AFMN BIOMEDICINE

CASE REPORT

CYSTIC DUCT WITH MEDIAL SPIRAL INSERTION

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The biliary system is well known for its anatomical variability. Preoperative imaging and evaluation of the cystic duct are essential for surgeons and interventional radiologists.

Herein we reported a rare case of cystic duct variation. Coronal oblique 3D magnetic resonance cholangiopancreatography (MRCP) revealed a posterior spiral course of the cystic duct, with a medial spiral insertion into the middle part of the extrahepatic bile duct. Intraoperative cholangiography confirmed this finding.

Specific anatomical variations might require modifications to the surgical approach. Understanding the cystic duct anatomy, variants, and disease processes aids in better diagnosis and interpretation of imaging results. MRCP is essential for providing key anatomical information and helps to reduce the risk of complications during percutaneous, endoscopic, and surgical procedures.

Keywords: cystic duct, anatomical variations, magnetic resonance cholangiopancreatography

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INTRODUCTION

The biliary system is well known for its anatomical variability which is usually unrecognized (1). With the growing frequency of laparoscopic cholecystectomy, hepatobiliary surgery, and transcholecystic biliary treatments, precise imaging and evaluation of the cystic duct are essential for surgeons and interventional radiologists (2). The biliary tract consists of intrahepatic and extrahepatic components. The cystic duct is roughly 2-4 cm long and 1-5 mm in diameter, connecting the neck of the gallbladder to the common hepatic duct (CHD) and forming the common bile duct (CBD). The cystic duct's point of insertion into the CHD varies. It typically enters the CHD from the right lateral aspect. It joins the CHD approximately halfway between the hepatic confluence and the ampulla of Vater (3).

CASE REPORT

Here, we report a rare case of cystic duct with medial [illegible] insertion to the mid part of the extrahepatic bile duct. A 50-year-old male was admitted to our department due to abdominal pain for seven days. The patient had a five-year history of recurrent visits to the hospital for right upper quadrant pain, nausea, and vomiting. Alcohol abuse was denied.

On admission he had normal vital signs. Physical examination demonstrated right upper quadrant tenderness without peritoneal signs with negative clinical Murphy's sign. His blood work showed white blood cell count of 12,500/microliter, alanine aminotransferase of 218 U/L, aspartate aminotransferase of 159 U/L, alkaline phosphatase of 100 U/L, and total bilirubin of 1.4 mg/dL.

Ultrasound of the abdomen and pelvis revealed a dilated gallbladder with a thicker wall and with stones. The common bile duct measured 15 mm in diameter, and stones were visible within it. Furthermore, the ultrasonography revealed the dilatation of the intrahepatic bile ducts. Magnetic resonance cholangiopancreatography (MRCP) was conducted using 1.5 T MRI (Ingenia, Philips Healthcare, Best, the Netherlands) in the coronal, axial, and sagittal planes in accordance with the standard protocol. T2-weighted sequences in multi planar reconstruction were used for the evaluation. Respiratory triggered T2 SPAIR axial and T2 coronal sequences with slice thickness of 5 mm, comprising the liver and region, were acquired. MRCP revealed a gallbladder with three small stones and a 16 mm-diameter CBD with four stones visible inside. Furthermore, coronal oblique 3D MRCP revealed a posterior spiral course of the cystic duct with medial insertion into the CHD (Figure 1).

Due to a large number of adhesions from previous operations, the laparoscopic approach was abandoned, and open cholecystectomy with bile duct exploration was performed for symptomatic choledocholithiasis and acute-on-chronic cholecystitis.

Before the end of the operation, intraoperative cholangiogram was performed through the cystic duct, which showed the affirmative spiral course of cystic duct with medial insertion into the CHD, intact CBD, CHD, as well as right and left hepatic ducts without stones (Figure 2).

The patient's liver function tests returned to normal after surgery. On the third postoperative day after surgery, the drain was removed, and the patient was tolerating a diet. At his 2 and 4 week post-operative assessments in the outpatient clinic, there were no concerns regarding a bile leak or any problems. The pathology report showed acute-on-chronic cholecystitis.

