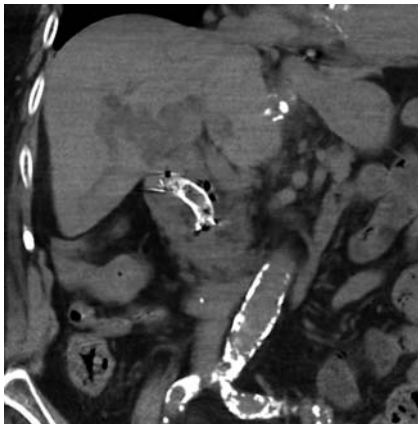
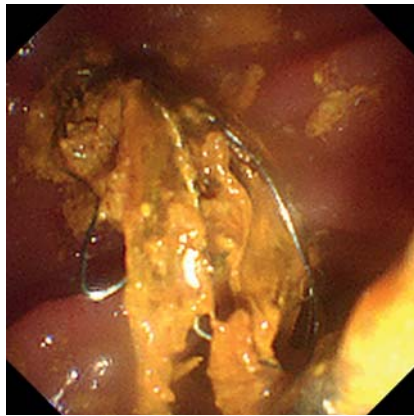


Successful removal of an uncovered metallic stent using peroral direct cholangioscopy and the stent-in-stent technique

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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

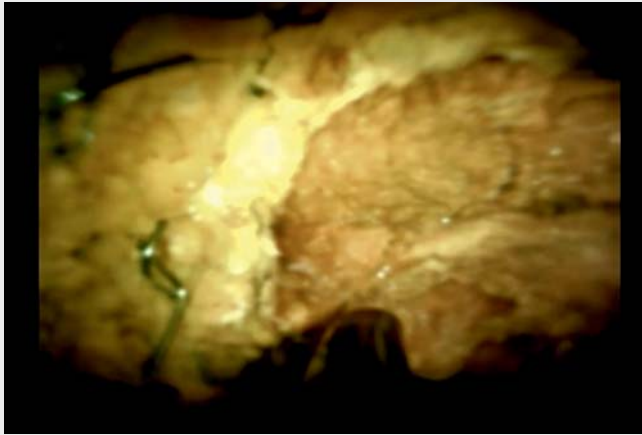
within the stent (► **Fig. 3**) and create space for devices to pass through the inside [3]. We cleaned the inside of the stent with a balloon catheter (Extractor; Boston Scientific), and then placed an additional FCSEMS (Bonastent; Medico's Hirata) within the old stent (► **Fig. 4**). One month later, 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.

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