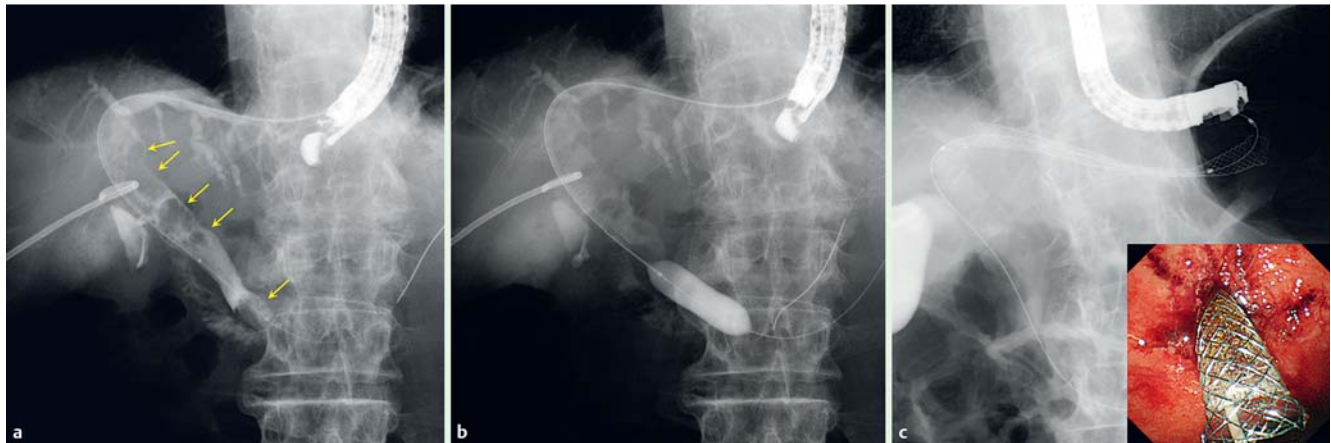
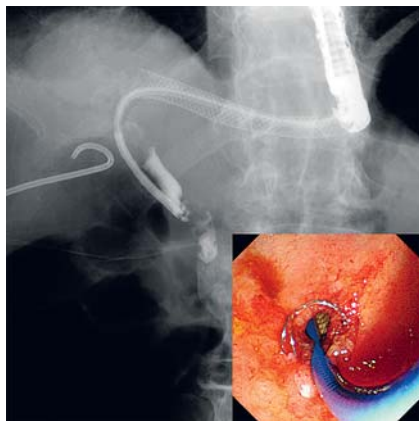


## Peroral transhepatic cholangioscopy-guided electrohydraulic lithotripsy via an endoscopic ultrasonography-guided hepaticogastrostomy route for bile duct stones in a patient with Roux-en-Y anatomy



**Fig. 1** Transhepatic endosonography (EUS)-guided antegrade approach for attempted treatment of bile duct stones in an 84-year-old man with Roux-en-Y anatomy: radiographic views. **a** Multiple bile duct stones (arrows). **b** EUS-guided papillary balloon dilation under fluoroscopic guidance. The bile duct stones could not be extracted. **c** A self-expandable metallic stent was placed via the EUS-guided hepaticogastrostomy route. Inset: endoscopic image.



**Fig. 2** At 1 month later, the radiograph shows direct peroral transhepatic cholangioscopy with electrohydraulic lithotripsy through the endoscopic ultrasound-guided hepaticogastrostomy route. Extraction of the bile duct stones again failed. Inset: endoscopic image.



**Fig. 3** At 2 months later: the radiograph shows complete clearance of bile duct stones by means of endoscopic papillary large-balloon dilation (EPLBD). The arrow shows a bile duct stone in the duodenal lumen.

