



Video Article

Low-cost and reliable method for confirming residual bile duct stones utilizing a novel peroral cholangioscope

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BRIEF EXPLANATION

WHEN PERFORMING ENDOSCOPIC procedures for bile duct stones, confirming the absence of residual stones is crucial. However, during postprocedural cholangiography, the presence of air or debris can pose challenges in assessing residual stones.¹ Especially in cases of altered anatomy, pursuing reintervention may not be feasible, even if residual stones are present.^{2,3} Although peroral cholangioscopes can confirm stone absence,⁴ their routine use is impractical because of high costs. Therefore, we developed a novel method using the complementary metal oxide semiconductor (CMOS) camera unit of a new ultrathin cholangioscope (DRES Slim Scope; Japan Lifeline, Tokyo, Japan), allowing for the reliable confirmation of the absence

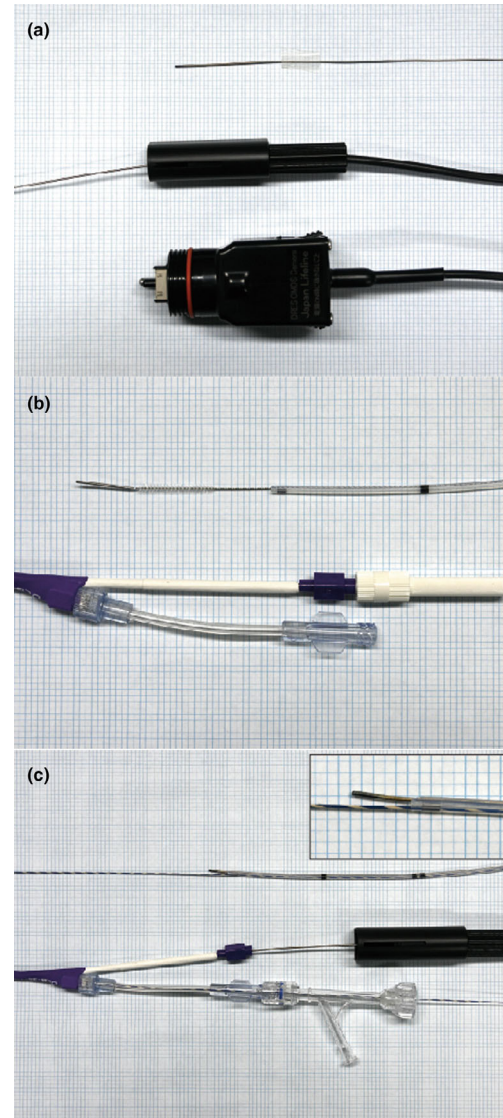


Figure 1 DRES Slim Scope (Japan Lifeline, Tokyo, Japan) complementary metal oxide semiconductor (CMOS) camera unit, CytoMaxII double lumen cytology brush, and the combination of both. (a) The DRES CMOS camera unit is the world's thinnest reusable cholangioscope, with a diameter of only 1 mm. (b) Its application involves extracting the brush from the CytoMaxII double-lumen cytology brush, thus employing it as a substitute for the original sheath. (c) The CMOS camera is inserted into the lumen from which the brush has been removed. The addition of a Y-shaped connector to the guidewire lumen enables the irrigation of the bile duct with saline solution. The enlarged tip is shown in the upper right corner. One square grid represents 2 mm. The manufacturer states that this CMOS camera unit can be reused 10 times for different patients with proper washing and sterilization. At our hospital, we adhere to the manufacturer's protocol and use OER-5 with Acecide and EndoQuick solutions (all products are from Olympus Corporation, Tokyo, Japan).

