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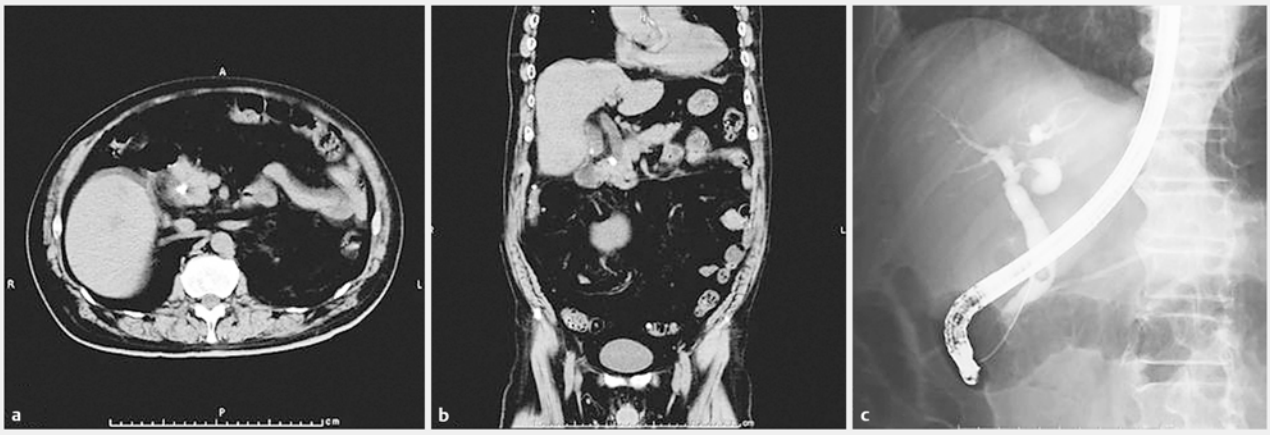
Successful removal of an impacted stone in the common bile duct by electric lithotripsy using a needle-knife and a forward-viewing endoscope



▶ **Fig. 1** Bile duct stone on imaging studies. **a, b** Computed tomography images showing a bile duct stone of 10 mm in diameter. **c** Cholangiograph showing the stone in the bile duct.

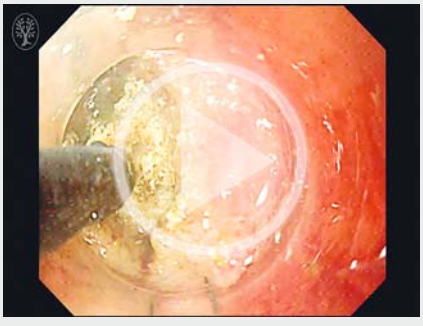
Although stones in the common bile duct (CBD) can be endoscopically removed [1,2], stone impaction in the CBD occasionally occurs as a severe complication [3,4]. We encountered a case of stone impaction in the CBD after endoscopic papillary balloon dilation (EPBD), which could be successfully treated by electrically cutting the stone using a needle-knife.

A 68-year-old man visited our hospital because of acute cholangitis. Abdominal computed tomography revealed a calcified stone of 10 mm in diameter in the CBD (▶ **Fig. 1**). After obtaining informed consent, we attempted endoscopic retrograde cholangiopancreatography (ERCP) using a duodenoscope (JF260V; Olympus, Tokyo, Japan), and diagnosed choledocholithiasis (▶ **Fig. 1**).

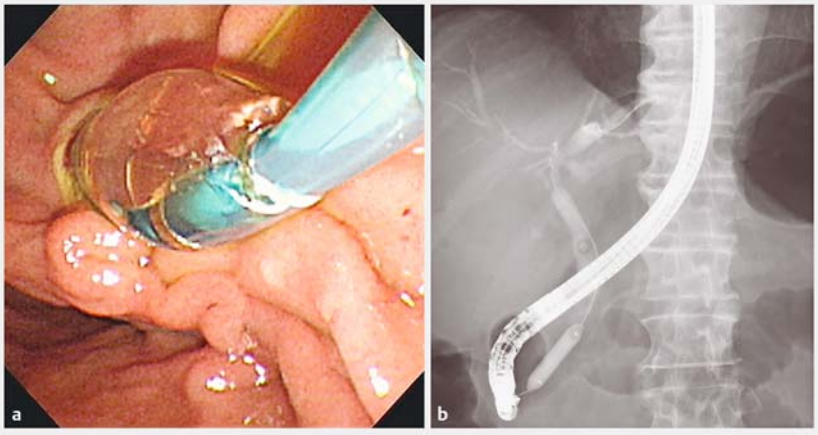
We performed EPBD (QBD-8X3; Cook Medical, Inc., Bloomington, Indiana, USA) (▶ **Fig. 2**). Although we attempted stone extraction using a basket catheter (Nitinol-lithotomy basket, 4 wires, 25 × 40 mm; MTW Endoskopie, Wesel, Germany), the stone was tightly impacted within the biliary orifice (▶ **Fig. 3**). After cutting and removing the outer sheath of the impacted catheter, we exchanged the instrument to a forward-viewing endoscope (GIF-Q260; Olympus) with a hood (Elastic Touch, slit&hole, F-010; Top Corp., Tokyo, Japan) attached to its tip. After positioning the endoscope close to the impacted stone, we electrically cut the stone using a needle-knife (KD-1L-1; Olympus) (Forced Coagulation 50 W, ICC200; Erbe, Tübingen, Germany) under direct visualization, in a fashion similar to the technique of endoscopic submucosal dissection [5] until stone reduction was confirmed (▶ **Fig. 4**; ▶ **Video 1**).

