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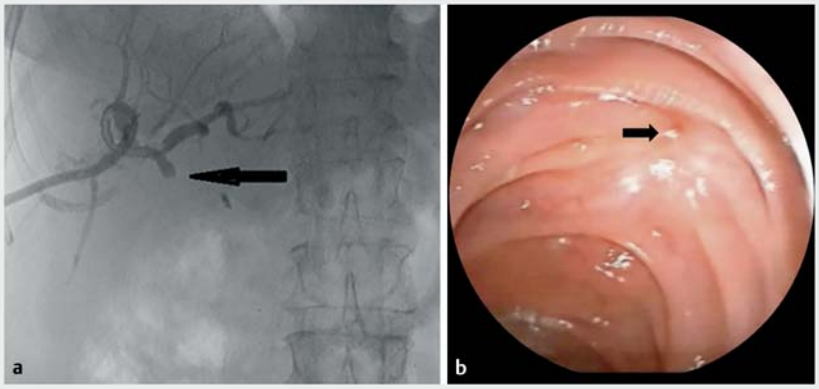
Magnetic compression anastomosis using a double-balloon enteroscope for complete obstruction of Roux-en-Y hepaticojejunostomy anastomosis

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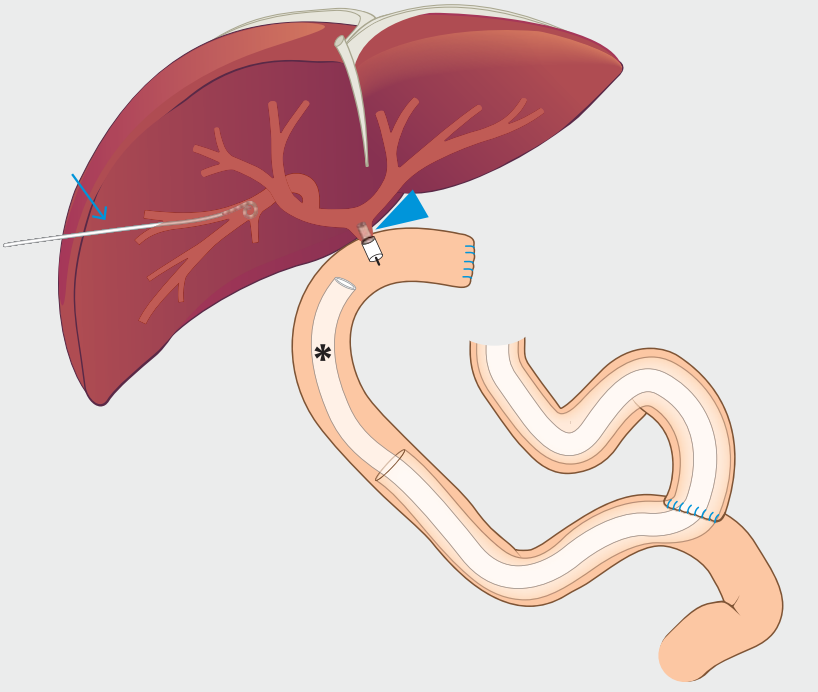
Standard treatment for most post-cholecystectomy bile duct injuries is Roux-en-Y hepaticojejunostomy [1]. Conventional treatment of complete anastomotic obstruction after this procedure is revision surgery, which has high morbidity and mortality. Therefore, less invasive treatments are preferred, such as guidewire tapping, needle knife puncture, and magnetic compression anastomosis [2, 3].

A 72-year-old woman developed obstructive cholangitis 3 months after Roux-en-Y hepaticojejunostomy was performed for a post-cholecystectomy bile duct injury. Complete anastomotic obstruction was observed on percutaneous transhepatic cholangiography and the guidewire could not be passed through the anastomosis (▶ **Fig. 1 a**). We decided to apply magnetic compression anastomosis by using a double-balloon enteroscope (EN 580; Fujifilm, Tokyo, Japan) because the patient was at a high risk for surgery owing to comorbid diseases (▶ **Fig. 2**, ▶ **Video 1**).

First, the bowel site of the anastomosis was reached with the double-balloon enteroscope (▶ **Fig. 1 b**), which was then removed, leaving the overtube in place. The neodymium magnet (4 × 10 mm), which was held by a snare at the tip of the endoscope without the balloon, was introduced into the afferent jejunal limb through the overtube (▶ **Fig. 3**, ▶ **Fig. 4 a**). Simultaneously, the neodymium magnet (3 × 10 mm) was inserted into the hepatic side of the obstruction through the percutaneous transhepatic cholangiography catheter (▶ **Fig. 4 a**). After confirming that the magnets were aligned in the fluoroscopy, the magnets were released. After 8 days, the magnets were seen to be coupled on fluoroscopy (▶ **Fig. 4 b**) and were removed by re-entering with the double-balloon endoscope. In the same session, the percutaneous transhepatic cholangiography catheter was advanced through the new



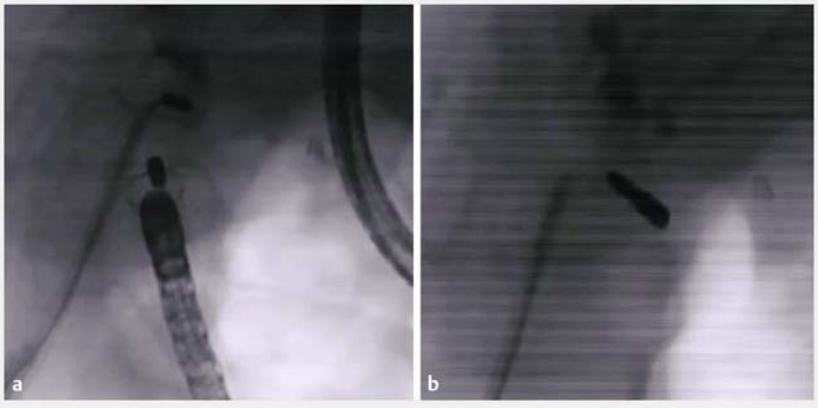
▶ **Fig. 1** Complete obstruction of the Roux-en Y hepaticojejunostomy anastomosis (arrow). **a** Percutaneous transhepatic cholangiography view. **b** Double-balloon enteroscope view.



▶ **Fig. 2** An illustration of magnetic compression anastomosis using a double-balloon enteroscope (asterisk) and percutaneous transhepatic cholangiography (arrow) performed for complete obstruction of Roux-en-Y hepaticojejunostomy anastomosis. The arrowhead represents the alignment of the magnets.



Video 1 Magnetic compression anastomosis using a double-balloon enteroscope for complete obstruction of Roux-en-Y hepaticojejunostomy anastomosis after bile duct injury due to laparoscopic cholecystectomy.



▶ **Fig. 4** Fluoroscopic images showing: **a** The magnets inserted percutaneously and endoscopically. **b** The coupled magnets.

anastomosis and passed into the intestine. The cholangiography 60 days later showed that the radiopaque material had passed into the jejunum very easily, and the drainage catheter was removed (▶ **Fig. 5**). There was no recurrence of the stenosis on clinical and radiological follow-ups at 1 year.

In conclusion, magnetic compression anastomosis using double-balloon endoscopy may be used as a viable alternative to surgery for the treatment of anastomotic complete obstruction after Roux-en-Y hepaticojejunostomy.

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Competing interests

The authors declare that they have no conflict of interest.

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▶ **Fig. 3** Endoscopic view of the magnet brought to the anastomosis line by snare at the tip of the double-balloon enteroscope.



▶ **Fig. 5** Successful recanalization is observed under percutaneous transhepatic cholangiogram.

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