

## Additional stenting for hilar cholangiocarcinoma using a novel delivery device after uncovered metallic stent placements

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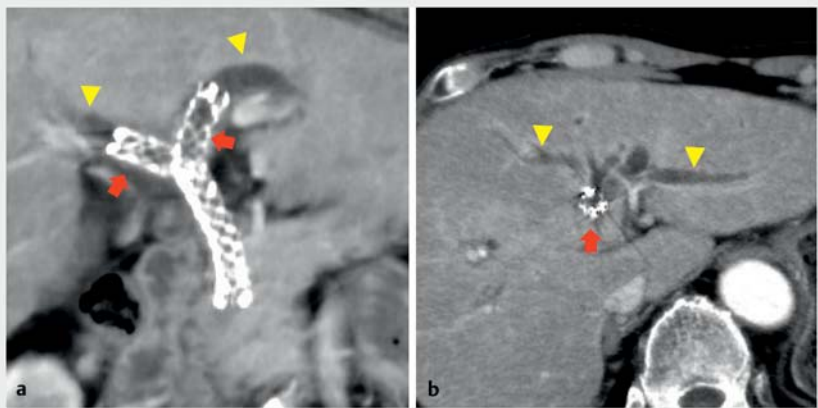
An 86-year-old man who had undergone placement of multiple uncovered self-expandable metal stents (U-SEMSs) by the stent-in-stent (SIS) method for hilar cholangiocarcinoma presented with fever. Blood tests revealed elevated levels of inflammatory markers and liver enzymes. Computed tomography showed intrahepatic bile duct dilatation due to U-SEMS obstruction caused by tumor ingrowth, and peripheral early enhancement probably due to cholangitis (► **Fig. 1**).

Endoscopic retrograde cholangiography was performed for additional stent placement. After guidewires had been placed in the left and right intrahepatic ducts through the U-SEMS meshes, it was possible to pass a balloon dilation catheter (REN 6mm; KANEKA, Osaka, Japan) through and dilate the meshes. However, a cannula (MTW; Endoskopie, Wesel, Germany) could not be passed through the meshes. We used a novel delivery device (EndoSheather; Piolax, Kanagawa, Japan) that could be passed through along the guidewires and dilate the meshes. Following the removal of the inner catheter, a 5-Fr endoscopic nasobiliary drainage (ENBD) tube (Silky Pass; Boston Scientific, Tokyo, Japan) was placed in the left intrahepatic duct through the outer sheath (► **Fig. 2**; ► **Video 1**), and another ENBD tube was placed in the right intrahepatic duct.

Re-intervention for obstruction of U-SEMSs placed by the SIS method can be technically challenging [1, 2]. Recently, we developed a novel delivery device composed of an inner catheter with a tapered tip and an outer sheath with no caliber difference. With this device, various devices up to 6Fr can be delivered into the bile duct through the outer sheath, which has an inner diameter of 6.5Fr [3, 4]. In this case, not only did the tapered shape and moderate stiffness of this novel device aid its passage through the U-SEMS meshes, but the outer sheath also served as a conduit for easy place-



► **Video 1** Additional stenting for hilar cholangiocarcinoma is performed using a novel delivery device after previous placement of uncovered metal stents by the stent-in-stent method.



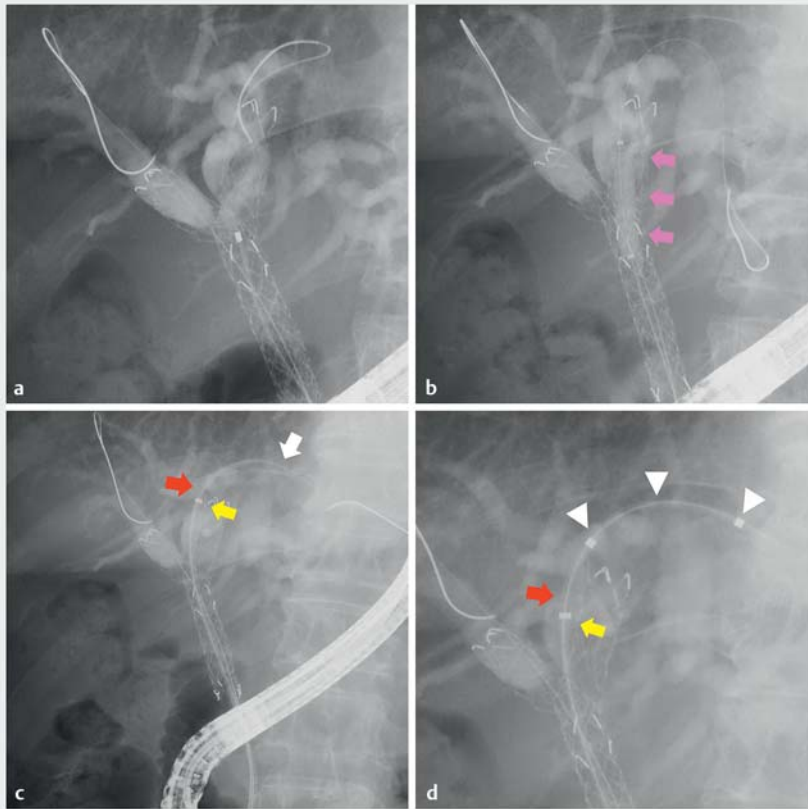
► **Fig. 1** Computed tomography images from a patient with malignant hilar cholangiocarcinoma showing uncovered self-expandable metal stents (U-SEMSs) placed by the stent-in-stent method in the right and left hepatic ducts (red arrows) and dilatation of the intrahepatic bile ducts (yellow arrowheads) with peripheral early enhancement suggestive of cholangitis due to U-SEMS obstruction on: **a** multiplanar reconstruction; **b** axial view.

ment of an ENBD tube (► **Fig. 3**). This novel delivery device may be useful for additional stenting through the meshes of U-SEMSs placed by the SIS method.

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### Competing interests

The authors declare that they have no conflict of interest.



► **Fig. 2** Fluoroscopic images during endoscopic retrograde cholangiography showing: **a** a 7-Fr dilator (ES Dilator; Zeon Medical Co., Tokyo, Japan) that could not be passed through the U-SEMS meshes; **b** dilation with a balloon dilator (pink arrows); **c** the novel delivery device being passed through the U-SEMS meshes, with the tip of the inner sheath (white arrow), tip of the outer sheath (red arrow), and a radio-opaque marker (yellow arrow) visible; **d** a 5-Fr endoscopic nasobiliary drainage tube (white arrowheads) placed in the left intrahepatic bile duct through the outer sheath of the novel delivery device.

## References

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► **Fig. 3** Photographs of the novel delivery device (EndoSheather) showing: **a** it consists of a tapered inner catheter (white arrow) and an outer sheath (red arrows) with a radio-opaque marker (yellow arrow), with almost no difference in the outer diameter between the inner catheter and outer sheath; **b** the outer sheath and 0.025-inch guidewire after removal of the inner catheter; **c** a 5-Fr endoscopic nasobiliary drainage tube (white arrowheads) inserted through the outer sheath.