

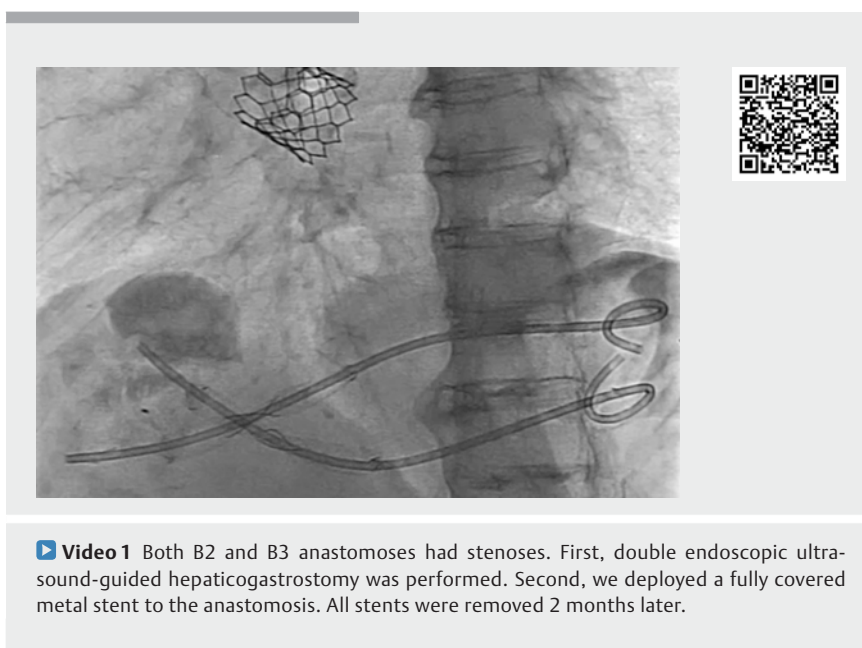
Novel double endoscopic ultrasound-guided hepaticogastrostomy for two-hole benign anastomotic stenosis with difficult gastrointestinal approach



► **Fig. 1** Plain computed tomography (CT) scan image and intrahepatic bile duct enhancement via percutaneous transhepatic biliary drainage. Both B2 and B3 biliary anastomoses had stenosis. **a** Plain CT scan image. The arrow indicates the anastomosis. **b** Intrahepatic bile duct enhancement via PTBD. The arrow indicates the anastomosis.

Enteroscopy is useful for approaching anastomotic stenoses; however, in surgically altered anatomy, success rates of 70%–80% have been reported [1]. Alternatively, endoscopic ultrasound-guided hepaticogastrostomy (EUS-HGS) may be acceptable [2]. Usually, one EUS-HGS is performed; however, double EUS-HGS is required for two-hole anastomotic stenosis to resolve symptoms. We report the first case of successful double EUS-HGS for two-hole benign anastomotic stenosis.

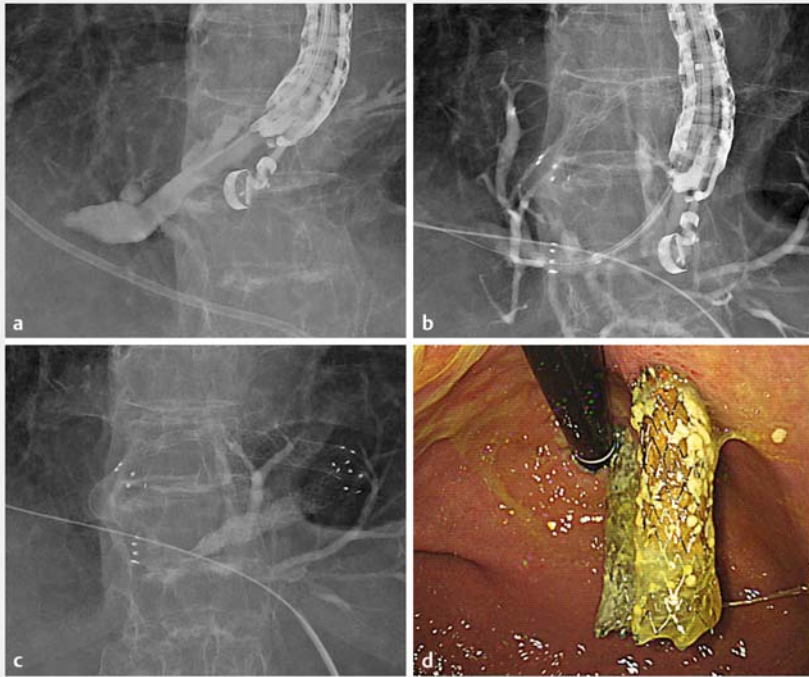
An 89-year-old woman had a history of right hepatic trisegmentectomy, and Roux-en-Y reconstruction for bile duct cancer 10 years prior to presentation. Percutaneous transhepatic biliary drainage (PTBD) was previously performed for B3 to treat cholangitis due to anastomotic stenosis, but cholangitis was poorly controlled because B2 and B3 were separately anastomosed. PTBD revealed that both had stenoses (► **Fig. 1**). Endoscopic



