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

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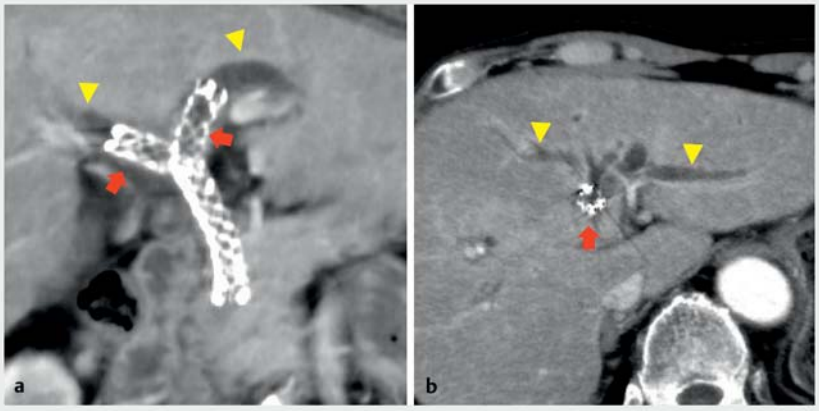
An 86-year-old man who had undergone placement of multiple uncovered self-expandable metal stents (U-SEMSs) by the stent-in-stent (SIS) method for hilar cholangiocarcinoma presented with fever. Blood tests revealed elevated levels of inflammatory markers and liver enzymes. Computed tomography showed 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 6 mm; 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 6 Fr can be delivered into the bile duct through the outer sheath, which has an inner diameter of 6.5 Fr [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 placement 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.

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.

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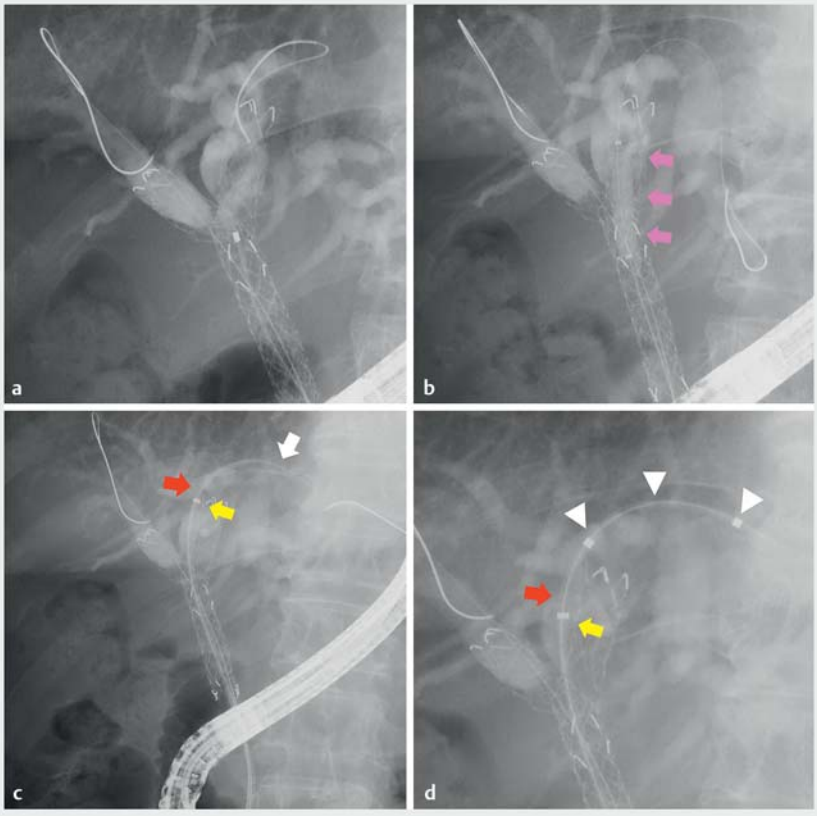
Competing interests

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.

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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.