

## Management of choledocholithiasis by direct cholangioscopy via freehand intubation using the “J” maneuver



Hao Chi Zhang, MD, Bhavtosh Dedania, MD, Nirav Thosani, MD

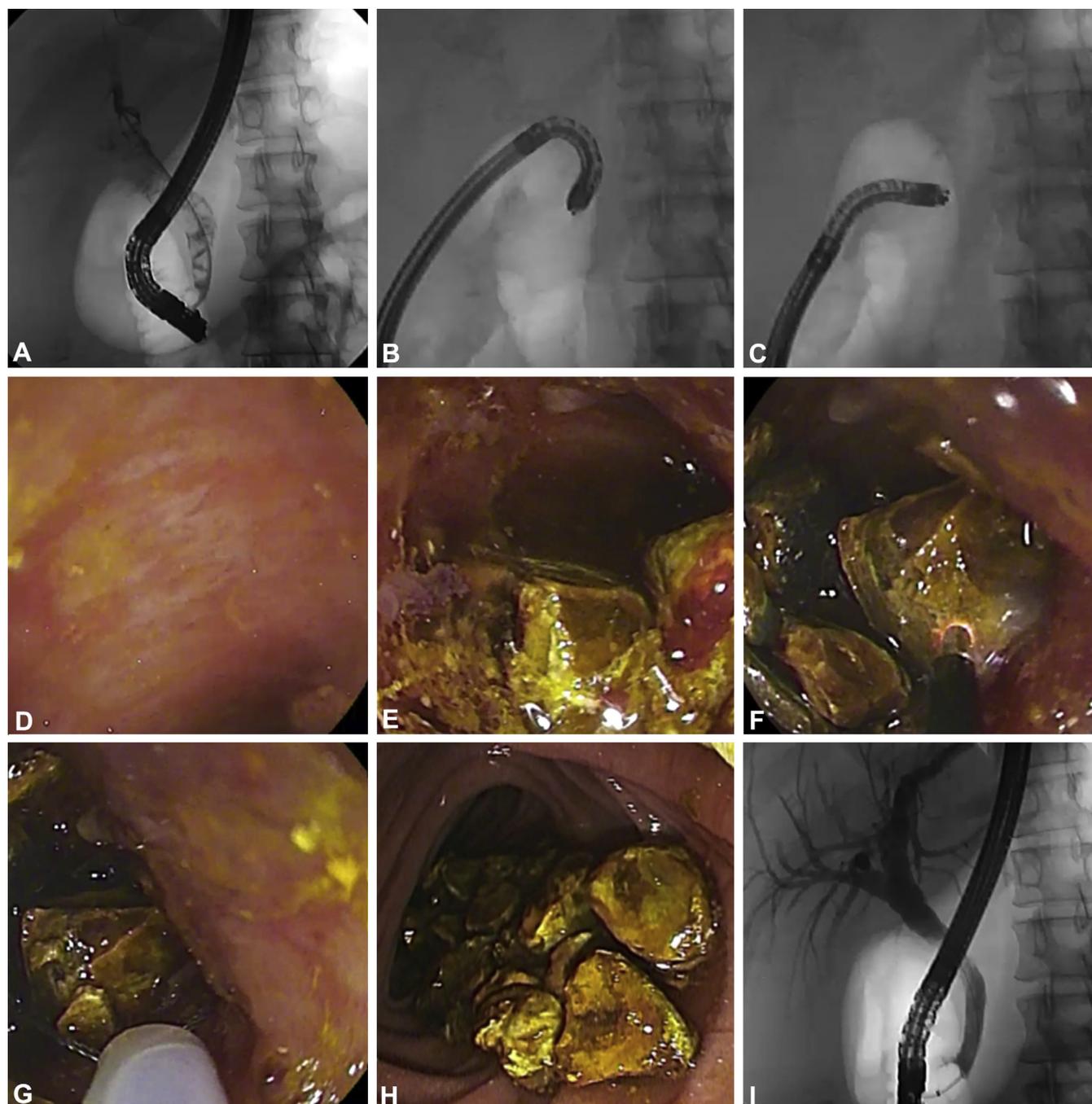
Challenging cases of choledocholithiasis may require multiple modalities to achieve successful extraction of stones. Although conventional cholangioscopy may afford the ability to perform electrohydraulic lithotripsy, the stone burden may still be overwhelming. We demonstrate the application of single-step direct cholangioscopy, with use of a slim upper-endoscope, by freehand intubation using the “J” maneuver, as an additional endoscopic solution for biliary stone management, to avoid the need for surgical bile duct exploration (Video 1, available online at [www.VideoGIE.org](http://www.VideoGIE.org)).

A 37-year-old woman, 2 months postpartum, presented with epigastric pain associated with nausea and vomiting. Four months prior, during her third trimester of pregnancy, she was treated for choledocholithiasis complicated by acute pancreatitis and acute cholangitis. An ERCP was performed with successful extraction of small biliary stones, sludge, and pus. A plastic biliary stent was placed to allow for bile drainage, pending the decision of timing to perform cholecystectomy; the patient expressed the desire to undergo cholecystectomy after her delivery. Although she gave birth 2 months later, she did not later undergo cholecystectomy. On physical examination, the patient had tenderness in the epigastrium and the right upper quadrant of the abdomen without Murphy’s sign. Laboratory evaluation demonstrated elevated alanine aminotransferase and alkaline phosphatase levels with normal bilirubin. Serum lipase was normal. Choledocholithiasis was confirmed by US.

