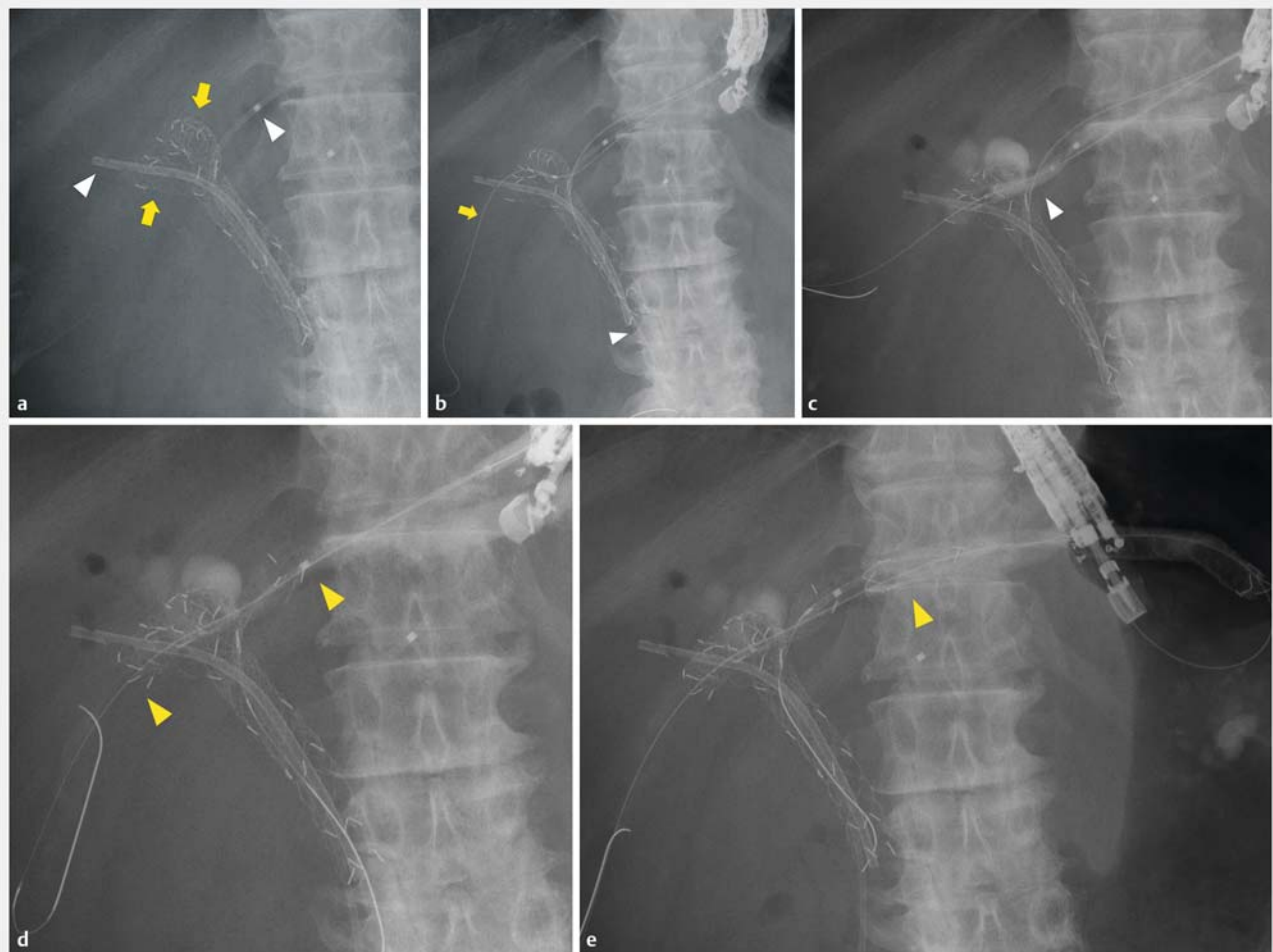


## Endoscopic ultrasound-guided hepaticogastrostomy with bridging as reintervention for stent occlusion in malignant hilar biliary obstruction

