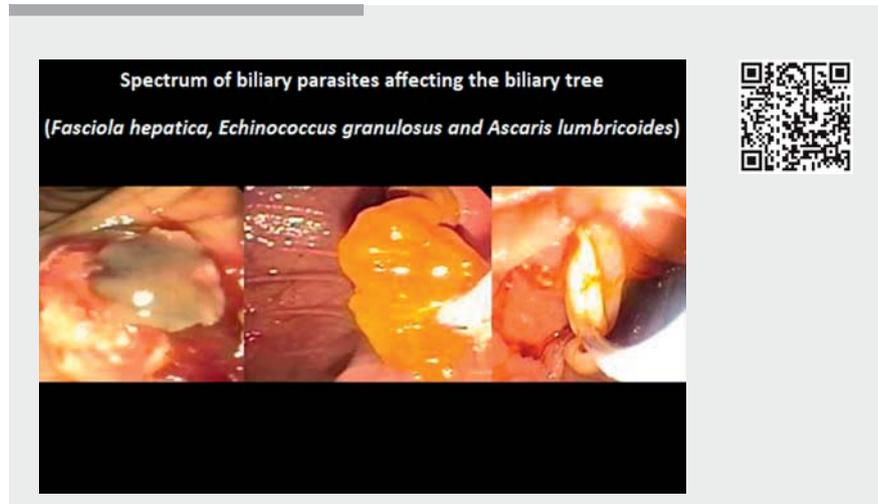


## Spectrum of biliary parasites affecting the biliary tree (*Fasciola hepatica*, *Echinococcus granulosus*, and *Ascaris lumbricoides*)

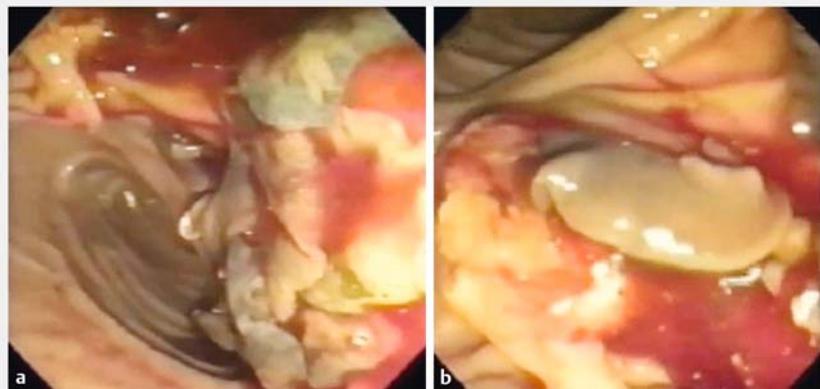
Parasites are common worldwide and may involve any part of the gastrointestinal tract. Despite the high prevalence, reports of biliary involvement and its endoscopic treatment are scarce. Hereby we present a spectrum of biliary tree parasitosis (► **Video 1**).

Case 1 was an 18-year-old woman who presented to our institution with jaundice and pruritus. An abdominal ultrasound revealed mobile lamellae in the gallbladder and common bile duct. An endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy was performed. Multiple adult vital flatworms (*Fasciola hepatica*) were retrieved with a Dormia basket (► **Fig. 1**). Intraductal instillation of 2.5% iodopovidone was performed, and we allowed it to act for 5 minutes by occluding the distal bile duct with a balloon [1]. Medical treatment with triclabendazole was then completed and the patient had an excellent clinical outcome.

The second case was a 27-year-old man who was admitted with acute cholangitis. An abdominal computed tomography (CT) scan was performed. The common bile duct was dilated and a subhepatic cystic cavity was observed. We decided to perform an ERCP, during which an extrinsic compression of the duodenum was first observed. The cholangiography showed dilatation of the intra- and extrahepatic bile ducts with heterogeneous distribution and filling of the contrast into the bile duct. The subhepatic cavity was also rapidly filled with contrast, so we assumed that it was in communication with the biliary tree (► **Fig. 2**). A sphincterotomy was performed and we extracted multiple membranes, mucinous contents, and purulent bile with an extractor balloon. Subsequent medical treatment with albendazole was given with a good clinical response being achieved.



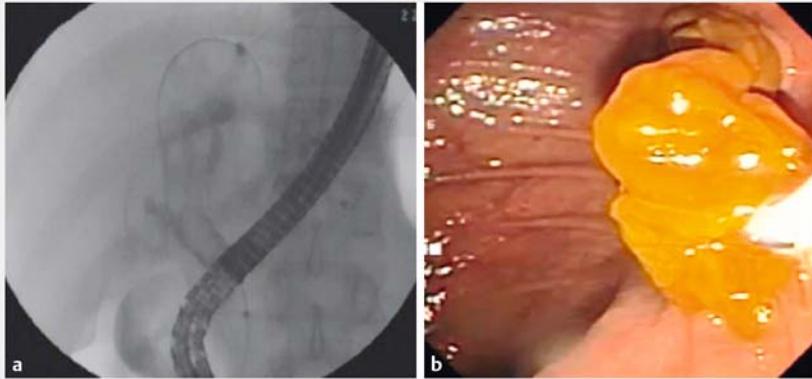
► **Video 1** Case 1 shows multiple adult vital flatworms (*Fasciola hepatica*) being retrieved with a Dormia basket. Case 2 shows the extraction of multiple membranes, mucinous contents, and purulent bile with an extractor balloon in a patient with a hydatid cyst and how the cyst is cleared at the end of the procedure. Case 3 shows the extraction of multiple membranes with a Dormia basket. Case 4 shows a large *Ascaris lumbricoides* being extracted with a stone retrieval basket.



