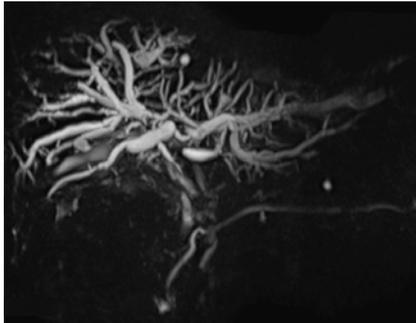


Combination of ERCP with endoscopic ultrasound-guided hepaticogastrostomy and hepaticoduodenostomy for biliary drainage in malignant hilar biliary obstruction

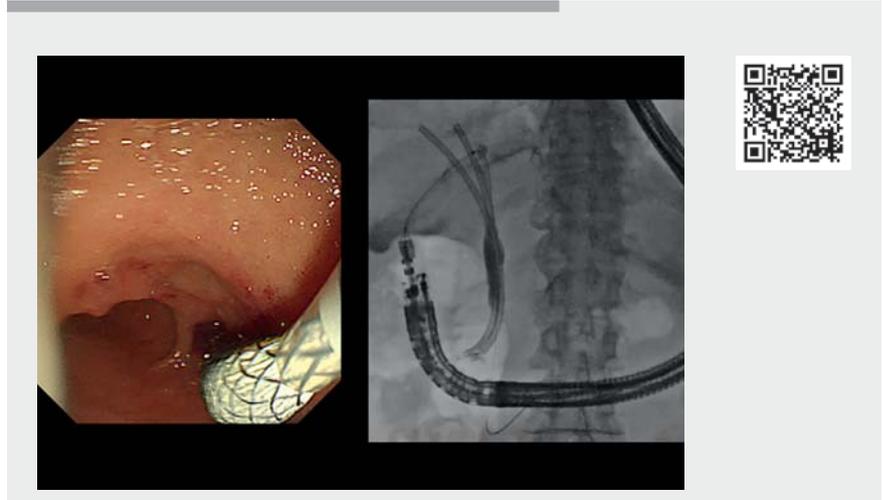



► **Fig. 1** Magnetic resonance cholangiopancreatography image showing a severe, Bismuth class IV, hilar biliary obstruction, specifically of the left, right-anterior, B5, and B8 bile ducts.



► **Fig. 2** Radiographic image showing the four 7-Fr intraductal biliary plastic stents that were placed for decompression of the hilar biliary obstruction, 2 months prior to the development of acute obstructive cholangitis.

Among patients with malignant hilar biliary obstruction, those suffering from cholangitis sometimes require decompression of all divided biliary branches; however, the achievement of this by endoscopic retrograde cholangiopancreatography (ERCP) alone is difficult in patients with severe biliary obstruction, such as Bismuth types III and IV [1]. In such cases, combining ERCP and percuta-



► **Video 1** Combination biliary drainage with endoscopic retrograde cholangiopancreatography, endoscopic ultrasound-guided hepaticogastrostomy, and hepaticoduodenostomy is performed for a patient with malignant hilar biliary obstruction.

neous transhepatic biliary drainage (PTBD) is common; however, PTBD has been associated with a decreased quality of life. Endoscopic ultrasound (EUS)-guided procedures are widely performed [2], and there are increasing reports that EUS-guided biliary drainage (EUS-BD) is useful in patients with malignant hilar biliary obstruction [3–5].

A 79-year-old man with malignant hilar biliary obstruction, Bismuth type IV, caused by a poorly differentiated hilar cholangiocarcinoma (► **Fig. 1**) underwent biliary multistenting using four intraductal plastic stents during ERCP (► **Fig. 2**). After 2 months, the patient developed acute obstructive cholangitis. The hilar cholangiocarcinoma was growing rapidly and the multiple branches of the biliary system were divided, thereby making transpapillary drainage for all branches challenging. Bilateral endoscopic nasobiliary drainage and antibiotic therapy were administered, and a combination of biliary drainage with ERCP, EUS-guided hepaticogastrostomy

(EUS-HGS) and hepaticoduodenostomy (EUS-HDS) was planned (► **Video 1**). First, EUS-HGS of the B3 bile duct was performed with a 6-mm × 12-cm partially covered self-expandable metal stent (PCSEMS) (► **Fig. 3 a**). Second, via the transpapillary route, we deployed 10-Fr plastic stents at the divided B5 and B8 branches (► **Fig. 3 b**). Finally, EUS-HDS of the B6 bile duct was successfully performed from the first portion of the duodenum using a 6-mm × 10-cm PCSEMS (► **Fig. 3 c**). Because each intrahepatic bile duct was thin, we performed EUS-BD using a 22-gauge fine needle and 0.018-inch guidewire. After biliary access had been achieved, we used a 0.025-inch guidewire, a 7-Fr bougie dilator with ultra-tapered tip dedicated to the 0.018-inch guidewire, and a balloon dilator as necessary. After performance of this combined biliary drainage procedure, the patient's cholangitis was controlled and he was able to continue chemotherapy.



► **Fig. 3** Radiographic images of the combined biliary drainage procedure involving endoscopic retrograde cholangiopancreatography (ERCP), endoscopic ultrasound-guided hepaticogastrostomy (EUS-HGS), and hepaticoduodenostomy (EUS-HDS) showing: **a** a 6-mm × 12-cm partially covered self-expandable metal stent (PC-SEMS) deployed in the B3 bile duct during EUS-HGS for left lobe drainage; **b** 10-Fr plastic stents placed in the B5 and B8 bile ducts for transpapillary biliary drainage as the second step; **c** a 6-mm × 10-cm PC-SEMS deployed in B6 as the posterior branch by EUS-HDS from the first portion of the duodenum.

The combination of ERCP and EUS-BD can provide precise and effective biliary drainage for malignant hilar biliary obstruction.

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Competing interests

A. Katanuma has received speaker's fees from Olympus Co., Tokyo, Japan. The remaining authors declare that they have no conflict of interest.

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