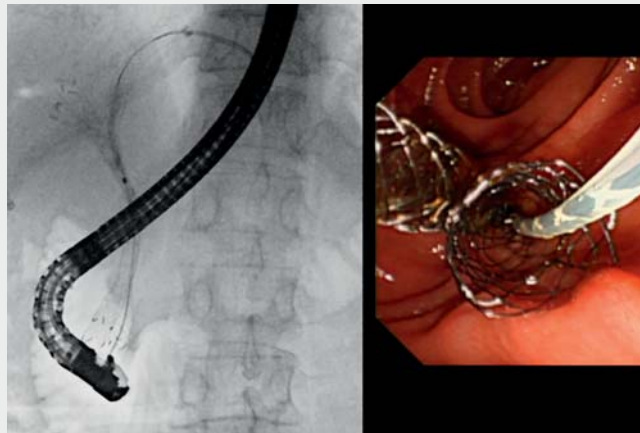


## Combined stent-in-stent and side-by-side stenting for hilar cholangiocarcinoma using a novel braided and weaving metal stent



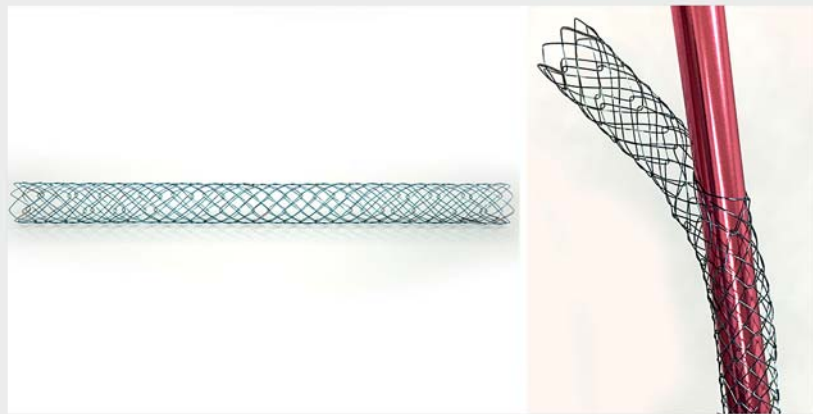
► **Fig. 1** Cholangiogram delineating severe hilar biliary stricture due to cholangiocarcinoma. Guidewires were successfully passed to B2, B6, and B8, respectively. A percutaneous catheter, which was placed for cholecystitis during previous hospitalization, can also be seen.



► **Video 1** A novel self-expandable metal stent for drainage of hilar malignant biliary obstruction with a combination of stent-in-stent and side-by-side methods.

For hilar malignant biliary obstruction, bilateral self-expandable metal stent (SEMS) placement provides longer patency than unilateral drainage [1,2]. Although recently developed fine-gauge delivery systems allow simultaneous side-by-side (SBS) placement, the partial stent-in-stent (SIS) method is sometimes preferred because of higher adverse event rates with SBS [3]. However, technical difficulty can be encountered with the SIS method, such as guidewire or stent delivery through the stent interstice [4]. Herein, we present a combined SIS and SBS technique using a novel SEMS with a combination of braided and weaving construction (► **Video 1**).

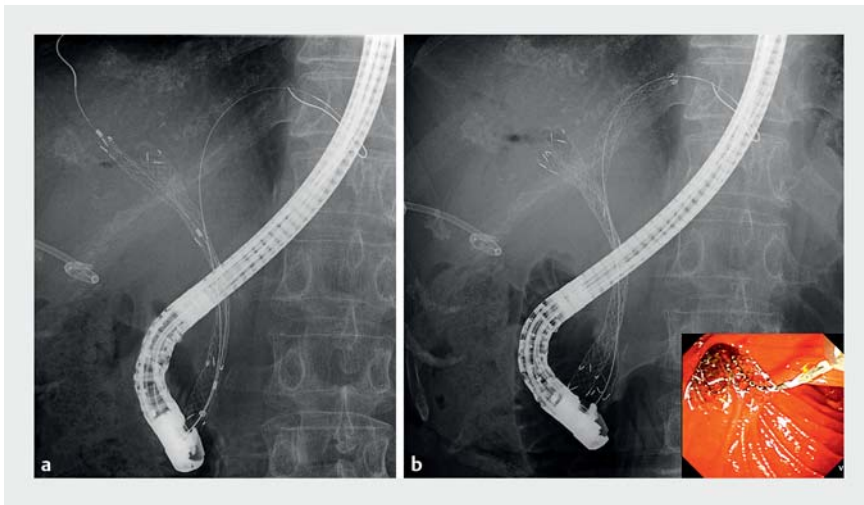
A 69-year-old woman with unresectable hilar cholangiocarcinoma was referred to us, and endoscopic retrograde cholangiography revealed hilar biliary obstruction. After passing three guidewires to B2, B6, and B8, respectively (► **Fig. 1**), two uncovered SEMSs (Niti-S M Biliary Stent, 8-mm-wide; Taewoong Medical Inc., Gimpo, Korea) (► **Fig. 2**) were placed, first in an SIS fashion (from B6 to



► **Fig. 2** The Niti-S M Biliary Stent (Taewoong Medical Inc., Gimpo, Korea). The stent mesh is characterized by a braided and weaving construction with large flexible interstices, potentially facilitating passage of a guidewire to the contralateral bile duct. This stent also has characteristics of a 7.5-Fr delivery system. Because of these features, Niti-S M Biliary Stent can be used for both side-by-side and stent-in-stent placement.

the duodenum first, followed by B8 to the duodenum) (► **Fig. 3 a**) without difficulty. Initially, additional stent placement was attempted in an SIS fashion but guidewire passage through the two overlapped stents was not technically easy and thus, we decided to place the third

SEMS in an SBS fashion over the guidewire, which had been already placed in B2 as a landmark. The delivery system was readily inserted to B2 without interference to or from the other two SEMS, and the third SEMS (► **Fig. 3 b**) was successfully deployed in an SBS fashion from



► **Fig. 3** Fluoroscopic and endoscopic images. **a** Fluoroscopy showing two metal stents placed in a partial stent-in-stent fashion for B6 and B8. **b** Fluoroscopic and endoscopic views showing a metal stent placed alongside the metal stents in a side-by-side fashion.

B2 to the duodenum. No procedure-related adverse events were observed. Despite the superiority of bilateral over unilateral stenting for hilar malignant biliary obstruction, there is no standard technique – SIS or SBS. This novel SEMS with braided and weaving construction allows both SIS and SBS methods, and even its combination method [5] can be applied, as shown in this case.

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### Competing interests

None

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