MR Cholangiography of Accessory Bile Duct Connected to the Stomach

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Accessory bile ducts, often draining a segment of the right lobe of the liver into the common bile duct or the gallbladder, have been found at as many as 4% of necropsies [1]. Accessory bile ducts connected to the gastrointestinal tract are extremely rare [1, 2]. Since the first report of double bile duct draining into the gastrointestinal tract as a congenital anomaly registered by Vesalius in 1543, more than 50 cases of double biliary drainage have been reported worldwide [2].

We describe a case of accessory bile duct that connected the caudate lobe of the liver to the stomach in which MR cholangiography (MRC) showed the biliary anomaly and provided sufficient evidence for development of an appropriate surgical plan. Subsequent intraoperative cholangiography supplemented the imaging diagnosis, and surgical resection was performed. To our knowledge, there have been no reported cases of MRC diagnosis of accessory bile duct connected to the gastrointestinal tract.

Case Report

A 69-year-old man was admitted to our hospital with a 4-day history of epigastric pain and fever (40.4°C). Physical examination revealed slight tenderness of the right upper quadrant of the abdomen. Laboratory tests showed leukocytosis (WBC count, 23,750/mm³) and an elevated alkaline phosphatase level (366 IU/L). Results of liver function tests were normal.

Contrast-enhanced CT showed a cystic lesion with tubular configuration connected to the caudate lobe of the liver and extending to the lesser curvature of the gastric antrum through the anterior aspect of the neck of the pancreas (Fig. 1A). Inhomogeneous contrast enhancement of the liver parenchyma was associated with minimal intrahepatic bile duct dilatation and peripancreatic tracking due to cholangitis. A loculated fluid collection around the caudate lobe of the liver also was found (Fig. 1A).

To determine whether a biliary problem had caused cholangitis, MRC was performed with a 1.5-T superconducting unit (Magnetom Vision, Siemens Medical Solutions). A single-shot RARE sequence (TR/effective TE, infinity/1,200; echo-train length, 240; flip angle, 150°) and multislice half-Fourier RARE sequence (TR/effective TE, infinity/95; echo-train length, 128; flip angle, 150°) were used. The slab of a single-shot RARE sequence was obtained at various angles to obtain optimal visualization of the bile ducts. The multislice half-Fourier RARE images were obtained at an angle 20–35° to the coronal plane to simulate a right anterior oblique projection on direct cholangiography. Each of the imaging sets was obtained during a breath-hold. A phased-array torso coil was used for body imaging.

MRC revealed a curved tubular area of hypointensity along the lesser curvature side of the gastric antrum running parallel to the common bile duct (Fig. 1B). MRC showed no characteristic signs of cholangitis in the intrahepatic portion of the bile duct (Fig. 1B). Sonographically guided percutaneous diagnostic needle aspiration of the lesion was performed, and the cystic lesion collapsed (Fig. 1C). After treatment with antibiotics, the symptoms resolved, and the WBC count returned to normal.

Follow-up abdominal CT 25 days after the initial CT examination showed that the fluid collection, located in the lesser sac around the caudate lobe of the liver and extending to the focally thickened posterior wall of the gastric antrum, was still evident (Fig. 1D). Gastroscopy revealed localized fibrinous scarring in the posterior wall of the antrum without a definite mucosal lesion. Because a congenital anomaly of the biliary tract potentiating recurrent inflammation was suspected, surgical intervention was performed. In the operative field, a tubular structure connecting the antrum of the stomach to the caudate lobe of the
liver and partially passing through the pancreatic parenchyma was identified. After direct cannulation of the tubular structure, a diagnostic tubogram was obtained, and the intrahepatic bile ducts, common hepatic duct, and cystic duct all appeared opaque after filling of the anomalous tubular structure (Fig. 1E).

There was no evidence of cholangitis in the intrahepatic bile duct. The lowermost portion of this anomalous tubular structure was blunted distally, and there was no evidence of contrast material entering the stomach. Combined with partial dissection of the body of the pancreas and wedge resection of the posterior wall of the gastric antrum, the anomalous tubular structure was excised from the caudate lobe of the liver. The internal epithelium of the tubular lesion reacted to cytokeratin 7 but not to cytokeratin 20. The pathologic diagnosis was accessory bile duct. The distal portion of the accessory bile duct appeared contiguous with the gastric antrum, and there was fibrotic scarring without an identifiable opening to the gastric mucosa (Figs. 1F and 1G).

