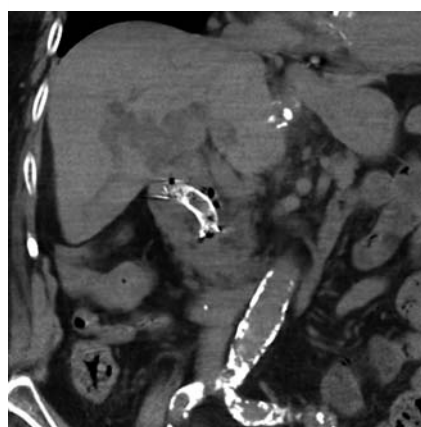
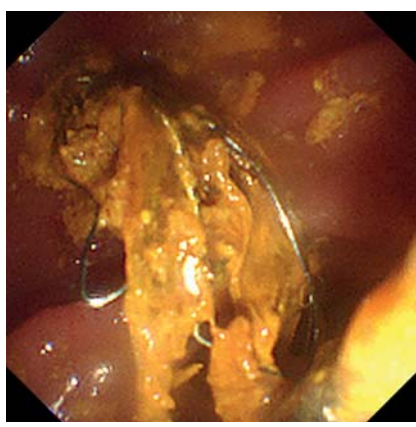


Successful removal of an uncovered metallic stent using peroral direct cholangioscopy and the stent-in-stent technique

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► **Fig. 1** A metallic stent is seen above the papilla and stones in the hilar bile duct.



► **Fig. 2** The metallic stent was not removable with rat-tooth forceps and did not allow a guidewire to go through.



► **Fig. 3** The stones within the stent were crushed using electronic hydraulic lithotripsy.



► **Fig. 4** A new covered self-expandable metallic stent was placed inside the previously implanted metallic stent.



► **Fig. 5** The removed stent had an exposed mesh and was covered with numerous stones.

Long-term biliary stenting can result in complications such as stent migration, fistulas, and stent–stone complexes [1]. We report a case of an uncovered metallic stent exhibiting stent–stone complexes that was successfully removed using peroral direct cholangioscopy (PDCS) and the stent-in-stent technique [2]. An 89-year-old woman was admitted with fever and abdominal pain. Computed tomography revealed a metallic stent placed above the papilla and many stones at the hilar level of the bile duct (► **Fig. 1**).

Ten years ago, a fully covered self-expandable metallic stent (FCSEMS) was implanted for a choledochoduodenal fistula due to bile duct stones; however, follow-up was interrupted after treatment. We were unable to remove the FCSEMS with rat-tooth forceps because the mesh of the stent was exposed and the inside of the stent was filled with stones. Unable to pass a guidewire through the stent (► **Fig. 2**), we performed PDCS (SpyScope DS II; Boston Scientific) with electronic hydraulic lithotripsy to crush the stones

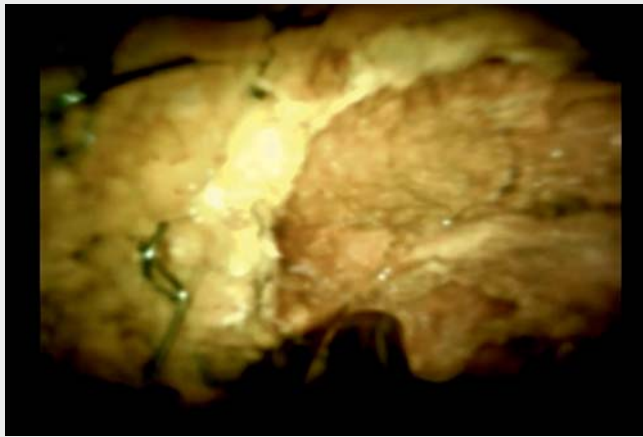
within the stent (► **Fig. 3**) and create space for devices to pass through the inside [3]. We cleaned the inside of the stent with a balloon catheter (Extractor; Boston Scientific), and then placed an additional FCSEMS (Bonastent; Medico's Hirata) within the old stent (► **Fig. 4**). One month later, we used a snare under fluoroscopic guidance and successfully removed both stents (► **Video 1**; ► **Fig. 5**) [4, 5].

It has been reported that partially covered and uncovered SEMS can be removed using the stent-in-stent technique with a success rate of approximately 80% [4]. When placing FCSEMS for benign biliary strictures, prolonged stent implantation should be avoided, and we advise preparation for potential complications.

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Competing interests

The authors declare that they have no conflict of interest.



Video 1 Removal of a longstanding stent (10 years) showing stent–stone complexes. To do this we performed peroral direct cholangioscopy with electronic hydraulic lithotripsy to crush the stones within the stent, followed by insertion of a new fully covered self-expandable metallic stent inside the old stent. One month later, both stents were removed.

The authors

Akihiro Matsumi  **Kazuyuki Matsumoto** 
Tatsuhiro Yamazaki, Shigeru Horiguchi,
Koichiro Tsutsumi, Hironari Kato, Hiroyuki
Okada

Department of Gastroenterology and
 Hepatology, Okayama University Hospital,
 Okayama, Japan

Corresponding author

Akihiro Matsumi, MD

Department of Gastroenterology and
 Hepatology, Okayama University Hospital,
 2-5-1 Shikata-cho, Okayama 700-8558,
 Japan
 akihiro.matsumi.gastro@gmail.com

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