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

A 37-year-old 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 (dotted red line outlines the worm) and a central, longitudinal anechoic shadow, consistent with the "inner-tube" or "double-tube" sign (red arrows), within the common bile duct (dotted green line).

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

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**Fig. 1** Endoscopic ultrasound images showing: 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. 2** Endoscopic ultrasound showing the papilla that had been opened up by the previous sphincterotomy.

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

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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 diagno-

sis 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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