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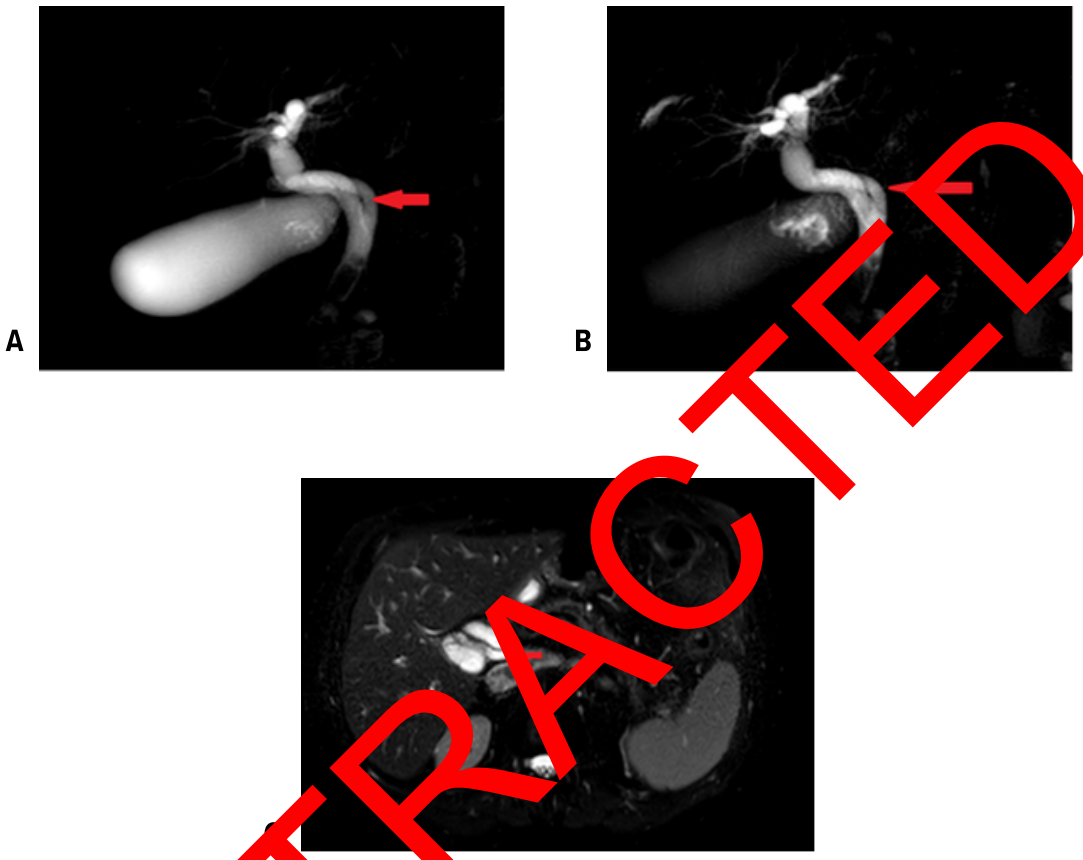

Figure 1. *Coronal oblique 3D MRCP (A and B) and T2w-SPAIR sequence in axial plane (C) show posterior spiral course of the cystic duct (red arrow) with medial insertion into the CHD*

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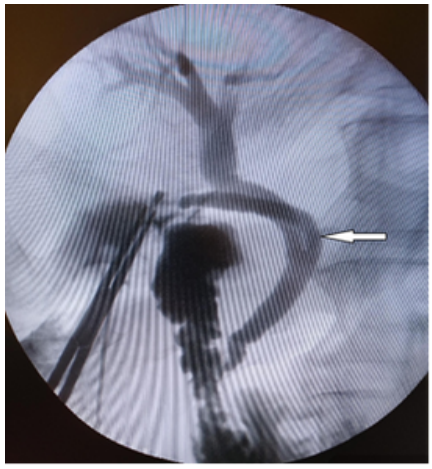

Figure 2. *Intraoperative cholangiogram shows spiral course of the cystic duct (white arrow) with medial insertion into the CHD*

Table 1. *Different cystic duct variations which are clinically more important*

I	low insertion of cystic duct
II	parallel course of cystic duct with CHD
III	anterior or posterior spiral course with medial insertion
IV	absent or short cystic duct (length < 5 mm)
V	aberrant drainage of cystic duct to right hepatic or left hepatic duct
VI	aberrant or accessory intrahepatic ducts draining into cystic duct
VII	double cystic duct

Abbreviation: CHD—the common hepatic duct

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DISCUSSION

Ultrasonography (US), computed tomography (CT), endoscopic retrograde cholangiopancreatography (ERCP), percutaneous transhepatic cholangiography (PTC), T[illegible] cholangiography, intraoperative cholangiography (IOC), magnetic resonance cholangiopancreatography (MRCP), and cholescintigraphy can all be used to evaluate the biliary system (4).

In one set of studies incorporating IOC, only 57% of cases yielded conclusive results, hence it is not frequently conducted (5). To address these limitations, MRCP is considered as the primary imaging modality. MRCP has a reported accuracy of 94% when compared to CT and US for detecting the anatomical variants. MRCP is crucial for providing essential data regarding cystic duct anatomy in cross-section and three-dimensional reconstruction images of the biliary tree, and it considerably improves the safety of laparoscopic cholecystectomy (6).

Different cystic duct variations are described in the literature depending on their length, course, and site of insertion with CHD. Sarawagi et al. (7) presented some variations which are clinically more important (Table 1). In their study, medial insertion was seen in 16% of cases, of which 4% were low medial insertions (7).

In conclusion, we reported a rare case of cystic duct with medial spiral insertion to the mid part of the extrahepatic bile duct. Specific anatomical variations might require modifications to the surgical approach. Understanding the cystic duct anatomy, variants, and disease processes aids in better diagnosis and interpretation of imaging results.

Acknowledgement

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Competing Interest

The authors declare no relevant conflicts of interest.

Statement of Ethics

Complete written informed consent was obtained from the involved patient for the publication of the study and accompanying images.

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