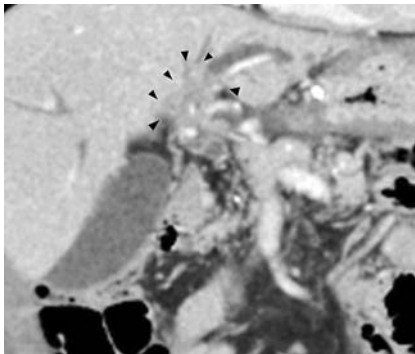
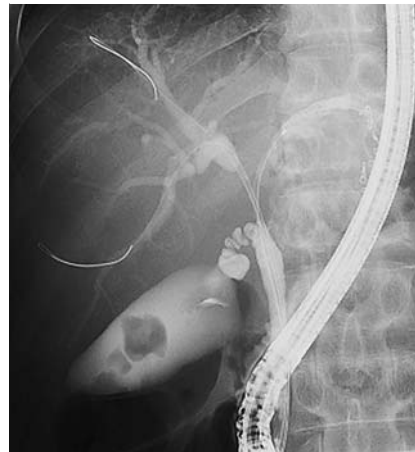


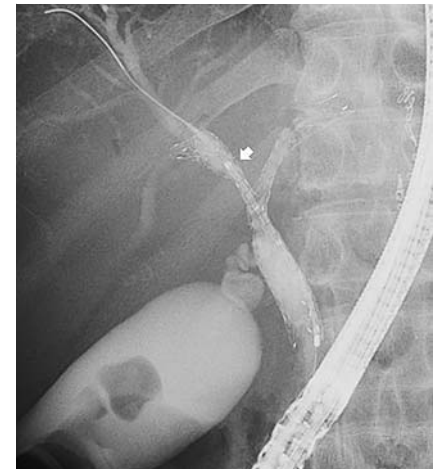
## Successful endoscopic three-branch self-expandable metallic stent placement using a novel device delivery system for malignant hilar biliary stricture



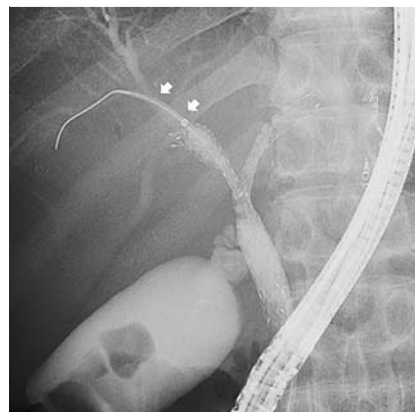
► **Fig. 1** Contrast-enhanced computed tomography showed that the hilar part of the tumor had spread to the umbilical portion of the portal vein with right hepatic artery involvement (arrowheads).



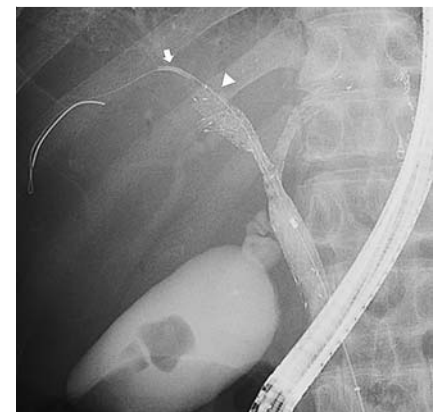
► **Fig. 2** A cholangiogram showed high-grade malignant hilar biliary stricture with Bismuth type IIIa.



► **Fig. 3** The third metallic stent could not be passed through the mesh (arrow).



► **Fig. 4** A novel device delivery system was able to be passed through the mesh (arrow).



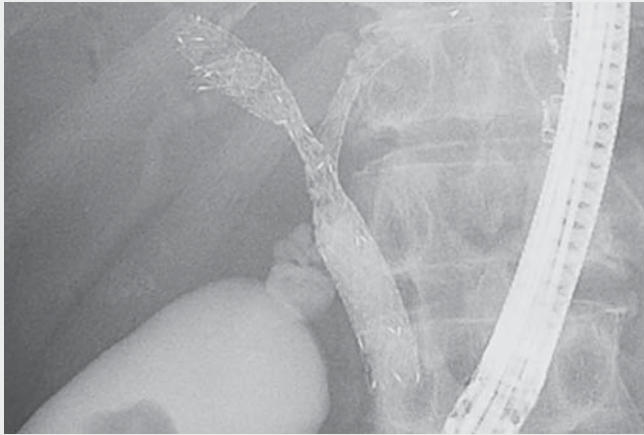
► **Fig. 5** After removing the inner catheter, the third metallic stent was placed through the outer sheath (arrow, tip of the stent; arrowhead, proximal side of the stent).

Endoscopic bilateral drainage of high-grade hilar malignant biliary obstruction (HMBO) is technically challenging, even for experienced endoscopists [1]. A novel device delivery system was recently developed, originally intended for placement of a plastic stent in the bile duct. It comprises a slim-tip guide catheter (diameter 1.13 mm) and pusher tube, which facilitate the insertion of devices up to 1.9 mm in diameter [2–5]. We successfully placed an endoscopic three-branch self-expandable metallic stent (SEMS) using this novel device delivery system with partial stent-in-stent (SIS) for a patient with HMBO.

A 74-year-old man presented to our hospital with jaundice. Contrast-enhanced computed tomography showed that the hilar part of the tumor had spread to the umbilical portion of the portal vein with right hepatic artery involvement (► **Fig. 1**). A cholangiogram showed hilar biliary stricture (Bismuth type IIIa) (► **Fig. 2**). The pathological diagnosis with brush cytology was adenocarcinoma, so we planned multiple stenting using SEMSs with the SIS method. We placed the initial uncovered SEMS (10×80 mm, BileRush Selective; Piolax, Kanagawa, Japan) at the left bile duct

and then inserted the second SEMS into the right posterior branch through the mesh. We sought the right anterior branch with a 0.025-inch hydrophilic guidewire (Radifocus; Terumo, Tokyo, Japan) and followed the tapered tip catheter (PR-220Q; Olympus Medical, Tokyo, Japan) after the guidewire, switching the hydrophilic guidewire to a 0.025-inch versatile guidewire (Endoselector; Boston Scientific, Tokyo, Japan). We inserted a third SEMS over the guidewire, but it

could not be passed through the mesh (► **Fig. 3**). We thus inserted the novel device delivery system (EndoSheather; Piolax) over the guidewire, allowing smooth passage through the mesh (► **Fig. 4**). After removing the inner catheter, we delivered the third SEMS (10×60 mm; BileRush Selective) through the outer sheath and successfully deployed it at the target site (► **Fig. 5**, ► **Video 1**).



**Video 1** Successful endoscopic three-branch metallic stent placement using a novel device delivery system for malignant hilar biliary stricture.

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## Competing interests

The authors declare that they have no conflict of interest.

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