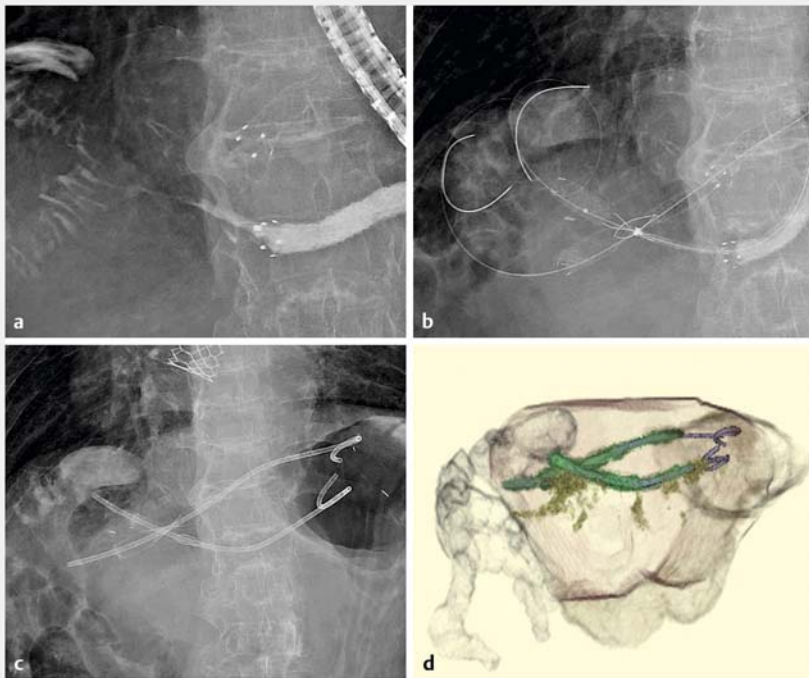
► **Video 1** Both B2 and B3 anastomoses had stenoses. First, double endoscopic ultrasound-guided hepaticogastrostomy was performed. Second, we deployed a fully covered metal stent to the anastomosis. All stents were removed 2 months later.

retrograde cholangiography was performed using double-balloon enteroscopy, but adhesion prevented the entero-

scope from reaching the anastomosis. EUS-HGS was performed instead. Double EUS-HGS was temporarily applied to B2



► **Fig. 2** Double endoscopic ultrasound-guided hepaticogastrostomy (EUS-HGS). **a** Puncture of the B2. Contrast agent did not flow out from the B2 because of stenosis. **b** Deployment of the fully covered metal stent from B3 to the stomach. **c** Double HGS was completed. **d** Endoscopic view of the double EUS-HGS from the stomach.



► **Fig. 3** Placement of the fully covered metal stent (FCMS) to the anastomosis. **a** Bile duct enhancement shows the anastomotic stenosis. **b** Deployment of the FCMS to the anastomosis through the hepaticogastrostomy (HGS) route. **c** Deployment of the plastic stent from the B2 and B3 to the stomach through the HGS route. **d** 3D composite image of the FCMS and plastic stent.

and B3 using a laser cut-type fully covered metal stent (FCMS; 8 mm × 8 cm, X-suit NIR; Olympus, Tokyo, Japan) (► **Fig. 2**, ► **Video 1**). PTBD was removed during the same session. The stenoses were expanded 2 weeks after HGS fistula completion by placing another FCMS (8 mm × 5 cm, BONASTENT M-intraductal; Medicos Hirata, Tokyo, Japan) through the HGS fistula to both anastomoses. Plastic stents (7 Fr, 14 cm; Through Pass Type IT; Gadelius Medical, Tokyo, Japan) were placed at the HGS fistula (► **Fig. 3**).

All stents were removed endoscopically from the HGS fistula 2 months later. Improvement of anastomotic stenosis was confirmed. Biopsy from the anastomosis revealed no malignant findings. No complications occurred during the procedure. No recurrence has been observed 5 months postoperatively. This is the first report on a successful double EUS-HGS, which can be safely performed for anastomotic stenosis with a two-hole anastomosis with difficult gastrointestinal approach.

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Competing interests

The authors declare that they have no conflict of interest.

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