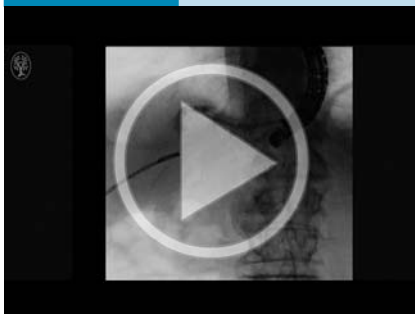
Endoscopic ultrasonography (EUS)-guided antegrade bile duct stone treatment has been developed for patients with altered anatomy [1–5]. Here, we present a case of successful bile duct stone treatment via an EUS-guided hepaticogastrostomy (EUS-HGS) route in the setting of prior Roux-en-Y reconstruction. Direct peroral transhepatic cholangioscopy-guided electrohydraulic lithotripsy

(EHL) and endoscopic papillary large-balloon dilation (EPLBD) were used. An 84-year-old man with bile duct stones, acute cholecystitis, cholangitis, and a history of distal gastrectomy with Roux-en-Y reconstruction was referred to our hospital. As the papilla was inaccessible even with balloon enteroscopy, only percutaneous transhepatic gallbladder drainage had been previously performed.

Transhepatic EUS-guided antegrade treatment was selected for the treatment of the bile duct stones. A B3 branch duct was punctured using a 22-gauge needle, and a 0.018-inch guidewire (NovaGold; Boston Scientific Japan, Tokyo, Japan) was placed. EUS-guided antegrade cholangiography revealed multiple bile duct stones (▶ Fig. 1 a). After exchanging to a 0.035-inch guidewire (Jagwire Plus High Performance Guidewire; Boston Scientific), we performed EPLBD (Giga, 13–15 mm; Century Medical, Tokyo, Japan) under fluoroscopic guidance (▶ Fig. 1 b), but were unable to extract the bile duct stones using a retrieval balloon (Extractor Pro RX retrieval balloon catheter, 15–18 mm; Boston Scientific) (▶ Video 1). A partially covered self-expandable metallic stent (WallFlex, 10×60 mm, Boston) was placed without complications (▶ Fig. 1 c).

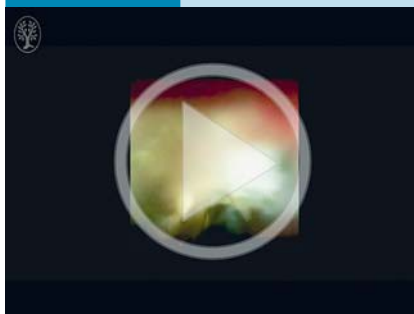
Then 1 month later, we performed EHL under direct antegrade peroral video cholangioscopy (SpyGlass DS; Boston Scientific) using a therapeutic duodenoscope via an EUS-HGS route (▶ Fig. 2, ▶ Video 2). However, extraction of the bile duct stones, this time by basket and balloon catheter, again failed. Therefore, 2 months later, we repeated EPLBD, and achieved complete

## Video 1



Attempted treatment of bile duct stones in an 84-year-old man with Roux-en-Y anatomy: bile duct puncture and antegrade cholangiography under endoscopic ultrasonography (EUS) and fluoroscopic guidance; guidewire insertion into the intrahepatic bile duct and advancement towards the distal bile duct under fluoroscopic guidance; endoscopic papillary large-balloon dilation (EPLBD) under fluoroscopic guidance; and failure of stone extraction using the balloon catheter.

## Video 2



At 1 month later, direct peroral transhepatic cholangioscopy-guided electronic hydraulic lithotripsy via an endoscopic ultrasound-guided hepaticogastrostomy route.

clearance of the bile duct stones with a balloon catheter (● Fig. 3).

Although it is challenging, EUS-guided antegrade cholangiography and cholangioscopy (EUS-ACC) should be recognized as a treatment in patients with altered gastrointestinal anatomy. We have recently reported successful EUS-ACC in one such case [4]. Tonozuka et al. have described laser lithotripsy via the EUS-HGS route after pancreaticoduodenectomy [5]. To our knowledge, this is the first report of treatment for bile duct stones with EHL via an EUS-HGS route guided by direct antegrade cholangioscopy.

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**Competing interests:** None

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