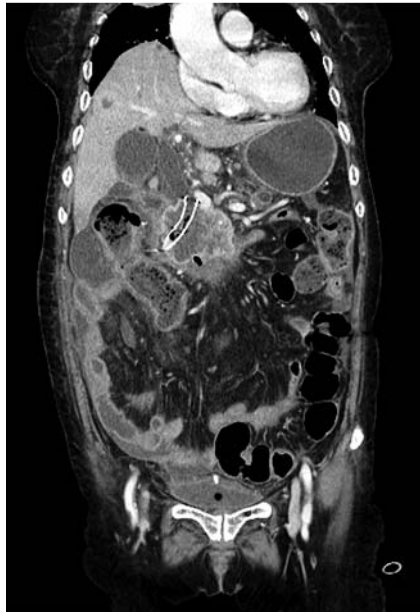
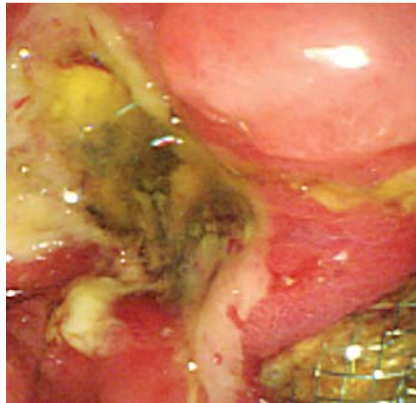


## Bile duct perforation caused by an uncovered metal stent treated by placement of a covered metal stent in a patient with pancreatic cancer



**Fig. 1** Abdominal computed tomography (CT) scan showing a mass in the head of the pancreas associated with a biliary metal stent and a fluid collection in the retroperitoneal space.

Endoscopic retrograde biliary drainage (ERBD) using metal biliary stents is widely applied to biliary obstruction resulting from benign stricture or malignancy. The increased use of biliary stents has also



**Fig. 2** Duodenoscopy image showing a penetrating ulcer in the infundibulum of the duodenum with a portion of the stent visible.

been accompanied by an increasing number of cases of complications. Early complications occurring within 2 weeks of treatment by ERBD are not uncommon [1]. Delayed biliary perforation caused by metal stents is very rare [2]. Various methods have been suggested for the management of complications after placement of self-expandable metal stents (SEMSs) including mechanical cleaning, use of a diathermic treatment to remove malignant tissue ingrowth, introduction of a second stent into the primary stent, use of percuta-

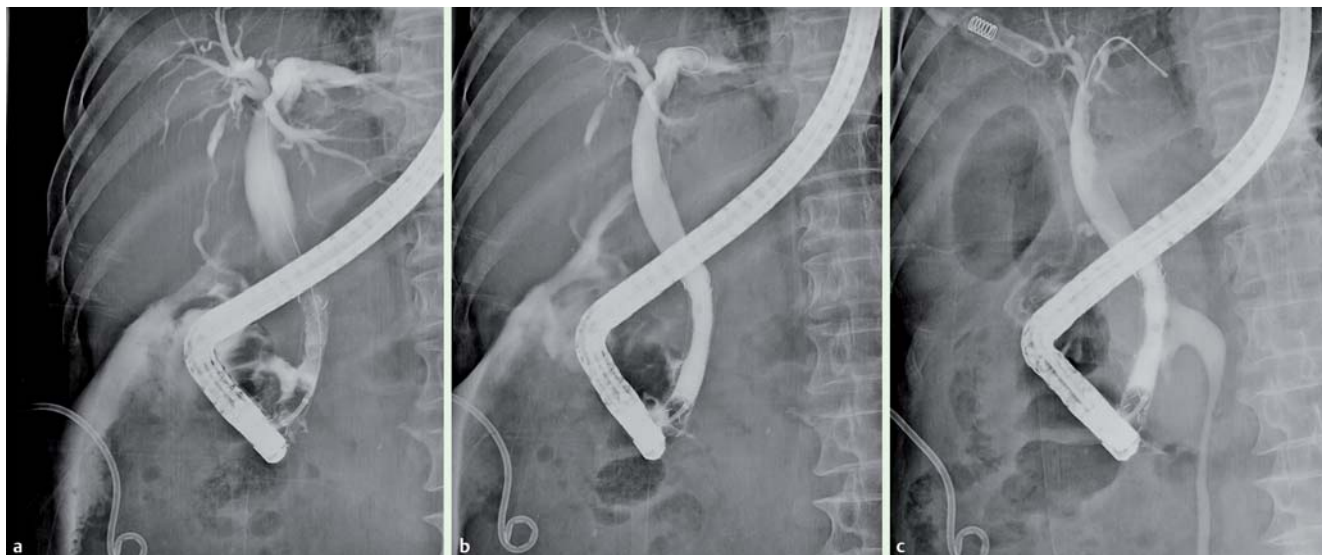
neous transhepatic biliary drainage, cutting the stent using argon plasma, or endoscopic removal of the stent [3, 4].

A 74-year-old woman was diagnosed with pancreatic ductal adenocarcinoma with common bile duct (CBD) invasion and hepatic metastases. She underwent endoscopic insertion of an uncovered biliary SEMS (10 mm × 6 cm) as palliative management. She was admitted again 4 months later with severe right upper quadrant pain, jaundice, and chills. An abdominal computed tomography (CT) scan revealed a mass in the head of the pancreas associated with the biliary stent, and fluid collections in the retroperitoneal space, right paracolic gutters, and pelvis (Fig. 1).

A percutaneous drainage catheter was inserted into the right-sided retroperitoneal space and bile-stained fluid was drained through the catheter. This was followed by a duodenoscopy, during which a portion of the metal stent was visible through a penetrating ulcer in the infundibulum of the duodenum (Fig. 2).

A balloon-occlusion cholangiogram was performed using an extraction balloon catheter and revealed a leak at the lateral side of the distal CBD (Fig. 3a). A membrane-covered SEMS (10 mm × 6 cm) was inserted endoscopically into the previously placed, uncovered SEMS. Immediately after the new stent was deployed, the cholangiogram indicated that the bile leak from the distal CBD had stopped (Fig. 3b).

A cholangiogram performed 7 days later showed no dye leakage from the CBD (Fig. 3c). The patient was discharged in



**Fig. 3** Cholangiographic images showing: **a** a leak at the lateral side of the distal common bile duct (CBD) before placement of the new stent; **b** no further leakage from the distal CBD immediately after deployment of a new membrane-covered stent; **c** no leakage from the CBD perforation site 7 days after treatment.

good condition 3 weeks later, after removal of the percutaneous drainage tube. In this patient, a bile duct perforation occurred as a delayed complication 4 months after a SEMS had been placed for palliative management of a malignant biliary obstruction. It is believed that the perforation occurred because the radial force of the stent was relatively strong, so the stent wall exerted pressure against the bile duct wall, which resulted in necrosis of nearby tissue. In cases where bile duct perforation occurs along with an unresectable malignant tumor, a more conservative treatment than surgery may be considered. The placement of a covered SEMS into the bile duct is an option for the successful management of CBD perforation.

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