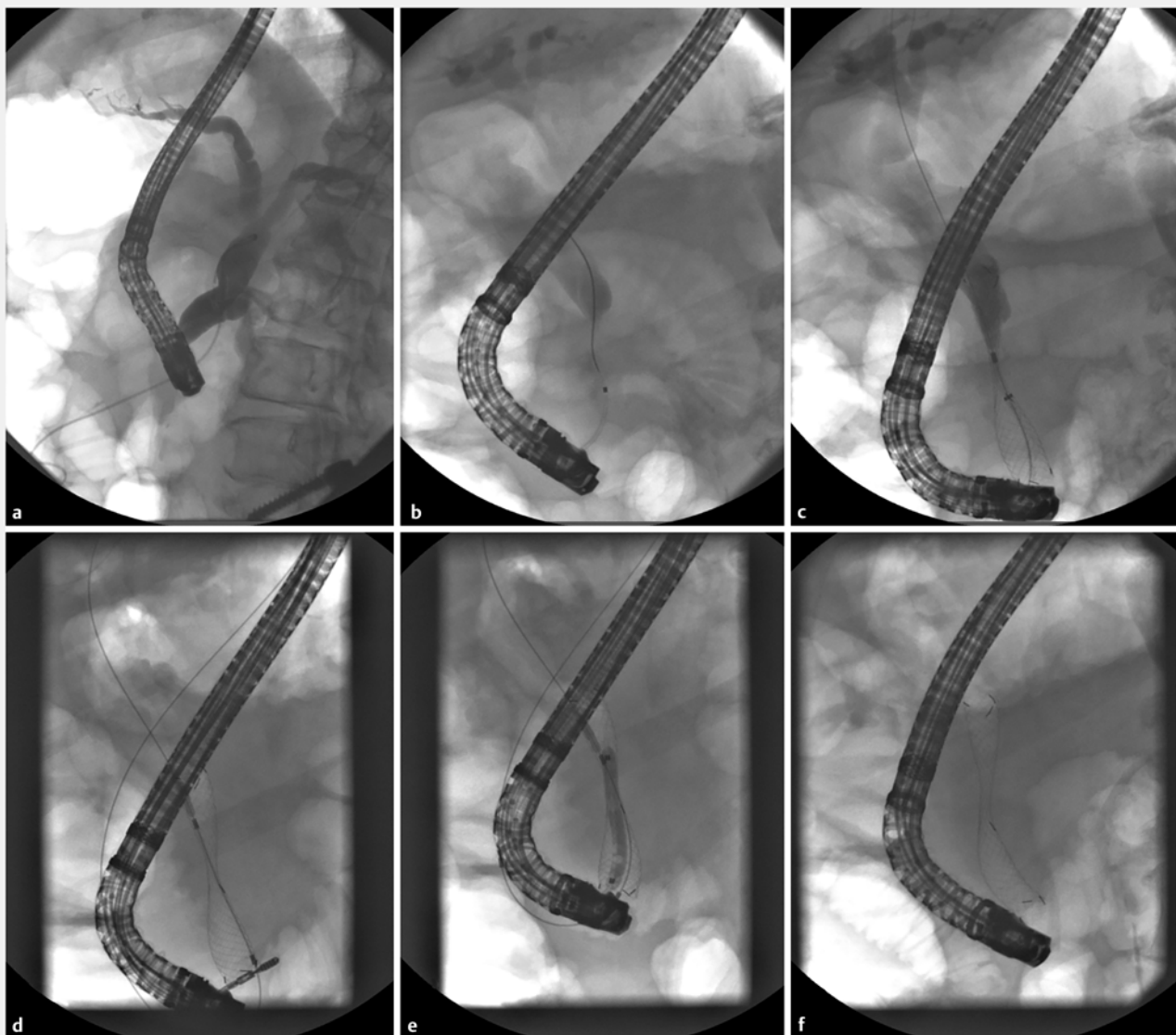


“Alongside-balloon-dilation” as a novel endoscopic bailout involving external cutting of an entrapped biliary self-expandable metal stent delivery system