After breaking the stone with grasping forceps (FG-47L-1; Olympus) (▶ **Fig. 4**;

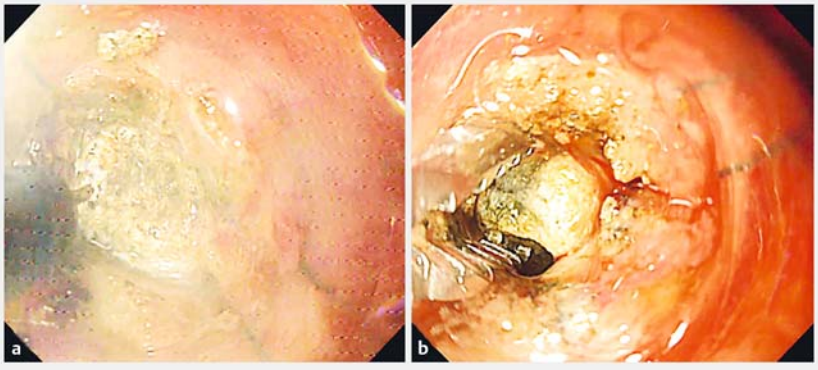
Video 1



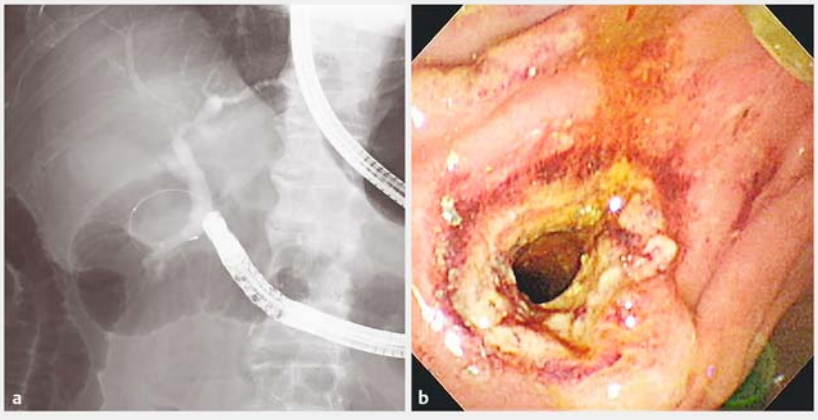
▶ Video 1: In the present case a bile duct stone was tightly impacted within the biliary orifice after endoscopic papillary balloon dilation. We electrically cut the stone using a needle-knife under direct visualization, in a fashion similar to the technique of endoscopic submucosal dissection, and then broke it with grasping forceps. An endoscopic view of electrical lithotripsy using a needle-knife is shown.



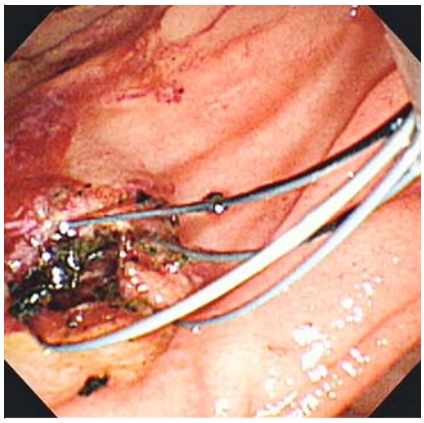
▶ **Fig. 2** Endoscopic papillary balloon dilation. **a** Endoscopic view. **b** Fluoroscopic view.



▶ **Fig. 4** Endoscopic view: cutting and retrieval of the stone. **a** The stone was electrically cut using a needle-knife, in a fashion similar to the technique of endoscopic submucosal dissection. **b** The stone was gripped with grasping forceps after being electrically cut using the needle-knife.



▶ **Fig. 5** Retrieval of the stone. **a** Fluoroscopic view of a duodenoscope inserted into the second part of the duodenum using the impacted wire for guidance. **b** The impacted stone was successfully removed after being broken using the needle-knife and grasping forceps.



▶ **Fig. 3** Endoscopic view showing the impacted stone in the biliary orifice after endoscopic papillary balloon dilation.

▶ **Video 1**), we could easily extract the impacted stone by pulling the impacted wire through the duodenoscope, which had been inserted to the second part of the duodenum using the wire for guidance (▶ **Fig. 5**). No adverse events occurred during or after the procedure.

This technique has been suggested to be useful for the retrieval of impacted stones associated with ERCP. However, its reported use is limited to case reports; therefore, further evaluation should be performed in the future.

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Competing interests

None

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