Clinical History:

The patient presenting with clinical and laboratory features of obstructive jaundice with cholangitis and showing linear coiled filling defects within the CBD.

Imaging Findings:

A middle-aged patient presented with right upper abdominal pain, fever associated with chills and associated mild jaundice of 4 weeks’ duration. On physical examination the patient was febrile and had a tender hepatomegaly. Laboratory findings revealed a raised white cell count, and deranged liver function tests - the total bilirubin was 5.6mg/dL (direct bilirubin 3.2mg/dL), serum alkaline phosphatase levels 140U/L, AST 32IU/L, and ALT 37IU/L. Abdominal sonography revealed dilated intrahepatic biliary radicals and common duct dilatation with echogenic foci within its upper half (Fig. 1). The entire common bile duct (CBD) was not adequately visualised because of bowel gas. The patient was referred for MRI and MRCP examination to delineate the cause and exact level of obstruction. MRI performed with T1-weighted FLASH (Fig. 2a) and T2-weighted TSE HASTE (Fig. 2b) breath-hold pulse sequences revealed linear structures within the CBD having a central hyperintense core on T2-weighted images. MRCP (Fig. 3) revealed irregular linear coiled structures within the duct. The patient was managed with intravenous fluids, antibiotics and subsequently referred for endoscopic management.

Discussion:

Ascariasis is caused by the nematode Ascaris lumbricoides. The prevalence of ascariasis is low in the large cities but may be high in the rural areas of the developed countries and is definitely high in the developing countries of Asia and Latin America. The adult worm usually resides in the jejunum and the infection is acquired by the ingestion of the embryonated eggs. Ascariasis is more commonly associated with vague abdominal symptoms and intestinal obstruction. It is also a rare cause of granulomatous peritonitis and appendicular colic in endemic areas. Biliary ascariasis is a well-described entity and not an uncommon manifestation of ascariasis (1). Distinct presentations described with the entity include biliary colic, acalculous cholecystitis, acute cholangitis, pancreatitis and hepatic abscesses (1). The worm has been blamed for causing recurrent pyogenic cholangitis and is also responsible for the formation of intrahepatic and common bile duct stones when fragments of the dead worm serve as niduses for the development of stones. Biliary ascariasis is more common in women, pregnancy and in patients having undergone prior biliary surgery.
The diagnosis of biliary ascariasis can be easily made on ultrasonography when linear echogenic foci are seen moving within the biliary system. Ultrasonography is a convenient non-invasive imaging modality to monitor the status of the worms since most are known to wriggle in and out of the biliary duct. Various signs such as a spaghetti-like appearance, inner tube sign, double tube sign, bulls eye sign and impacted worm sign have been described (2).

ERCP serves as an important diagnostic modality since therapy can be combined at the same time by allowing extraction of the worms using baskets as advocated by various authors (1,3). However, ERCP is relatively invasive and becomes necessary only when the symptoms are active since it is not unusual to find worms within the CBD without producing symptoms, especially in endemic areas. Therapeutic extraction of worms during ERCP has thus fallen into disrepute and is now advocated only when: conservative treatment fails; the worms are dead or inactive for more than 4 weeks; or they coexist with stones (3).

The patient in this case underwent endoscopic removal of the worms from the bile duct because it was over 4 weeks since the worms were consistently demonstrated in the bile duct and patient was unrelieved of his symptoms. The procedure brought rapid relief to the patient by relieving the jaundice and signs of cholangitis.

MRI and MRCP are not primarily indicated for the diagnosis of ascariasis since ultrasound is often able to demonstrate the worms. However, in doubtful cases (such as this one) and when a pre-ERCP map is necessary for the removal of worms, MRCP can be usefully utilised (4). MRI can serve as a very specific imaging modality by demonstrating the worm morphology (4,5). MRCP can demonstrate the load of the disease in the biliary tract, in addition to revealing any associated strictures, stones and the status of intrahepatic biliary radicals. MRI also scores over CT since it allows coronal imaging, better delineation of fluid around the worm in the CBD and three-dimensional maximum intensity projection images of the biliary tract using MRCP.

**Differential Diagnosis List:** Obstructive jaundice and cholangitis due to biliary ascariasis

**Final Diagnosis:** Obstructive jaundice and cholangitis due to biliary ascariasis

**References:**

Description: The common duct is dilated with an echogenic focus seen within (arrows). The lower duct could not be visualised because of bowel gas. Origin:
Description: Air in the gallbladder is revealed by the presence of a non-dependent echogenic focus (arrow) with the reverberation artefact. Origin:
Figure 2

Description: Axial T1-weighted FLASH image through the mid portion of the CBD revealing an isointense structure (arrow) outlined by the hypointense bile. Origin:
Description: Axial T2-weighted TSE HASTE image at the level of the head of pancreas revealing the ascaris worm with a hyperintense central core (arrow) in the lower CBD. Origin:
Figure 3

Description: Source image revealing the linear filling defect within the CBD. Origin:
Description: MIP reconstruction revealing multiple coiled linear structures (arrows) within the dilated CBD. Origin: