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Digital cholangioscopy-guided removal of an Ascaris worm from the biliary tree

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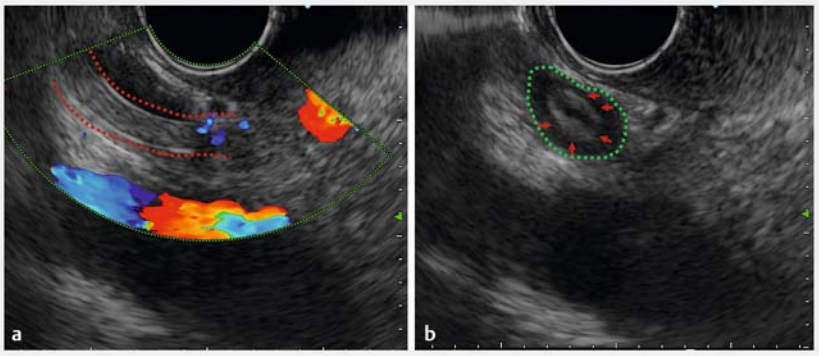

▶ **Fig. 1** Endoscopic ultrasound images showing: **a** a long, linear hyperechoic strip without any acoustic shadow within the common bile duct, consistent with the "strip" sign (dotted red line outlines the worm); **b** a central, longitudinal anechoic shadow, consistent with the "inner-tube" or "double-tube" sign (red arrows), within the common bile duct (dotted green line).

▶ **Fig. 3** Photographs of the 14-cm *Ascaris* that was pulled alive from the bile duct.

▶ **Fig. 2** Endoscopic ultrasound showing the papilla that had been opened up by the previous sphincterotomy.

A-37-year woman, who had undergone endoscopic retrograde cholangiopancreatography (ERCP) and sphincterotomy for common bile duct (CBD) stones followed by cholecystectomy 3 years ago, presented to us complaining of right upper quadrant pain for 3 days. Laboratory investigations showed raised liver enzymes (alanine transaminase 100 U/L and alkaline phosphatase 320 U/L), with normal bilirubin levels. An ultrasound of the abdomen showed a mildly dilated CBD with aerobilia. Endoscopic ultrasound (EUS) was performed, which showed long, moving, linear hyperechoic strips, without any acoustic shadow within the CBD, consistent with the "strip" sign and a central, longitudinal anechoic shadow, consistent with the "inner-tube" or "double-tube" sign, which suggests a diagnosis of biliary ascariasis (▶ **Fig. 1**). EUS examination of the ampulla showed an open biliary orifice (▶ **Fig. 2**) owing to the previous sphincterotomy, with flow of water within the CBD on ingestion and aerobilia.

The patient underwent ERCP with a therapeutic duodenoscope (TJF-180F; Olympus, Japan), which showed the previous papillary sphincterotomy, but no worm was seen at the papillary orifice. Contrast

Video 1 Endoscopic ultrasound showing the features of a live *Ascaris* within the bile duct and its cholangioscopy-guided removal.

was not injected as the patient had a history of contrast allergy. Digital single-operator cholangioscopy (DSOC; SpyGlass; Boston Scientific, USA) of the CBD was performed through the duodenoscope. DSOC showed a long, live, linear tubular worm occupying the whole CBD and piercing into the right anterior hepatic duct (▶ **Video 1**). The worm was removed with forceps (SpyBite; Boston Scientific) under direct visualization (▶ **Fig. 3**). Following the procedure, the patient was stable and albendazole was given as deworming therapy.

Biliary ascariasis is a common cause of pancreaticobiliary disease in tropical countries. Risk factors for biliary ascariasis include a history of cholecystectomy, choledocholithotomy, sphincteroplasty, or endoscopic sphincterotomy, and pregnancy [1]. Our patient had a history of both cholecystectomy and biliary sphincterotomy (▶ **Fig. 2**). ERCP plays an important role in the diagnosis of pancreaticobiliary ascariasis, as well as in its therapy by direct extraction of the worm [2]. In this case, biliary ascariasis was suspected on EUS and DSOC confirmed the diagnosis and also assisted with removal of the worm under direct visualization.

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Competing interests

The authors declare that they have no conflict of interest.

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