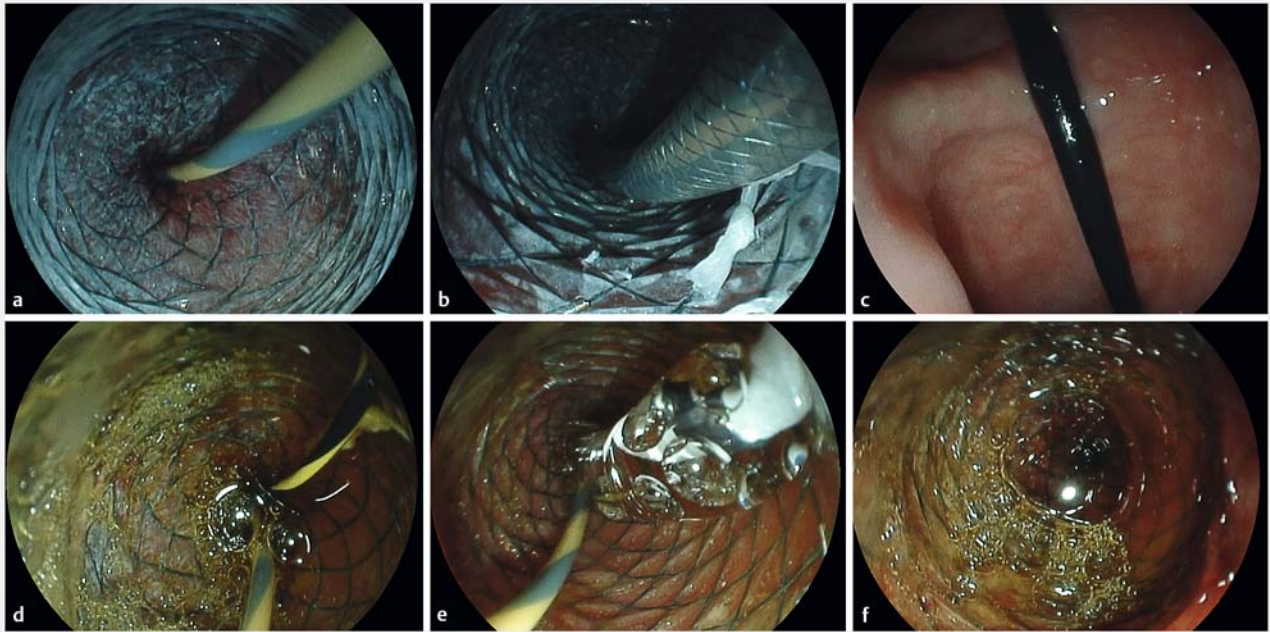
Placement of a biliary fully covered self-expandable metal stent (FCSEMS) as the mainstay treatment in pancreatic cancer is usually straightforward once guidewire

passage has been achieved. However, entrapment of the deployed stent, mostly by diameter mismatch between the olive-shaped tip of the stent applicator

system in cases of high-grade and tight strictures, may complicate the procedure [1]. In such situations it is prudent to pause a while and let the stent expand



► Fig. 1 Fluoroscopic illustration of the “alongside-balloon-dilation” procedure. **a** T-tube cholangiogram with bile duct dilation and lack of duodenal drainage (note overlay of the distal bile duct stricture by the scope shaft; T-tube rendezvous endoscopic retrograde cholangiopancreatography [ERCP] failed, as trans-stricture guidewire passage proved impossible). **b** After needle-knife access, a guidewire crossed the short, though high-grade, distal common bile duct stricture. **c** Insertion of a 10 × 60 mm fully covered self-expandable metal stent (Taewoong Medical, Seoul, South Korea) with failure to withdraw the olive tip of the stent applicator system. **d** After external cutting and extraction of the duodenoscope and the outer applicator sheath, the entrapped delivery system was gently pushed up again after grasping with an alligator forceps. **e** “Alongside-balloon-dilation” rescue using a 4-mm Hurricane balloon (Boston Scientific, Marlborough, Massachusetts, USA). **f** Removal of the system is achieved.



► **Fig. 2** Endoscopic illustration of the “alongside-balloon-dilation” procedure. **a** View inside the stent after stent deployment, with the inner applicator sheath entrapped in situ. **b** Attempts to cautiously push forward the outer sheath to re-establish contact with the olive-shaped tip and then to withdraw as one failed, or rather were not forced due to the risk of stent dislodgment. **c** The inner sheath of the delivery system was visible after external cutting and duodenoscope reinsertion. **d** After upward mobilization of the delivery system, the stricture was recannulated; **e** “Alongside-balloon-dilation” up to 4mm was performed. **f** Final endoscopic result after successful removal of the stent applicator.



► **Video 1** Dynamic illustration of the “alongside-balloon-dilation” bailout technique for stent delivery system entrapment.

quently, endoscopic retrograde cholangiopancreatography (ERCP) was performed three weeks later after gentle duodenoscope passage of the bulb. After failed rendezvous ERCP via the T-tube (► **Fig. 1 a**), needle-knife access and guidewire passage over a short, high-grade biliary stricture was achieved (► **Fig. 1 b**). A 10 × 60 mm FCSEMS was inserted and deployed without difficulty; however, the olive tip could not be withdrawn (► **Fig. 1 c**, ► **Fig. 2 a**, ► **Video 1**). Attempts to push the outer sheath forward (► **Fig. 2 b**) and a 5-minute break did not improve the situation, and a decision was made to externally cut the stent applicator system and remove the scope as well as the outer sheath. Next, the duodenoscope was reinserted alongside the inner sheath (► **Fig. 2 c**) and, after gently pushing the delivery system out of the stricture by grasping with alligator forceps (► **Fig. 1 d**), the stent was recannulated, followed by 4-mm “alongside-balloon-dilation” (► **Fig. 1 e**, ► **Fig. 2 e**), resulting in uncomplicated extraction of the applicator system (► **Fig. 1 f**, ► **Fig. 2 f**).

further or, as is my routine practice, to gently push forward the outer delivery catheter sheath, until full contact with the olive tip is re-established, followed by cautious withdrawal of the device without dislodging the stent. Among the very few rescue techniques in the literature, nasal re-routing of the system with later extraction and utilization of a

dedicated low-profile angioplasty balloon has been reported. Here, another technique designated “alongside-balloon-dilation” is pioneered [2, 3]. An elderly woman was referred from surgery after emergency closure of duodenal ulcer perforation and insertion of a T-tube for three weeks later locally advanced pancreatic head mass. Subse-

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Competing interests

The authors declare that they have no conflict of interest.

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