

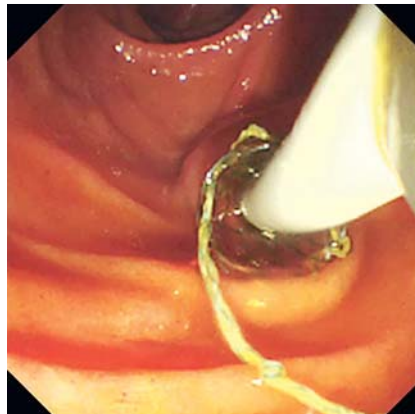
## Cholangioscopy-assisted extraction of choledocholithiasis and partial sediment-like gallstones through papillary support: A pilot exploration for super minimally invasive surgery

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► **Fig. 1** The novel cholangioscope (Eye-Max, 9F; Micro-Tech).

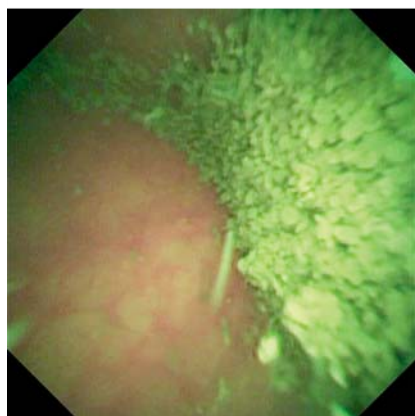
Endoscopic retrograde cholangiopancreatography (ERCP) has become a well-established technique for common bile duct (CBD) stones [1, 2]. However, it has always been necessary to perform endoscopic sphincterotomy (EST) during ERCP, resulting in the loss of sphincter function and probable regurgitation. In this study, we attempted cholangioscopy-assisted extraction through papillary support for a CBD stone and partial sediment-like gallstones without EST. First, an approximately 6-mm CBD stone was found by cholangiography after biliary intubation by the double-wire method. A covered support (12 mm in diameter, 30 mm in length) was then placed in the lower CBD and papilla, and a considerable amount of bile with biliary sludge flowed from the support under endoscopic aspiration. The support was dilated by balloon, and then the cholangioscope (Eye-Max, 9 F; Micro-Tech, Nanjing, China) was inserted into the CBD



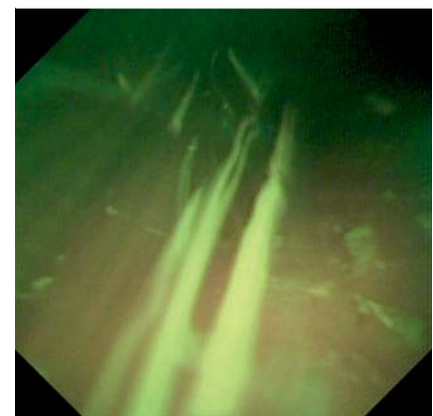
► **Fig. 2** A covered support (12 mm in diameter, 30 mm in length) was placed in the lower common bile duct (CBD) and papilla, and the cholangioscope was inserted into the CBD.



► **Fig. 3** A specially designed basket was inserted into the CBD through the working tunnel of the cholangioscope and was opened and closed smoothly.



► **Fig. 4** Many sediment-like gallstones were found under cholangioscopy.



► **Fig. 5** Partial sediment-like gallstones were removed by the aspiration function under cholangioscopy.

ing, China) was inserted into the CBD (► **Fig. 1**, ► **Fig. 2**). No stones were found in the left hepatic duct, right hepatic duct, or CBD, confirming that the above-mentioned CBD stone had flowed into duodenum after placement of the support and endoscopic aspiration. A specially designed basket was inserted into the CBD through the working tunnel of the cholangioscope and was opened and closed smoothly, confirming the

ability to remove the CBD stone under direct visualization (► **Fig. 3**). Cholangiography again confirmed that there was no stone in the CBD. Thereafter another thinner cholangioscope (Eye-Max, 7F; Micro-Tech) was inserted into the CBD, cystic duct, and gall bladder successively over the wire (0.25 mm). Many sediment-like gallstones were found and partial stones were removed by aspira-



**Video 1** Cholangioscopy-assisted extraction of common bile duct stone and partial sediment-like gallstones through papillary support.

tion under cholangioscopy (► **Fig. 4**, ► **Fig. 5**). Finally, the support was removed and a plastic CBD stent was placed (► **Video 1**).

This study preliminarily confirmed the feasibility of cholangioscopy-assisted extraction through papillary support for a CBD stone and sediment-like gallstones, although a more effective aspiration function under cholangioscopy was warranted to achieve the complete removal of sediment-like gallstones.

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### Competing interests

The authors declare that they have no conflict of interest.

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