

## A novel technique for partial stent-in-stent placement of three metal biliary stents using a short double-balloon enteroscope

The endoscopic partial stent-in-stent (PSIS) placement of self-expandable metal stents (SEMSs) is effective for the palliation of malignant hilar biliary strictures [1–5]. Despite its efficacy, however, PSIS placement is technically challenging, especially when placing second or subsequent stents. We report a novel technique for PSIS placement of three SEMSs using a short double-balloon enteroscope (DBE), which was used in a patient with a malignant hilar biliary stricture and surgically altered anatomy.

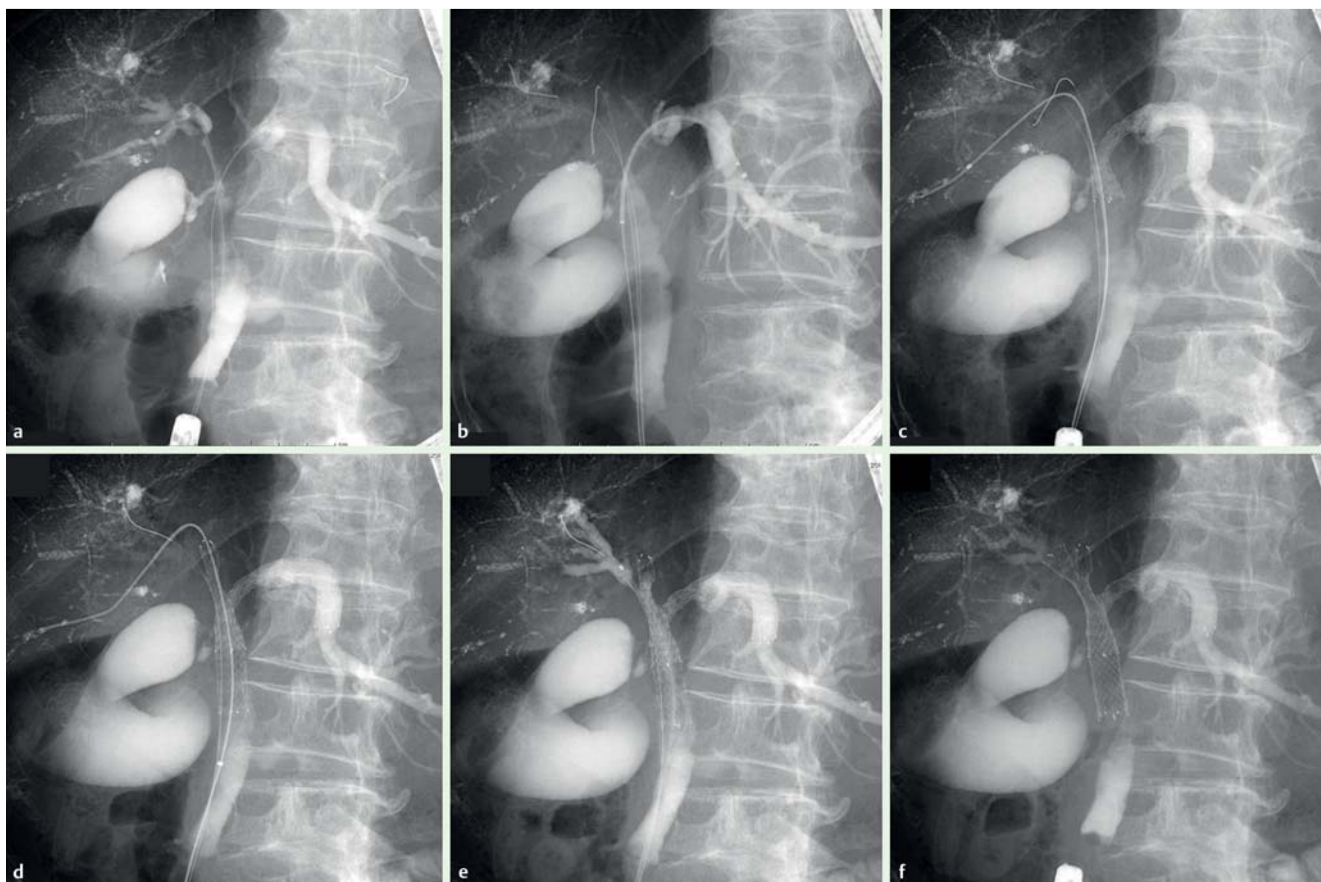
A 74-year-old man who had undergone distal gastrectomy with Billroth II reconstruction was admitted with jaundice due to cholangiocarcinoma with a Bismuth type IV hilar biliary stricture

(**Fig. 1 a**). To aid biliary drainage, we placed a 7-Fr plastic stent in the left hepatic duct, another in the right posterior hepatic duct, and a third in the right anterior hepatic duct using a short DBE (EI-530B; Fujifilm, Tokyo; working channel, 2.8-mm diameter). Although this led to immediate resolution of the patient's jaundice, we diagnosed unresectable cholangiocarcinoma and therefore went on to perform PSIS placement of three SEMSs (Zilver 635; Cook Medical, Winston-Salem, North Carolina, USA) using the DBE before the patient commenced chemotherapy.

First, the stricture was dilated (Quantum, 6-mm diameter; Cook Medical) then, to identify the bifurcation of the common

hepatic duct and the target bile duct, two 0.018-inch landmark guidewires (Roadrunner; Cook Medical) were inserted into the right posterior hepatic duct and the right anterior hepatic duct [1,2]. The first SEMS (10-mm diameter, 80-mm long) was then placed into the left hepatic duct over a stiff 0.035-inch guidewire (THSF; Cook Medical) using a small-diameter (6-Fr), 200-cm-long delivery system, while keeping the two landmark guidewires in the right anterior and posterior hepatic ducts (**Fig. 1 b**).

Next, a 0.035-inch hydrophilic guidewire (NaviPro; Boston Scientific, Natick, Massachusetts, USA) was easily inserted into the right posterior hepatic duct through the stricture and the interstices of the first SEMS following the landmark guidewire (**Fig. 1 c**). A second SEMS (10-mm diameter, 60-mm long) was then successfully placed in the right posterior hepatic duct using a stiff guidewire that had been exchanged for the hydrophilic guidewire (**Fig. 1 d**). The third SEMS (10-mm diameter, 60-mm long) was then placed



**Fig. 1** Cholangiographic views using a short double-balloon enteroscope showing: **a** a Bismuth type IV malignant hilar biliary obstruction; **b** the two landmark guidewires in the right anterior and posterior hepatic ducts and the first stent, which was placed across the bifurcation into the left hepatic duct; **c** a 0.035-inch hydrophilic guidewire passing into the right posterior hepatic duct through the stricture and the interstices of the first stent; **d** the second stent in the right posterior hepatic duct; **e** a guidewire passing through the interstices of the two previous stents and into the right anterior hepatic duct, over which the third stent was placed; **f** the three Zilver 635 stents forming a partial stent-in-stent arrangement.

into the right anterior hepatic duct over a guidewire that had been passed in similar fashion through the interstices of the two previous stents (● Fig. 1 e, f).

Therefore, the combined use of the 6-Fr Zilver 635 SEMSs [5] and 0.018-inch landmark guidewires facilitated the PSIS placement of multiple SEMSs for malignant hilar biliary stricture using a short DBE with a small working channel.

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**Competing interests:** None

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