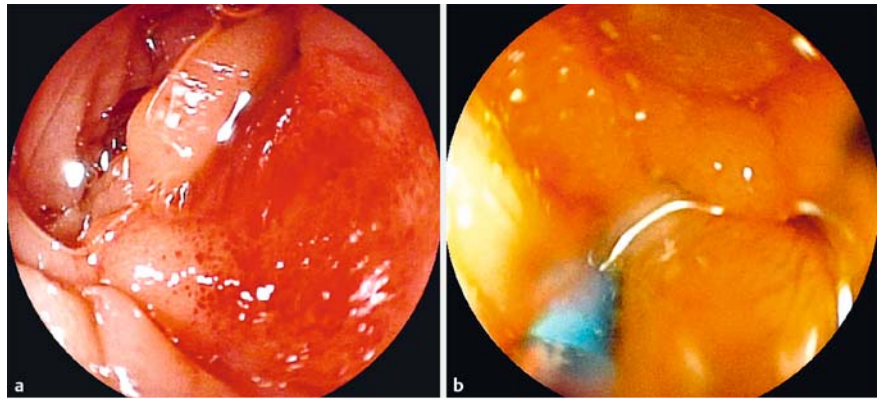


## Balloon enteroscopy-assisted biliary drainage using a diathermic dilator followed by placement of a novel ultra-slim metallic stent

Endoscopic management of malignant biliary stricture after hepaticojejunostomy is challenging. Although balloon enteroscopy-assisted endoscopic retrograde cholangiopancreatography (ERCP) has been developed, dedicated devices are still insufficient. We present a case of successful enteroscopic dilation using a wire-guided diathermic dilator [1–5], and placement of a novel, ultra-slim, uncovered, self-expandable, metallic stent (USEMS) for the treatment of a severe malignant stricture of the perihilar bile duct after hepaticojejunostomy.

A 52-year-old man with obstructive jaundice was referred to our department. He had undergone pancreaticoduodenectomy with hepaticojejunostomy for pancreatic head cancer 27 months earlier. He had received 6 months of chemotherapy for multiple liver metastases, but this treatment was suspended because of multiple liver abscesses, which developed 1 month before we saw him. Computed tomography revealed intrahepatic bile duct dilation, perihilar biliary mass, and ascites. Double-balloon enteroscopy (EI-530B; Fujifilm Corp., Tokyo, Japan) was selected for biliary drainage. Double-balloon enteroscopy showed jejunal invasion of recurrent tumor involving the hepaticojejunal anastomosis (▶ Fig. 1 a, b). A tapered ERCP catheter and a 0.025-inch guidewire were passed through the stricture of the hepaticojejunal anastomosis (▶ Fig. 1 b). ERCP showed perihilar biliary stricture (▶ Fig. 2 a, ▶ Video 1), which could not be passed by the tapered ERCP catheter (▶ Video 1).

The severe stricture was dilated successfully with a wire-guided diathermic dilator (Cysto-Gastro-Set, 6Fr, length 180 cm; Endo-Flex, Voerde, Germany) (▶ Fig. 2 b, ▶ Video 1). Total dilation time was 3 seconds for the hepaticojejunal anastomosis and 13 seconds for the



▶ Fig. 1 Endoscopic images. a Jejunal invasion. b Edematous mucosa around the hepaticojejunal anastomosis.

perihilar biliary stricture, respectively. A slim USEMS (Zilver 635, 6.0Fr delivery system, 10 mm diameter, 200 cm long; Cook Japan, Tokyo, Japan) failed to pass the stricture. However, a novel ultra-slim USEMS (BileRush Selective, 5.7 Fr delivery system, 10 mm diameter, 185 cm long; Piolax Medical Devices, Kanagawa, Japan) was successfully deployed, followed by placement of an additional USEMS, in a stent-in-stent fashion, with-

out any complications (▶ Fig. 3, ▶ Fig. 4, ▶ Video 1).

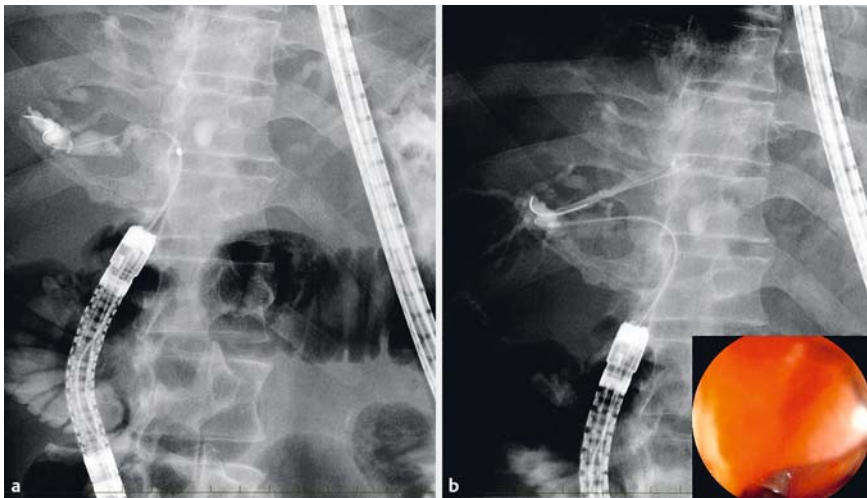
In summary, using balloon enteroscopy, a wire-guided diathermic dilator and novel ultra-slim USEMS were useful in facilitating dilation and stenting for the treatment of severe malignant anastomotic and biliary strictures in a patient with altered anatomy.

