

MRCP of Congenital Anomalies of Biliary System

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MR cholangiopancreatography (MRCP) is now virtually replaced ERCP for diagnosis of biliary and pancreatic duct diseases. MRCP is a noninvasive procedure and less operator dependence, compared to ERCP. Moreover, MRCP has the adding benefits of no radiation, no sedation, and ability to visualize ducts upstream to the obstruction. ERCP should be reserved only for interventional purpose. Acute pancreatitis, developed after ERCP, is not uncommon, and could be devastating to both patients and gastroenterologists. Therefore, to minimize the risk, diagnostic ERCP should be performed only if MRCP is not available or MRCP information is not adequate.

In this article, MRCP of congenital anomalies of biliary system will be discussed with illustration of MRCP images.

Anatomical variations (Figure 1-4)

The normal anatomy of biliary tract, according to Couinaud system⁽¹⁾, is as following (Figure 1):

a) The right anterior duct (RAD: draining segment 5 and 8) joins with the right posterior duct (RPD: draining segment 6 and 7) to become the right hepatic duct (RHD).

b) The RHD joins the left hepatic duct (LHD: draining segment 2-4) to become the common hepatic duct (CHD).

c) The bile duct draining the caudate lobe usually joins the origin of the LHD or the RHD.

d) The CHD joins the cystic duct of the gallbladder to become the common bile duct (CBD).

e) The CBD joins the pancreatic duct, and finally opens to the 2nd part of the duodenum via the major papilla.

This normal appearance is found in about 58% of cases⁽²⁾. Anatomical variation should be evaluated be-

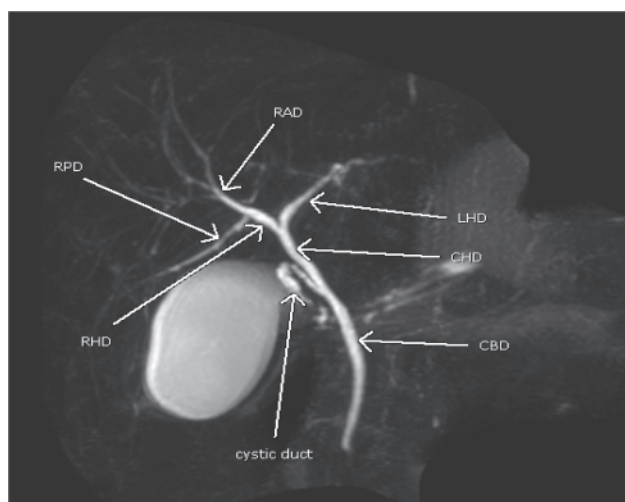


Figure 1. MRCP of normal anatomy of biliary tract, according to Couinaud system.

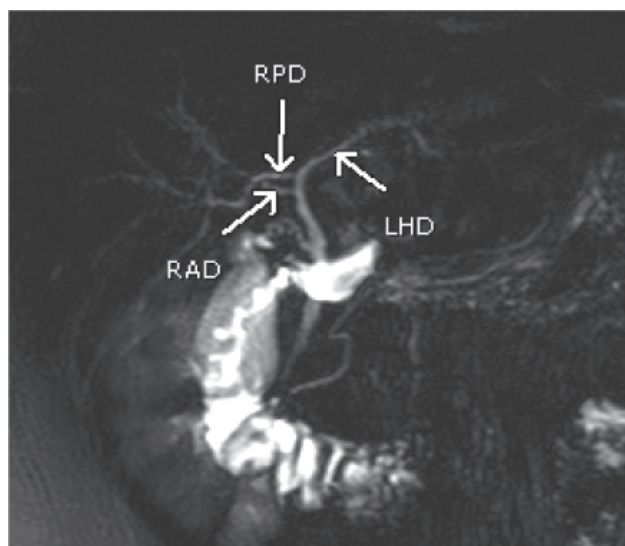


Figure 2. MRCP of RPD draining to the LHD, the most common anatomical variation.

fore hepatic surgery or laparoscopic cholecystectomy because certain risk of complication could be avoided. There are several anatomical variations of biliary system, but the 3 common ones are presented, as following:

1. RPD drains to the LHD (Figure 2). This variation is found in about 13-19% of cases⁽²⁻⁴⁾. Left hepatectomy may injure RPD, if this variation is not recognized pre-operatively.