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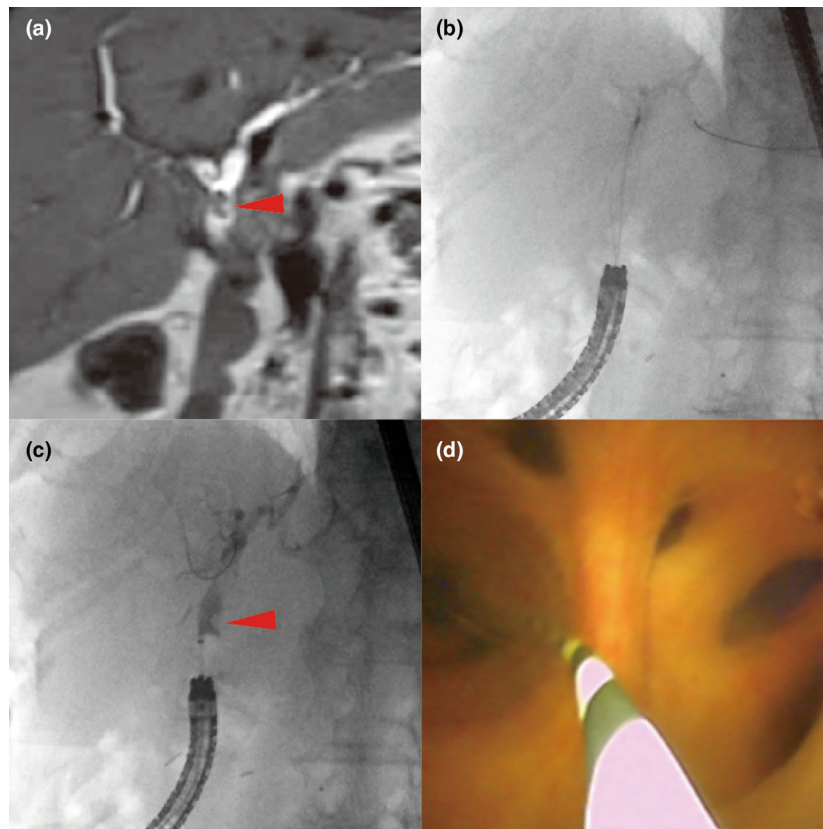


Figure 2 Application example for bile duct stones after hepaticojejunostomy. (a) A 71-year-old woman with a history of pancreaticoduodenectomy developed cholangitis resulting from hepaticojejunostomy anastomotic stricture and bile duct stones (red arrowhead). (b) Stone removal was performed using a basket and a balloon catheter. (c) However, residual stones were suspected during cholangiography (red arrowhead). (d) The double-lumen sheath of the cytology brush was employed as a substitute for the original sheath, and the complementary metal oxide semiconductor camera unit was inserted into the intrahepatic bile duct, confirming the absence of residual stones cost-effectively.

of residual stones at a low cost (Video S1). The CMOS camera unit, with a 1 mm diameter, is priced at 300,000 Japanese yen and can be reused 10 times with proper washing and sterilization (30,000 yen/use).⁵ It can be passed through the lumen after removing the brush from the double-lumen biliary cytology brush (CytoMaxII; Cook Japan Inc., Tokyo, Japan) (Fig. 1). Substituting the CytoMaxII sheath priced at 12,000 yen for the original sheath priced at 39,000 yen enables biliary duct observation at 42,000 yen.

We present an actual case utilizing this method. A 71-year-old woman with a history of pancreaticoduodenectomy developed cholangitis resulting from hepaticojejunostomy anastomotic stricture and bile duct stones. The stricture was dilated with a balloon, and stone removal was performed using a basket and balloon. However, the cholangiography

indicated the possible presence of residual stones, although definitive confirmation remained elusive. By using the aforementioned method while irrigating saline solution through the Y-shaped connector, we visualized the bile duct and confirmed the absence of stones (Fig. 2). Given the reduced effort and cost associated with endoscopic nasobiliary drainage tube placement or reintervention, this method proves beneficial for both altered and normal anatomy cases.

Authors declare no conflict of interest for this article.

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SUPPORTING INFORMATION

ADDITIONAL SUPPORTING INFORMATION may be found in the online version of this article at the publisher's web site.

Video S1 We were able to confirm the absence of residual bile duct stones with a low-cost (42,000 Japanese yen) and reliable method using a novel peroral cholangioscope.