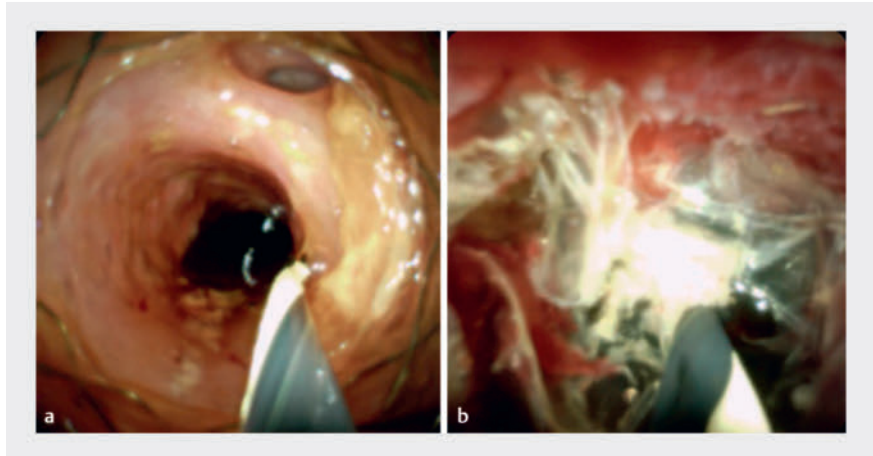


## Peroral cholangioscopy-assisted removal of a retained biliary fully covered metal stent using the inversion and traction technique



▶ **Video 1** Successful removal of a retained biliary fully covered self-expandable metal stent (FCSEMS) using the cholangioscopy-assisted inversion and traction technique.



▶ **Fig. 1 a–b** Cholangioscopic view of the proximal end of the fully covered self-expandable metal stent (FCSEMS) (a) and marked hyperplastic tissue overgrowth on the distal end of the FCSEMS (b).

A 45-year-old man with chronic pancreatitis was admitted with abdominal pain and jaundice caused by a benign biliary stricture. Endoscopic retrograde cholangiopancreatography (ERCP) confirmed a short, regular stricture in the distal common bile duct. A 60×10-mm fully covered self-expandable metal stent (FCSEMS) was placed for biliary drainage. After 6 months, a follow-up ERCP was performed, which revealed that the distal end of the FCSEMS was no longer visible in the lumen, as it had become entirely embedded in the duodenal wall due to hyperplastic tissue overgrowth. Multiple attempts to remove the stent using grasping forceps, a snare, and an extraction balloon were unsuccessful.

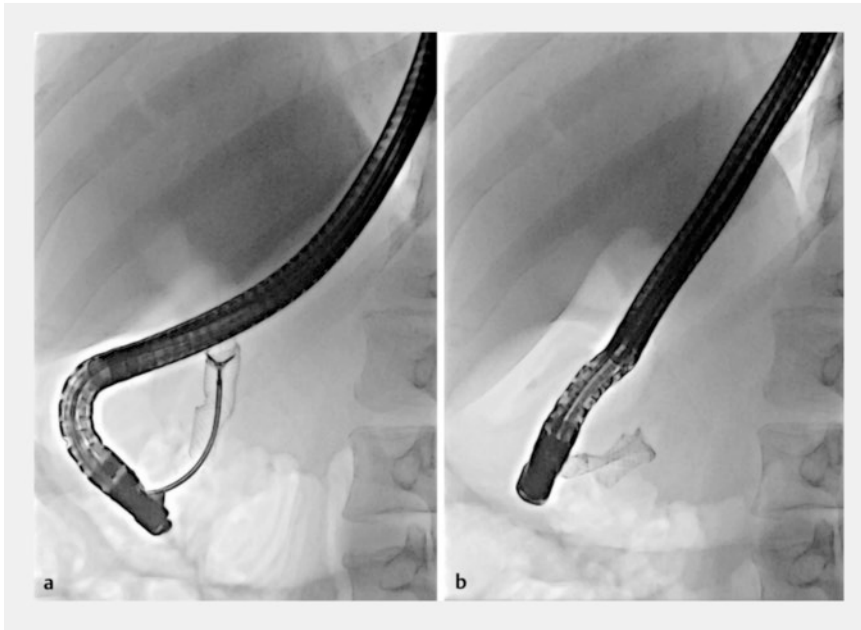
To induce tissue necrosis, a stent-in-stent technique was applied during three consecutive procedures performed over 2–4 weeks; however, all attempts to retrieve the FCSEMS failed. Consequently, a rescue ERCP with peroral cholangioscopy was scheduled to facilitate stent removal (▶ **Video 1**). During the procedure, hydrostatic balloon dilation improved the previous stent distortion caused by repeated manipulation. The cholangio-



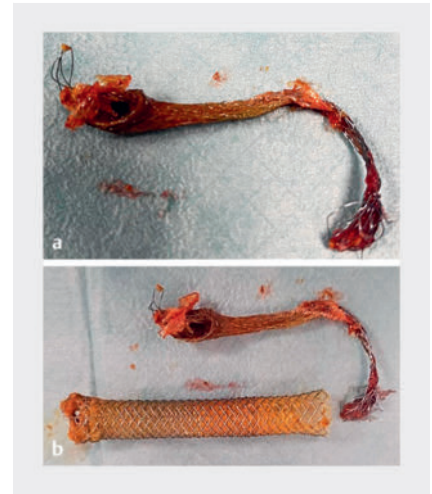
▶ **Fig. 2 a–b** Fluoroscopic (a) and cholangioscopic (b) images of partial inversion of the proximal end of the fully covered self-expandable metal stent (FCSEMS) using the SpyBite Max biopsy forceps.

scope (SpyGlass DS II; Boston Scientific, Boston, MA, USA) was advanced, confirming marked hyperplastic tissue overgrowth at the distal 2 cm of the FCSEMS (▶ **Fig. 1**). Using SpyBite Max biopsy forceps, the proximal end of the stent was grasped and retracted, allowing partial

inversion of the stent into its own lumen (▶ **Fig. 2**). This inversion maneuver facilitated grasping of the proximal end with foreign body biopsy forceps, introduced through the duodenoscope in a subsequent step. Moderate traction allowed complete inversion of the stent into the



► **Fig. 3** **a** Foreign body biopsy forceps grasping the inverted proximal end of the fully covered self-expandable metal stent. **b** Complete inversion of the stent into the duodenal lumen.



► **Fig. 4** **a** A fully covered self-expandable metal stent (FCSEMS) removed using the peroral cholangioscopy-assisted inversion and traction technique. **b** The retained FCSEMS and the inner stent are shown.

duodenal lumen, enabling successful removal of the FCSEMS without complications (► **Fig. 3**, ► **Fig. 4**). Complete resolution of the biliary stricture was observed.

Irretrievable biliary FCSEMSs typically result from proximal migration or hyperplastic tissue overgrowth. The use of peroral cholangioscopy is increasing in ERCP practice, with a growing range of clinical applications. Although the stent-in-stent technique has proven effective for removing retained biliary stents, this report presents a refractory case and describes an innovative, cholangioscopy-assisted approach to managing this challenging complication [1–4].

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### Conflict of Interest

The authors declare that they have no conflict of interest.

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