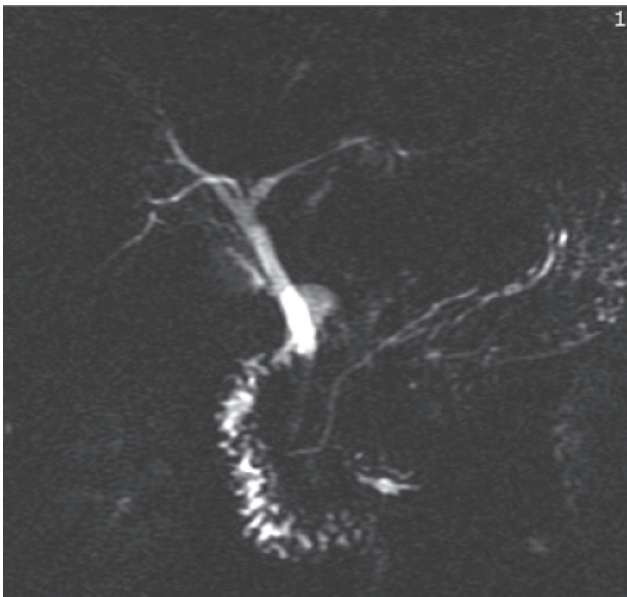


Figure 3. MRCP of trifurcation of biliary confluence.



Figure 4. Low insertion of the cystic duct. MRCP shows a long cystic duct (arrow) with low insertion to the CHD.

2. Triple confluence (Figure 3). This variation is found in about 11% of cases⁽¹⁾. This variance is important for a potential donor of right hepatic lobe transplantation.

3. Low insertion of the cystic duct (Figure 4). This variation is found in about 9% of case⁽¹⁾. Laparoscopic cholecystectomy may injure the CHD or CBD, if this variation is not aware before the procedure.

Choledochal cysts (Figure 5-8)

Based-on Tadoni classification, there are 5 types of choledochal cysts⁽⁵⁾, as following:

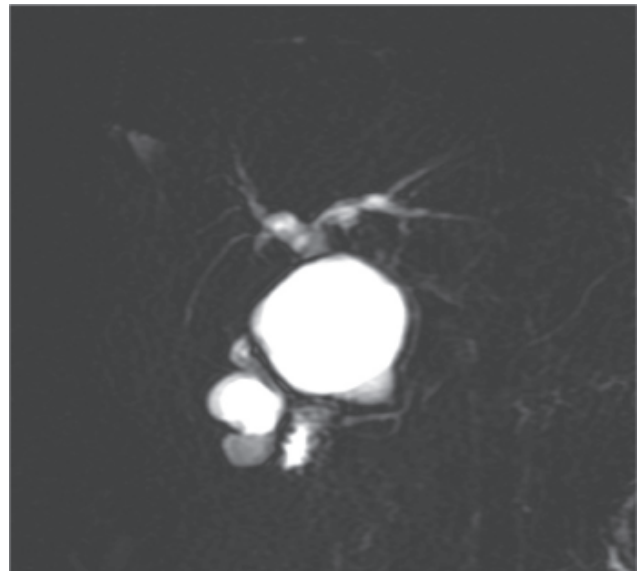


Figure 5. Type 1 choledochal cyst. MRCP shows diffuse cystic dilatation of the CBD.

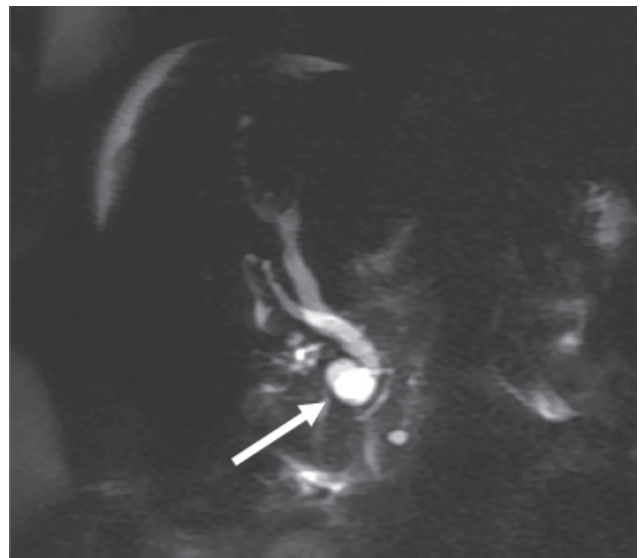


Figure 6. Type 2 choledochal cyst. MRCP shows CBD diverticulum (arrow).