ERCP was performed. After removal of the biliary stent, a cholangiogram confirmed innumerable filling defects representing stones in tandem from the distal common bile duct (CBD) to the common hepatic duct (CHD) and to the left hepatic duct (LHD) (Fig. 1A). Balloon extraction and use of a trapezoid basket did not yield satisfactory stone extraction. Conventional single-operator cholangioscopy with electrohydraulic lithotripsy (EHL) was attempted. However, 3 lithotripsy probes were obliterated during this attempt, without significant stone fragmentation. Sphincteroplasty with a balloon dilator was performed from 12 mm to 15 mm. The balloon extractor subsequently yielded 2 large stones, but numerous retained stones could not be extracted.

At this juncture, conventional methods of biliary stone extraction were exhausted. Although surgical bile duct exploration is a potential route, an effort was made to avoid such a surgery and its related comorbidities. A slim 8-mm upper endoscope was brought to the second part of the duodenum, where a series of maneuvers involving retroflexion, torque, and retraction of the endoscope allowed for direct intubation of the distal CBD without the need for a guidewire. This method of freehand intubation is known as single-step direct cholangioscopy via “J” maneuver (Fig. 1B and C). This allowed for high-definition, wider-angle views of the CBD lumen (Fig. 1D) with improved visibility compared with conventional cholangioscopy. Upon identification of impacted stones (Fig. 1E), another EHL probe was introduced for targeted lithotripsy (Fig. 1F) yielding only partial success because of frequent drainage of aqueous saline solution medium. With a larger 2.4-mm instrument channel now available, a stiff hexagonal snare was introduced into the CBD lumen (Fig. 1G). The distal-most stones were partially grasped as a means of disimpaction. Once satisfactory disimpaction was achieved, the upper endoscope was exchanged for ERCP. Additional sweeps with the balloon extractor led to successful extraction of numerous stones (Fig. 1H) from the CBD, CHD, and LHD. A final occlusion cholangiogram demonstrated clearance of the biliary tree (Fig. 1I). There were no immediate adverse events after the procedure.

One of the earliest reports of cholangioscopy by direct intubation with an 8.8-mm endoscope was described by Urakami et al<sup>1</sup> in 1977. Larghi and Waxman<sup>2</sup> described the feasibility of using an ultra-slim upper endoscope to directly access the distal bile duct; however, this technique involved exchange for the upper-endoscope via guidewire. A variation of this technique using the “ropeway method” (or the balloon-anchoring method) has been demonstrated for the management of choledocholithiasis.<sup>3</sup> Brauer et al<sup>4</sup> reported the feasibility of directly intubating the biliary tract without the use of guidewire exchange, including cases of native papilla. This single-step freehand intubation was achieved with the “J” maneuver, involving retroflexion of the upper-endoscope while it was in the second part of the duo-



**Figure 1.** Endoscopic and fluoroscopic images related to diagnosis, technique, and outcome. **A**, Initial cholangiogram demonstrating filling defects in tandem in the common bile duct (CBD) extending to the common hepatic duct and the left hepatic duct, suggesting significant stone burden. **B**, Fluoroscopic image demonstrating the “J” maneuver involving retroflexion of the tip of the 8-mm endoscope with simultaneous retraction of and rotational maneuvers with the endoscope. **C**, The tip of the endoscope partially straightened after direct intubation of the CBD. **D**, High-definition, white-light view of the lumen of the CBD with the upper-endoscope, with submersion in saline solution. **E**, Significant stone burden in the CBD. **F**, Direct lithotripsy of the stones in the CBD; however, the aqueous medium, saline solution, which is optimal for electrohydraulic lithotripsy, frequently drained and was difficult to retain in the CBD lumen. **G**, Use of snare instrument in the CBD to achieve stone disimpaction. **H**, Outcome of stone extraction, with innumerable stones and stone fragments settling in the duodenum. **I**, Final occlusion cholangiogram demonstrating no residual filling defects in the biliary tree.

denum, with simultaneous rotation and retraction of the endoscope toward the papilla. Once the endoscopist enters the bile duct, new diagnostic and therapeutic possibilities become possible.

## DISCLOSURE

*All authors disclosed no financial relationships relevant to this publication.*

*Abbreviations: CBD, common bile duct; CHD, common hepatic duct; EHL, electrohydraulic lithotripsy; LHD, left hepatic duct.*

## ACKNOWLEDGMENTS

Grant support provided by John Stroehlein Endowment and Charles Butt & HEB Endowment from the University of Texas MD Anderson Cancer Center, Houston, Texas.

## REFERENCES

1. Urakami Y, Seifert E, Butke H. Peroral direct cholangioscopy using routine straight-view endoscope: first report. *Endoscopy* 1977;9:27-30.
2. Larghi A, Waxman I. Endoscopic direct cholangioscopy by using an ultra-slim upper endoscope: a feasibility study. *Gastrointest Endosc* 2006;63:853-7.
3. Pohl J. Direct cholangioscopy with standard ultraslim endoscopes for electrohydraulic lithotripsy of an incarcerated large bile duct stone. *VideoGIE* 2013;1:447-8.
4. Brauer BC, Chen YK, Shah RJ. Single-step direct cholangioscopy by freehand intubation using standard endoscopes for diagnosis and therapy of biliary diseases. *Am J Gastroenterol* 2012;107:1030-5.

---

Division of Gastroenterology, Hepatology & Nutrition, University of Texas Health Science Center at Houston, Houston, Texas, USA.

Copyright © 2019 American Society for Gastrointestinal Endoscopy. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.vgie.2019.01.013>

---