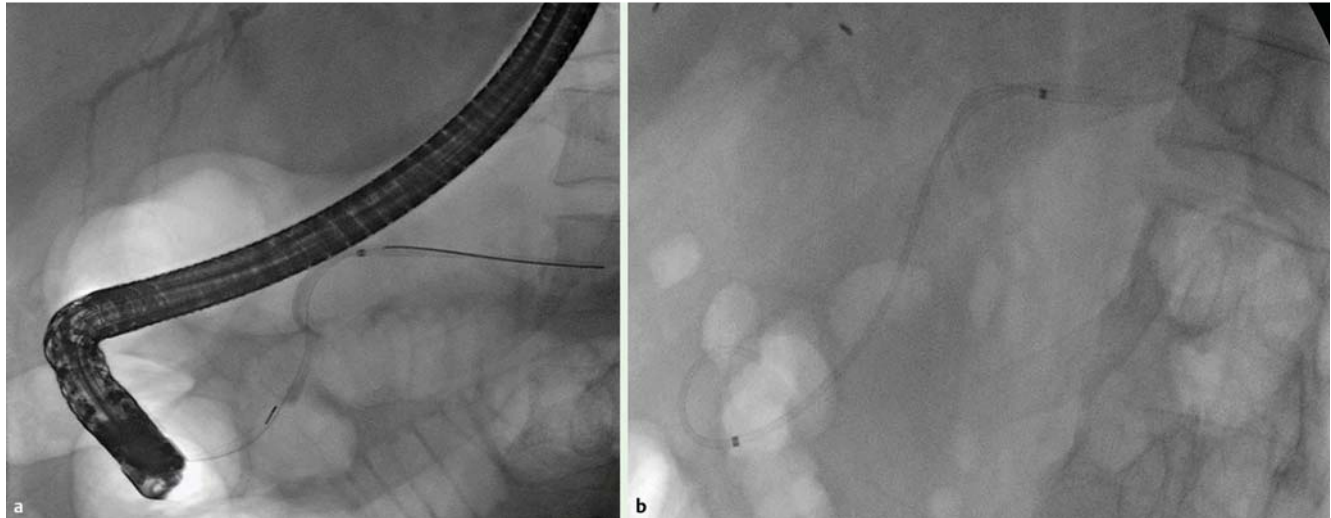
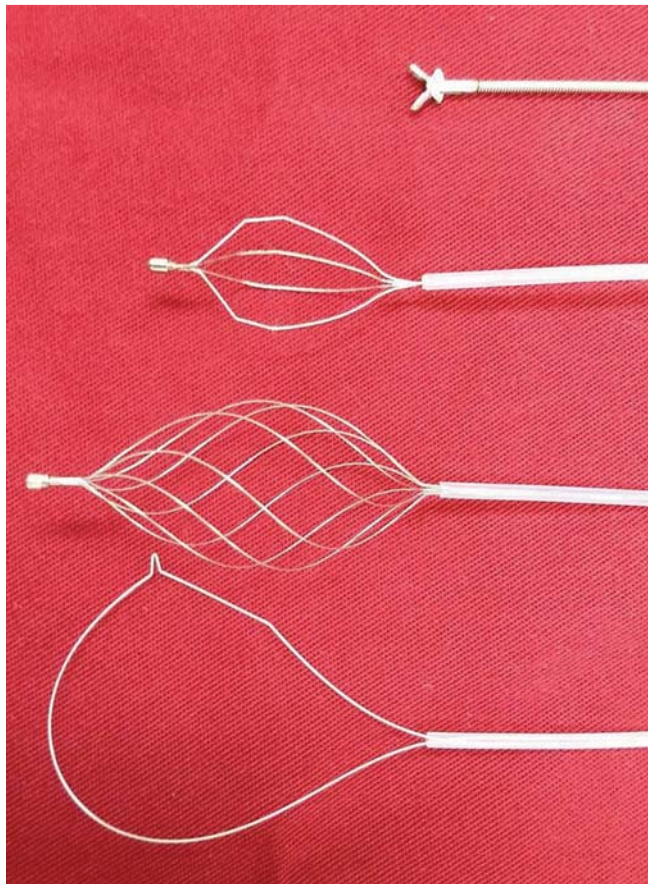


