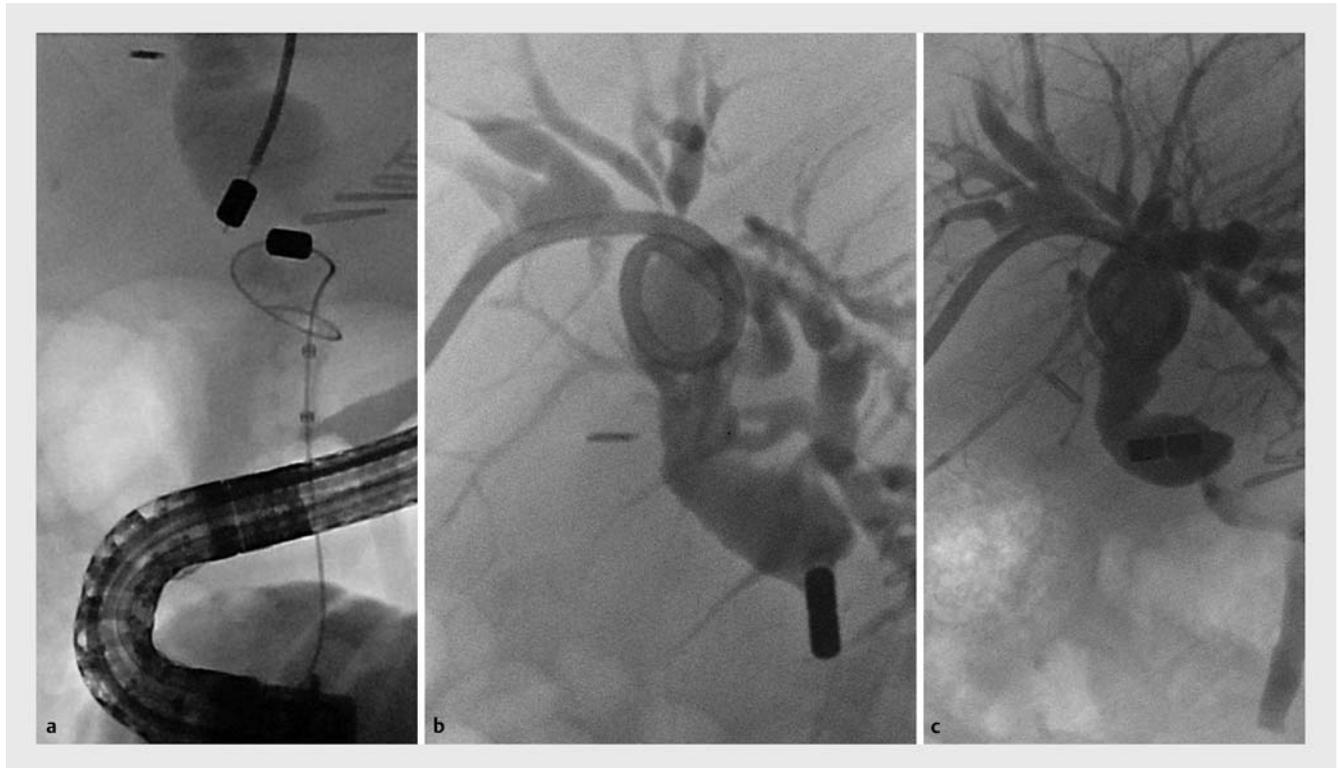


Transpapillary removal of migrated magnets after magnetic compression biliary anastomosis



► **Fig. 1** Radiographic images showing: **a** the combined endoscopic and percutaneous insertion of two magnets to obtain recanalization of the anastomotic biliary stricture; **b** complete approximation of the magnets after 3 days; **c** proximal migration of the magnets on day 24.

A 59-year-old man underwent orthotopic liver transplantation; liver re-transplantation was needed 24 hours later owing to primary liver failure. A large incisional hernia was repaired 5 years later. Increases in his liver function tests were noted 6 years later and magnetic resonance cholangiography showed an anastomotic biliary stricture. During endoscopic retrograde cholangiopancreatography (ERCP), it was impossible to pass beyond the anastomotic biliary stricture, even with the aid of cholangioscopy (SpyGlass DS; Boston Scientific, Natick, Massachusetts, USA). Percutaneous negotiation of the biliary stricture also failed despite cholangioscopy. After multidisciplinary discussion, surgery was considered too risky owing to the previous



► **Fig. 2** The migrated magnets were attracted with the tip of a modified catheter so that they could be removed.



► **Fig. 3** Photograph of the removed magnets showing corrosion on one side.



▶ Video 1 Video showing the endoscopic removal of two magnets that had migrated above an anastomotic biliary stricture using a homemade, over-the-wire magnet retrieval system.

interventions and therefore magnetic compression anastomosis [1–4] was proposed; the patient signed a specific informed consent for compassionate use. The procedure involved the over-the-wire placement of two cylindrical (7×3 mm) neodymium magnets (Cibas Srl, Milan, Italy) with a combined endoscopic and percutaneous approach (▶ Fig. 1 a). After 3 days, the magnets were found to be approximated (▶ Fig. 1 b) and the patient was discharged with a 10-Fr external drain. He underwent radiography every 3–4 days to detect migration of the magnets and, after 24 days, proximal migration and recanalization of the anastomotic biliary stricture was found to have occurred (▶ Fig. 1 c). Removal of the magnets was not initially attempted owing to the tightness of the stricture and three plastic stents were placed. Magnet removal was subsequently planned 2 months later. Grasping with a Dormia basket was considered to be dangerous owing to the risk of impaction. A homemade, over-the-wire “magnet retrieval” system was therefore created by inserting a paperclip into the tip of a steerable ERCP catheter (▶ Fig. 2). After the anastomotic biliary stricture had been dilated with a 6-mm balloon, the magnets were extracted through the papilla using the homemade device (▶ Video 1). One magnet showed corrosion at one side (▶ Fig. 3), but this was

without clinical consequences. The anastomotic biliary stricture was fully dilated by the insertion of eight 10-Fr plastic stents.

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Competing interests

Andrea Tringali is a consultant for Boston Scientific Corp. Ivo Boškosi is a consultant for Apollo Endosurgery, Cook Medical, and Boston Scientific Corp., he holds a research grant from Apollo Endosurgery, and is on the scientific board of EndoTools. Guido Costamagna is on the advisory board for Cook Medical, Olympus, and Ethicon, and holds a research grant from Boston Scientific Corp. and Apollo Endosurgery. The remaining authors declare that they have no conflict of interest.

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