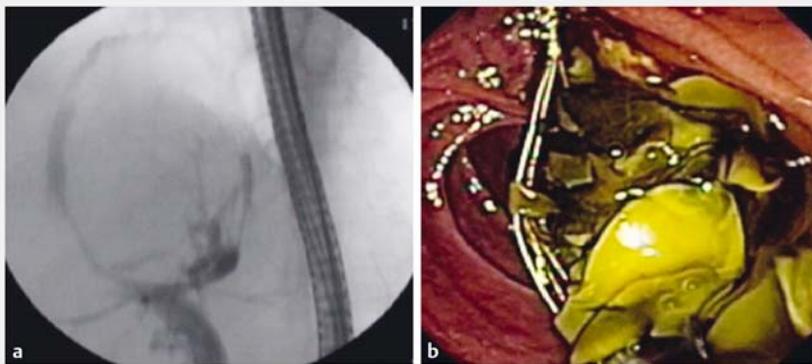
► **Fig. 1** Endoscopic images from an 18-year-old woman showing multiple adult vital flatworms (*Fasciola hepatica*), which were retrieved with a Dormia basket.

Case 3 was a 72-year-old woman who presented with acute cholangitis. An abdominal computed tomography (CT) scan was performed. Multiple thin-walled cysts were observed in the liver with dilatation of the biliary tree. An ERCP with sphincterotomy was performed.

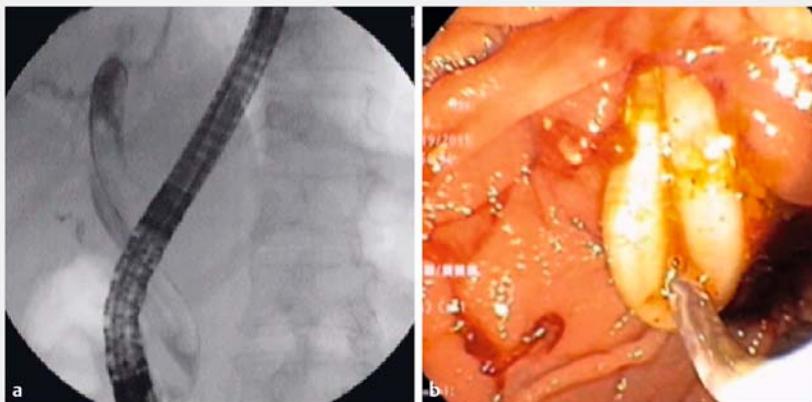
The cholangiogram showed extrahepatic bile duct dilatation. The intrahepatic bile ducts of the right hepatic lobe seemed “displaced” by the presence of an occupying mass. Multiple hydatid membranes (*Echinococcus granulosus*) were extracted with a Dormia basket



► **Fig. 2** Images from a 27-year-old man with acute cholangitis showing: **a** on cholangiographic view, heterogeneous distribution and contrast filling of the bile duct and a subhepatic cavity; **b** endoscopic extraction of multiple membranes.



► **Fig. 3** Images from a 72-year-old woman with acute cholangitis showing: **a** on cholangiographic view, extrahepatic bile duct dilatation and displacement of the intrahepatic bile ducts by the presence of an occupying mass; **b** endoscopic extraction of multiple membranes with a Dormia basket.



► **Fig. 4** Images from a 45-year-old man with a history of jaundice and weight loss showing: **a** on cholangiographic view, a filling defect suggestive of a parasite; **b** endoscopic extraction of a large *Ascaris lumbricoides* with a stone retrieval basket.

(► **Fig. 3**). The patient completed medical treatment and is currently under surveillance as an outpatient.

The final case was a 45-year-old man who was admitted for jaundice and weight loss. An ERCP was performed and a filling defect suggestive of a parasite was observed. After sphincterotomy had been performed, a large *Ascaris lumbricoides* was extracted with a stone retrieval basket (► **Fig. 4**).

Biliary tree compromise with parasites is thought to be rare and is usually seen in the context of a zoonosis. Hepatic fascioliasis is associated with the intake of contaminated algae with larvae that, once ingested, cross the intestinal barrier and the hepatic parenchyma through Glisson's capsule of the liver [2]. They finally reach the biliary tree where they develop into the adult forms. Hydatidosis is generated by *Echinococcus granulosus* parasites that are ingested through the consumption of contaminated food or by direct contact. The cysts quite frequently compromise the liver and, in some cases, may fistulize into the biliary tree [3]. *Ascaris lumbricoides* is common in tropical countries with low standards of hygiene, high levels of malnutrition, and heavy rainfall, and where untreated sewage is discharged into rivers, lakes, and onto agricultural land or is used as a fertilizer. It has a natural inclination to migrate and seek small orifices of the body, including the papilla of Vater and common bile duct [4]. Interestingly, in a highly endemic area, ascariasis was found to be the cause in 36.7% of 109 patients with proven biliary and pancreatic disorders [5].

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#### Competing interests

None

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## Bibliography

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