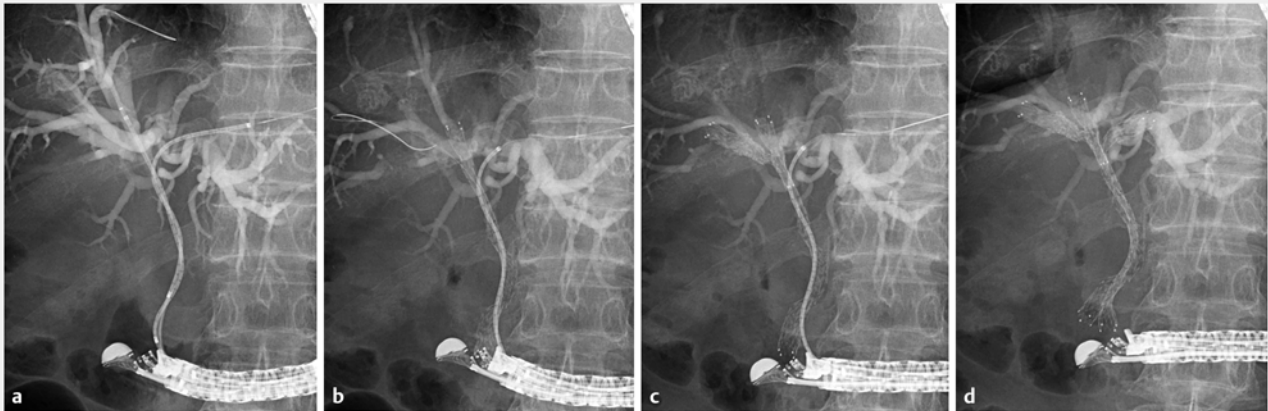


Combined stent-by-stent and stent-in-stent biliary metal stent deployment using a forward-oblique viewing echoendoscope in surgically altered anatomy

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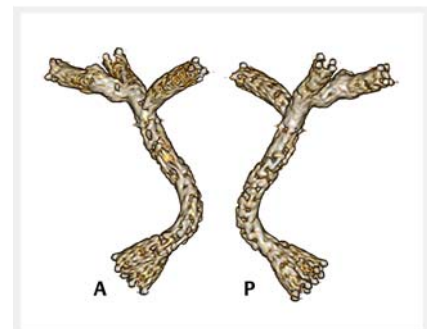
► Fig. 1 **a** After insertion of the forward-oblique viewing echoendoscope up to the duodenal papilla, two 0.025-inch guidewires were placed in the posterior and left hepatic ducts, followed by simultaneous insertion of two 5.4-Fr-diameter delivery systems. **b** After the posterior stent was deployed across the stricture, the guidewire was advanced into the anterior duct through the stent mesh. **c** An additional 5.4F metal stent was inserted and deployed in the anterior duct in a stent-in-stent manner. **d** Finally, the left stent was released and deployed in a stent-by-stent manner.

The combined stent-by-stent (SBS) and stent-in-stent (SIS) technique (SBSIS) can make tri-sectoral metal stenting for malignant hilar biliary obstruction (MHBO) straightforward [1, 2]. However, it is challenging to perform SBSIS in patients with surgically altered anatomy (SAA). Here, we report a successful case of SBSIS deployment in a patient with SAA, using a forward-oblique viewing echoendoscope.

A 91-year-old man who had distal gastrectomy with Billroth-II reconstruction developed obstructive jaundice due to Bismuth IIIa MHBO that extended to the duodenal papilla. We inserted a forward-oblique viewing echoendoscope (EG-580UT; Fujifilm, Tokyo, Japan) and succeeded in reaching the duodenal papilla. After wire-guided biliary cannulation, two 0.025-inch guidewires were placed in the right posterior superior segmental and left hepatic ducts, followed by simultaneous insertion of two 5.4F-diameter delivery systems (ZeoStent V; Zeon Medical, Tokyo, Japan). The

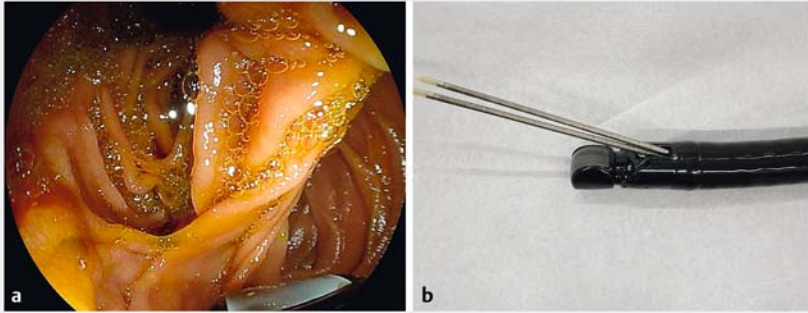
posterior stent was subsequently deployed across the stricture, and a 3-Fr microcatheter (Hanako Medical, Saitama, Japan) [3] was introduced over the posterior guidewire, and then the guidewire was advanced into the anterior hepatic duct through the stent mesh. An additional metal stent with a 5.4F delivery system was inserted without the need for any dilation and deployed in the anterior duct in a SIS manner. Finally, the left stent was released and deployed in a SBS manner (► Fig. 1, ► Fig. 2, and ► Video 1). The procedure was completed without any hindrance or adverse events.

The echoendoscope, which provides a forward endoscopic view and a wider bending capacity to up to 150 degrees, may enable insertion deep into the jejunum of patients with SAA [4, 5]. Moreover, the scope has a working channel diameter of 3.8 mm to allow simultaneous insertion of two delivery systems, and the forceps elevator enables easier device advancement (► Fig. 3). Therefore,



► Fig. 2 Three-dimensional reconstruction using computed tomography after the combined stent-by-stent and stent-in-stent deployment.

the scope can serve as a useful alternative when performing tri-sectoral metal stenting for patients with MHBO and SAA.



► **Fig. 3** **a** The echoendoscope, which provides a forward endoscopic view and a flexible scope tip, may enable insertion deep into the jejunum of patients with surgically altered anatomy. **b** The scope has a working channel diameter of 3.8 mm to allow simultaneous insertion of two delivery systems, and the forceps elevator enables device advancement easier.

VIDEO



► **Video 1** Combined simultaneous stent-by-stent and stent-in-stent metal stent deployment using the forward-oblique viewing echoendoscope for a case with malignant hilar biliary obstruction and surgically altered anatomy.

Competing interests

The authors declare that they have no conflict of interest.

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