Placement of multiple metal stents by endoscopic retrograde cholangiopancreatography for malignant hilar biliary obstruction (MHBO) contributes to longer stent patency [1,2]. However, endoscopic reintervention is technically diffi-

cult when stents are occluded [3]. Endoscopic ultrasonography-guided hepaticogastrostomy (EUS-HGS) is performed for the drainage of the left hepatic bile duct in MHBO. A bridging technique during EUS-HGS can be a promising method

for treating isolated right hepatic bile duct obstruction [4,5]. However, the bridging procedure has yet to be performed as a reintervention for obstructed metal stents in MHBO.



**► Fig. 1** Fluoroscopic images of endoscopic ultrasound-guided hepaticogastrostomy with bridging. **a** Biliary stents on admission. Over three separate sessions of endoscopic treatment by endoscopic retrograde cholangiopancreatography, three metal stents had been placed in the anterior and posterior bile duct by a partial stent-in-stent technique (arrows), followed by placement of one plastic stent into the anterior bile duct and another plastic stent into the B3 intrahepatic bile duct (arrowheads). **b** After puncture of the B2 intrahepatic bile duct from the stomach under endoscopic ultrasound guidance, a guidewire was inserted into the bile duct and the duodenum (arrowhead). Then, a 0.025-inch hydrophilic guidewire was advanced into the right posterior bile duct through the mesh of the previously placed metal stent (arrow) using a double-lumen cannula. **c** Balloon dilation was performed to dilate the mesh of the previously placed metal stents using a thin-tipped balloon catheter to facilitate subsequent placement of a self-expandable metal stent (arrowhead). **d** An uncovered self-expandable metal stent was inserted through the mesh of the previously placed metal stents, between the right posterior bile duct and the left hepatic bile duct (arrowheads). **e** A partially covered self-expandable metal stent was placed from the left hepatic bile duct to the stomach (arrowhead).



**Video 1** We successfully performed biliary drainage of the posterior intrahepatic bile duct using a bridging method from the endoscopic ultrasound-guided transgastric approach in a patient after placing multiple metal stents.

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A 58-year-old woman with gallbladder carcinoma and a history of multiple endoscopic treatments for MHBO, including placement of five stents, was admitted with cholangitis (► **Fig. 1 a**). Computed tomography revealed dilatation of the B2 intrahepatic bile duct and right posterior bile duct (RPD). We failed to insert a stent into the RPD using the endoscopic transpapillary approach. Moreover, EUS-guided RPD drainage from the duodenum was impossible because tumor obstruction prevented the puncture of the RPD. Therefore, EUS-HGS was performed using the bridging method (► **Video 1**).

Following the puncture of B2 under EUS guidance, a guidewire was advanced beyond the MHBO and into the duodenum. Subsequently, a double-lumen cannula (Uneven double-lumen cannula; Piolax Medical Devices, Inc., Tokyo, Japan) was inserted, followed by a 0.025-inch hydrophilic guidewire into the RPD through the mesh of the previously placed metal stent (► **Fig. 1 b**). After dilating the mesh of the metal stent using a thin-tipped balloon catheter with a diameter of 4 mm (REN Balloon Dilation Catheter; Kaneka Corporation, Osaka, Japan) (► **Fig. 1 c**), an uncovered self-expandable metal stent

(Niti-S biliary; Tae-Woong Medical, Seoul, Korea) was inserted between the RPD and left hepatic bile duct (► **Fig. 1 d**). Finally, we placed a partially covered, self-expandable metal stent from the left hepatic bile duct to the stomach (► **Fig. 1 e**). Recovery was uneventful, and cholangitis subsided within a few days. Although this patient had multiple metal stents placed, EUS-HGS with the bridging method was a feasible treatment option.

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## Competing interest

The authors declare that they have no conflict of interest.

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