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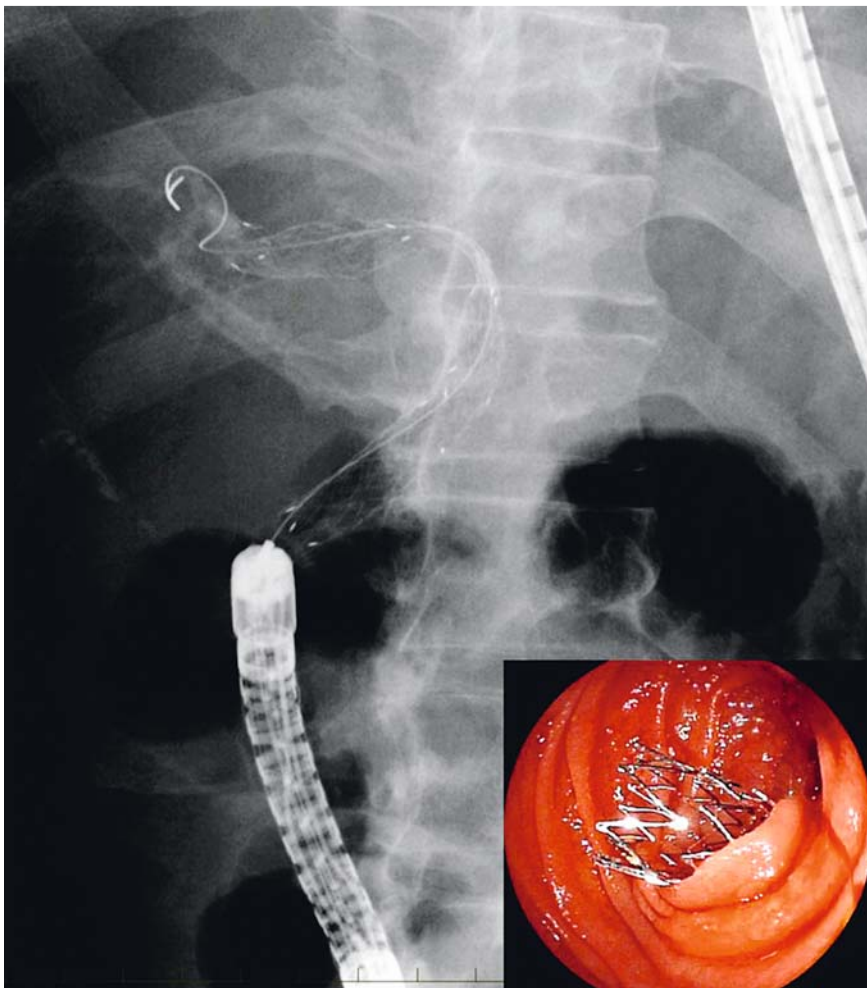
▶ VIDEO 1

Successful diathermic dilation for perihilar stricture

▶ Video 1: Wire-guided diathermic dilation after failed dilation using a tapered endoscopic retrograde cholangiopancreatography catheter, and deployment of novel, ultra-slim, uncovered, self-expandable, metallic stents.



► **Fig. 2** Radiographic images. **a** Perihilar biliary stricture. **b** Wire-guided diathermic dilator passing the perihilar bile duct stricture (inset: 6 Fr wire-guided diathermic dilator insertion under endoscopic guidance).



► **Fig. 4** Radiograph showing deployed novel ultra-slim uncovered self-expandable metallic stent (inset: enteroscopic view).



► **Fig. 3** Comparison of a novel, ultra-slim, uncovered, self-expandable, metallic stent (USEMS; BileRush Selective, 5.7 Fr delivery system, 10 mm diameter, 185 cm long; PIOLAX Medical Devices, Kanagawa, Japan) (above), and a slim USEMS (Zilver 635, 6.0 Fr delivery system, 10 mm diameter, 200 cm long; Cook Japan, Tokyo, Japan) (below).

### Competing interests

Dr. Kawakami has collaborated with Piolax Medical Devices on the development of the BileRush Selective, and is a consultant and gives lectures for the company.

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