## Delayed removal of a deeply migrated pigtail pancreatic stent in a normal pancreatic duct

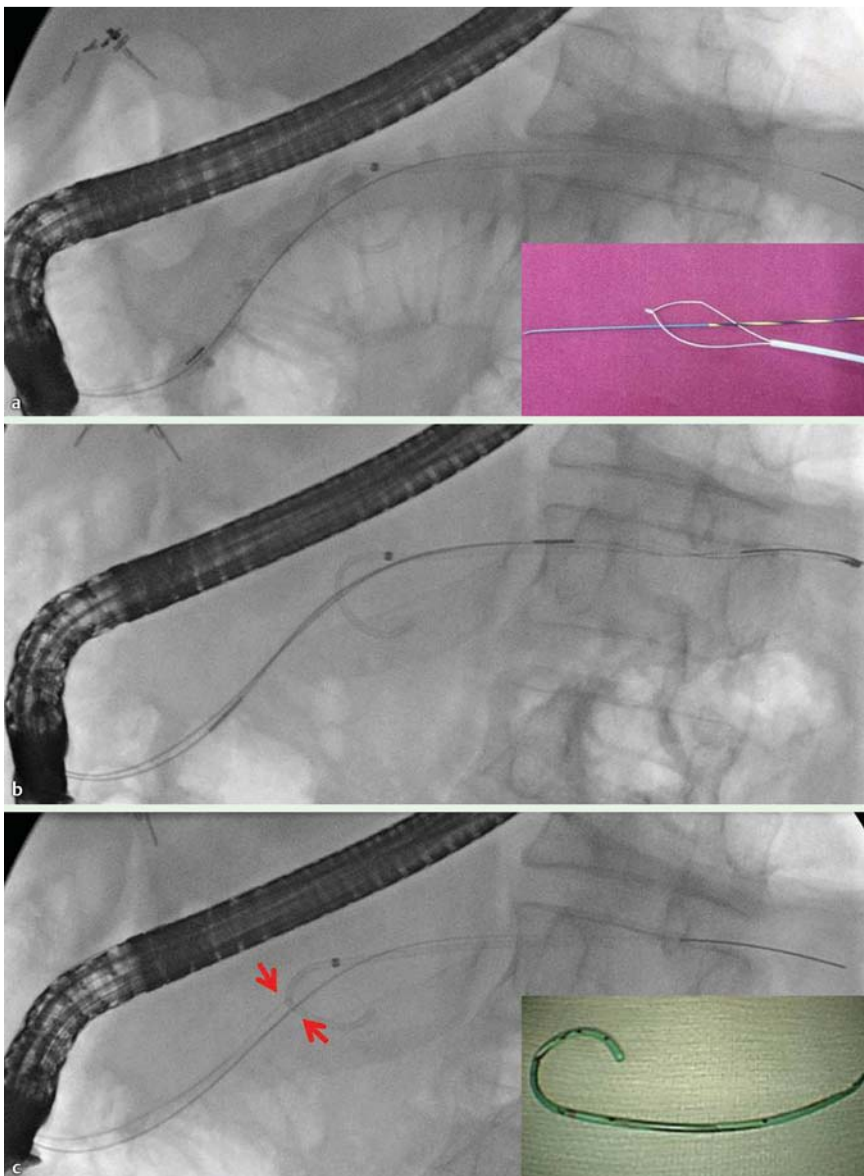


**Fig. 1** Unintentionally migrated pigtail pancreatic stent in a 57-year-old man who underwent endoscopic retrograde cholangiopancreatography (ERCP) for multiple bile duct and gallbladder stones. **a** Unintentional deep inward migration of a pigtail pancreatic stent up to the neck of the normal pancreatic duct. **b** A second long pancreatic duct stent inserted to prevent post-endoscopic retrograde cholangiopancreatography (ERCP) pancreatitis.