**Discussion**

Double extrahepatic bile ducts with separate openings into the gastrointestinal tract or ectopic drainage of the common bile duct (except into the major duodenal papilla) are extremely rare [2]. Because of its rarity, various terms have been used to describe an anomalous extra communication between the bile duct and the gastrointestinal tract. This pathologic condition has been called accessory bile duct, accessory common bile duct, and double common bile duct [1–5].
Accessory common bile duct has been described [5] as a channel of an aberrant common bile duct that does not open into the major duodenal papilla and therefore is a source of communication with the gastrointestinal tract between the upper portion of the lesser curvature of the stomach and either the pancreatic duct or the duodenum above the major papilla. The modified classification system currently used is based on Goor and Ebert’s [6] morphologic grouping and consists of the four following configuration subtypes [5]: 1, common bile duct with a septum within the lumen; 2, common bile duct that bifurcates and produces independent drainage tracks; 3, double biliary drainage without communicating channels (3a, without intrahepatic communicating channels; 3b, with intrahepatic communicating channels); 4, double biliary drainage with one or more communicating channels. Because MRC showed double biliary drainage without an extrapancreatic communicating channel, our case can be categorized as type 3b. Furthermore, operative cholangiography performed by cannulation of the accessory bile duct showed an opaque accessory bile duct, intrahepatic bile duct, common hepatic duct, and common bile duct. It is evident that an accessory bile duct was linked directly to the intrahepatic bile duct and that there was an intrahepatic communicating channel between the common bile duct and the accessory bile duct.

Kanematsu et al. [2] reported that accessory bile ducts draining into the gastrointestinal tract and opening into the duodenum, stomach, and pancreatic duct occurred with incidences of 52%, 46%, and 2%, respectively. The orifice of the accessory bile duct draining into the stomach was located in the lesser curvature of the gastric antrum, angle, lower body, midbody, and upper body.

An accessory bile duct can cause complications such as calculous formations, cholangitis, and cholecystitis. On rare occasions, it can cause liver abscess, pancreatitis, pancreatic cancer, gallbladder cancer, gastric cancer, and ampullary cancer [1, 2, 5]. Patients without symptoms should be carefully observed for the onset of serious biliary tract and gastrointestinal disease [2]. Patients with severe symptoms may need surgical treatment, as in the case of our patient, in whom recurrent cholangitis developed.

According to one report [7], specimens obtained from an accessory bile duct had mucosa and structure similar to those of normal bile ducts, but sphincter muscles were not found at the entrance to the gastrointestinal tract. In our case, the epithelium of the accessory bile duct reacted to cytokeratin 7 (implying bile duct origin) but did not react to cytokeratin 20 (which would have implied a gastrointestinal tract origin). Because of the imaging features of the anomalous connection between the bile duct of the caudate lobe and the stomach and because of the positive reaction to cytokeratin 7, we concluded that our patient had an accessory bile duct. In this case, gastroscopy revealed mucosal scarring at the antrum with no ectopic opening. We propose that the orifice of the accessory bile duct had at one time opened into the stomach. Repetitive inflammation caused by reflux of the gastric contents probably induced occlusion of the orifice of the accessory bile duct. Recurrent cholangitis developed that may have been caused by bile stasis. A case of gastric cancer due to longstanding mucosital irritation by bile juice at the site of the biliary orifice in a patient with gastric opening of an accessory bile duct has been reported [2].

MRC is a fast, noninvasive alternative to endoscopic retrograde cholangiography for evaluation of the biliary tract. Technical improvement in imaging sequences and the use of phase-array coils enable physicians to obtain high-quality images comparable with those produced by ERCP. MR cholangiopancreatography has been used not only to evaluate choledocholithiasis and malignant obstruction but also to assess postsurgical complications with or without anatomic variants of the biliary tract [8, 9]. In this case of accessory bile duct connected to the stomach, MRC showed the biliary anomaly and provided the evidence for development of an appropriate surgical plan.

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