted, intraductal anchoring balloon-mediated and duodenal balloon-assisted cholangioscopy; however, they require highly specialized endoscopists and are rather costly and time-consuming. DPOC with an USG may also involve a risk of air embolism, infection and mechanical injury to the biliary tree [6]. Finally, concerns are raised regarding ultraslim scopes being prone to damage due to their overuse, as well as the application of this method in non-academic settings with limited equipment.

In conclusion, DPOC with an USG comprises a valuable tool in our armamentarium for diagnosis and treatment of biliary tract diseases. Appropriate trials are definitely needed to evaluate its efficacy and safety in comparison with other cholangioscopic techniques. Hopefully, continuing advances in specialized endoscopes and related accessories will broaden its application in routine clinical practice.

CONFLICT OF INTEREST

None.

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