Type 1: CBD dilatation (Figure 5): This is the most common type.

Type 2: CBD diverticulum (Figure 6)

Type 3: Choledochoceles (Figure 7): This is a cystic dilatation of the intraduodenal portion of the CBD.

Type 4: Multiple sites of dilatation of the bile duct (Figure 8): This type is divided into type 4A, and 4B. Type 4A is multifocal dilatation of both intra- and extra- hepatic bile ducts. Type 4B is multifocal dilatation of only extrahepatic bile ducts.

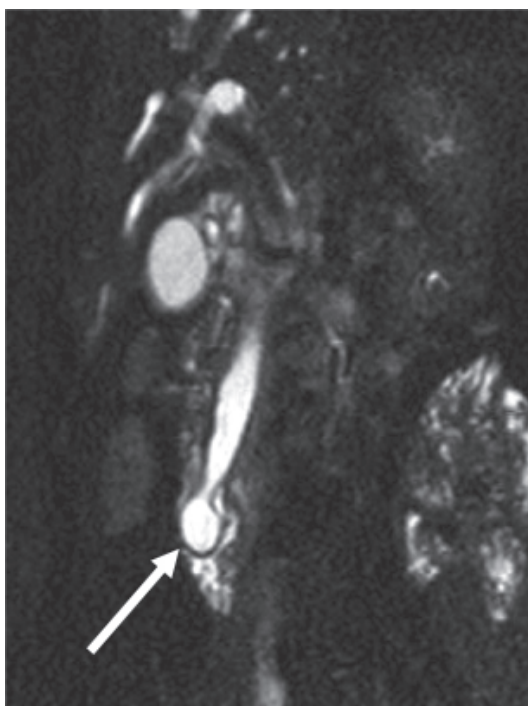


Figure 7. Type 3 choledochol cyst. MRCP shows choledochoceles of intraduodenal portion of the CBD (arrow).

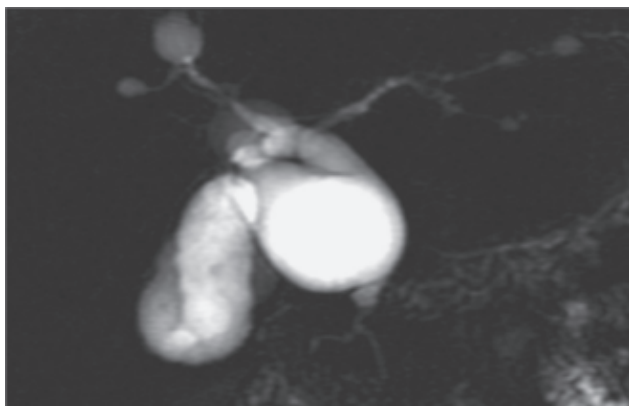


Figure 8. Type 4A choledochal cyst. MRCP shows multifocal cystic dilatation of both intra-, and extra-hepatic bile ducts.

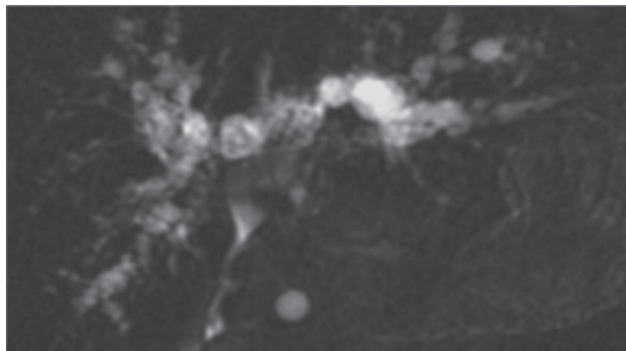


Figure 9. Type 5 choledochal cyst (Caroli disease). MRCP shows multifocal cystic dilatation of intrahepatic bile ducts.

Type 5: Caroli disease. This is an autosomal recessive disorder. There are multiple cystic dilatations of the IHDs.

Take home message:

1. MRCP is the imaging of choice for diagnostic purpose of biliary duct abnormalities.
2. ERCP is the invasive procedure, and should be reserved for interventional purpose.
3. Anatomical variation of biliary system is common, and should be evaluated before hepatic surgery or laparoscopic cholecystectomy.
4. There are 5 types of choledochal cysts, and Type 1 is the most common one.

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