**Fig. 2** Comparison of the devices used in attempts to remove the migrated pigtail-type pancreatic stent. From top to bottom: endobiliary biopsy forceps, Dormia basket (MTW Endoskopie, Wesel, Germany), eight-wire Memory™ basket (MB5-2X4-8, Cook Endoscopy, Winston-Salem, North Carolina, United States), and crescent-shaped snare (SD-7P-1, Olympus Optical, Tokyo, Japan).

A 57-year-old man underwent endoscopic retrograde cholangiopancreatography (ERCP) for multiple bile duct and gallbladder stones. During the ERCP, we attempted to insert a prophylactic 5-Fr, single pigtail pancreatic stent (Cook Endoscopy, Winston-Salem, North Carolina, United States) because biliary cannulation is difficult and the pancreatic duct is frequently cannulated unintentionally; however the pancreatic stent migrated deep into the normal pancreatic duct and the pigtail portion of the stent curled into the inner pancreatic duct (● Fig. 1 a). We attempted to remove the stent immediately using endobiliary biopsy forceps, a conventional snare, and a Dormia basket (● Fig. 2), as reported in various cases [1–4]; however these methods all failed because the pancreatic duct was of normal size and it was difficult to advance the devices past the neck of the pancreatic duct. Moreover, the curved pigtail head made capture impossible. The repeated attempts at removal only pushed the stent more deeply into the pancreatic duct. Consequently, we inserted a second 9-cm-long pancreatic stent to prevent post-ERCP pancreatitis, removed the biliary stones, and then performed a laparoscopic cholecystectomy. Again, we tried to remove the migrated pancreatic stent, but failed despite trying various methods,



**Fig. 3** Endoscopic removal with a crescent-shaped snare (SD-7P-1, Olympus Optical, Tokyo, Japan) 4 months later. **a** Following insertion of a 0.035-inch guidewire into the tail of the pancreatic duct, the crescent-shaped snare was inserted along the guidewire up to the distal tip of the migrated stent. **b** Then the snare was released and withdrawn slowly to capture the stent. **c** Finally, the migrated stent was captured at the neck portion (arrows) and removed successfully.

including a 5-Fr sheathed Memory basket (Cook Endoscopy) (● Fig. 2), and a modified snare with a cut plastic sheath [5]. Apart from a 0.035-inch guidewire, none of the devices could be advanced past the neck of the normal-sized pancreatic duct. As we needed more space to insert the removal devices, we decided to reinsert the 9-cm-long, 5-Fr pancreatic stent (● Fig. 1 b), which overlapped the migrated stent, and planned to remove the migrated stent 3–4 months later, hoping that the second stent would cause some duct enlargement. Finally, 4 months later, we attempted to remove the migrated pigtail pancreatic

stent. After removing the second stent with forceps, we inserted a 0.035-inch guidewire up to the tail of the pancreas and then inserted a crescent-shaped snare (● Fig. 2; SD-7P-1, Olympus Optical, Tokyo, Japan) along the guidewire to the body of the pancreas (● Fig. 3). This snare has a relatively narrow sheath and monofilament wire (● Fig. 2). Then, following slow release of the snare at the distal tip of the migrated stent, we carefully withdrew the snare, captured the first pancreatic stent, and removed it safely (● Fig. 3). No post-ERCP pancreatitis or other complications developed.

Various endoscopic techniques have been introduced for removing a proximally migrated pancreatic stent. Typically, however, these migrated stents are the straight type. The single pigtail type stent was developed to prevent spontaneous proximal migration. Nevertheless, unintentional migration is possible, as in our case. Various reported methods were unsuccessful because the normal-sized pancreatic duct and curved pigtail stent prohibited capture with forceps or advancing other capture devices. In this situation, delayed removal following insertion of an additional stent can help to make more space for inserting removal devices. In addition, the relatively small diameter of the sheathed snare that we used is helpful in such cases.

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**Competing interests:** None

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