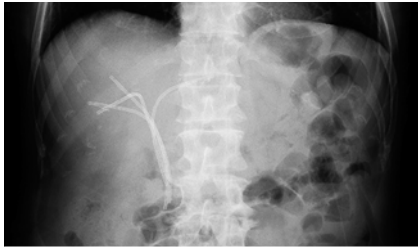


Endoscopic four-branched stent-in-stent deployment of self-expandable metal stents in malignant hilar biliary obstruction



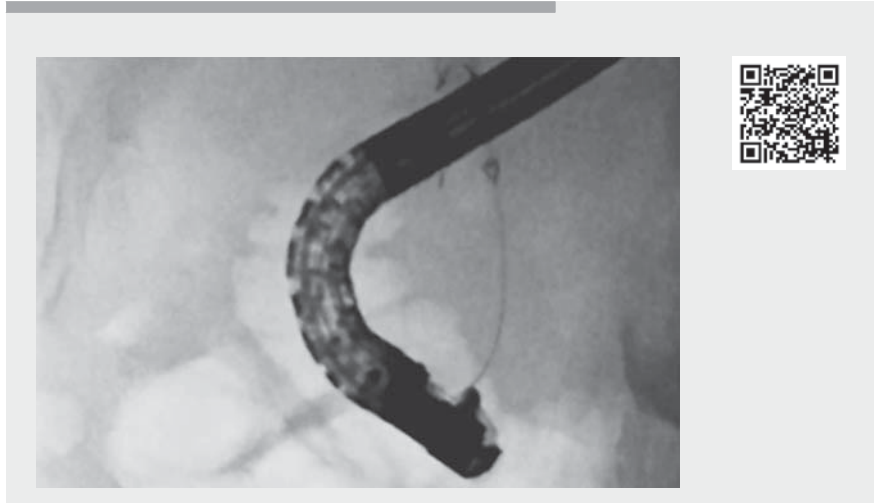
► **Fig. 1** Radiographic image showing four plastic stents deployed above the sphincter of Oddi in a patient with malignant hilar biliary obstruction.



► **Fig. 2** Computed tomography image on admission showing biliary stent occlusion.



► **Fig. 3** Radiographic image showing the four self-expandable metal stents resulting from the successful endoscopic four-branched deployment using the stent-in-stent method.



► **Video 1** Successful endoscopic four-branched deployment using the stent-in-stent method for malignant hilar biliary obstruction.

Malignant hilar biliary obstruction often requires multiple stents for biliary drainage [1,2]. However, deploying three or more self-expandable metal stents (SEMSs) is technically challenging [3]. The recently launched, novel uncovered SEMS with slim delivery system (Niti-S Large Cell SR Slim delivery; TaeWoong Medical, Seoul, South Korea) may be combined with a 6-mm balloon catheter (REN biliary dilation catheter; KANEKA, Osaka, Japan) to facilitate the deployment of multiple SEMSs [4]. Here, we report a successful endoscopic four-branched deployment of SEMSs using the stent-in-stent (SIS) method.

A 66-year-old man with metastatic hilar cholangiocarcinoma, who had been undergoing chemotherapy, was admitted to our hospital with acute cholangitis. Initially, 7 months previously, two plastic stents had been deployed for malignant hilar obstruction of Bismuth type 4 in the B2 and B8 bile duct segments above the sphincter of Oddi. However, owing to recurrent cholangitis and a liver abscess, a total of four plastic stents were de-

ployed 4 months later in B2, B5, B6, and B8 (► **Fig. 1**).

A computed tomography scan on admission showed dysfunctional plastic stents and deterioration of his cancer (► **Fig. 2**). We attempted to deploy four SEMSs using the SIS method (► **Video 1**). First, after removing the plastic stents, we deployed the first and second SEMSs in B6 and B2 using the SIS method. After dilating the mesh of the SEMSs using a balloon catheter, we deployed the third SEMS in B8 using the SIS method. Finally, an attempt was made to deploy a SEMS in B5, but the catheter could not be passed through the mesh of the SEMS. Therefore, a balloon catheter was used to dilate the lumen and mesh of the SEMSs, and the fourth SEMS was then successfully deployed in B5 using the SIS method (► **Fig. 3**). There were no adverse events such as stent occlusion during the 2 months before the patient's death, which was due to his primary disease.

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Competing interests

The authors declare that they have no conflict of interest

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