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Original Research

Intrahepatic and extrahepatic bile duct variations assessment with Magnetic resonance cholangiographic

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ABSTRACT:

Background: Intrahepatic and extrahepatic bile duct variations are commonly seen. Normal biliary anatomy is seen in only 58% of the population. The present study was conducted to assess intrahepatic and extrahepatic bile duct variation. **Materials & Methods:** 102 subjects were selected for the study. All underwent MR cholangiograms obtained with a Signa HDxt 3.0-T scanner volume MR. **Results:** Out of 102 patients, males were 62 and females were 40. Branching patterns of right hepatic bile duct was type I seen in 70, II in 4, III in 16, IV in 7 and V in 5. The difference was significant (P< 0.05). Branching patterns of left hepatic bile duct was type A pattern seen in 70, type B in 12, type C in 16 and type D in 4. The difference was significant (P< 0.05). **Conclusion:** Detailed knowledge of normal anatomy, and common and uncommon variations is of utmost importance for radiologists who are reporting these MRCP images.

Key words: Intrahepatic bile duct, extrahepatic, MRCP

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INTRODUCTION

Intrahepatic and extrahepatic bile duct variations are commonly seen. Normal biliary anatomy is seen in only 58% of the population. There are various techniques available for the visualization of biliary tree. Intravenous cholangiography often does not opacify the intra- and extrahepatic biliary tree and rarely allows a detailed visualization of the duct bifurcation.[1] Endoscopic retrograde cholangiopancreatography (ERCP), although very accurate, is an invasive method for imaging the biliary tree. Intraoperative cholangiography is also highly accurate; however, it is an invasive procedure and its routine use remains controversial.

Variations in the hepatic ducts include the presence of accessory ducts, notable for communicating hepatic segments with the extrahepatic biliary tract. Aberrant ducts which communicate the right hepatic lobe directly with the gallbladder have also been described.[2]

Magnetic resonance cholangiopancreatography (MRCP) is an excellent non-invasive imaging technique for visualization of detailed biliary anatomy. High-resolution cross-sectional, two-dimensional (2D) and three-dimensional (3D) projection images provide excellent detailed anatomy.[3] Branching patterns of right hepatic bile duct has been classified as type I typical: RPSD joining RASD medially to form RHD, type II trifurcation: simultaneous emptying of the RASD, RPSD, and LHD into the CHD, type III anomalous drainage of RPSD A- RPSD joining LHD (crossover anomaly) B- RPSD joining CHD C- RPSD joining cystic duct, type IV aberrant drainage of RHD into the cystic duct, type V accessory right hepatic duct, type VI segments II and III duct draining individually into the RHD or CHD ad type VII others and unclassified variations.[4] Branching patterns of left hepatic bile duct has been classified as type a common trunk of segment II and segment III joins segment IV, type B triconfluence of segments II, III, and IV, type C segment II duct drains into common trunk of segment III and segment IV and type D others and unclassified variations.[5] The present study was conducted to assess intrahepatic and extrahepatic bile duct variation.

MATERIALS & METHODS

This study was conducted among 102 subjects selected for the study. All were informed and their written consent was obtained.

Data related to subjects was recorded. All MR cholangiograms were obtained with a Signa HDxt 3.0-T scanner volume MR. We acquire coronal and axial T2-weighted (T2W) single-shot fast spin-echo (FSE) sequences, axial respiratory-triggered fat-suppressed T2W FSE sequence, and axial breath-hold T1-weighted (T1W) dual-echo spoiled gradient recalled-echo sequence. MRCP was performed by using a respiratory-triggered high-spatial-resolution isotropic 3D fast-recovery FSE sequence with parallel imaging in axial and oblique coronal planes. Results thus obtained were assessed statistically. P value <0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 102		
Gender	**Males**	**Females**
Number	62	40

Table I shows that out of 102 patients, males were 62 and females were 40.

Table II Branching patterns of right hepatic bile duct

Type	Number	P value
I	70	0.01
II	4	
III	16	
IV	7	
V	5	
VI	0	
VII	0	
Total	102	

Table II, graph I shows that branching patterns of right hepatic bile duct was type I seen in 70, II in 4, III in 16, IV in 7 and V in 5. The difference was significant (P< 0.05).

Table III Branching patterns of left hepatic bile duct

Type	Number	P value
A	70	0.01
B	12	
C	16	
D	4	

Table III shows that branching patterns of left hepatic bile duct was type A pattern seen in 70, type B in 12, type C in 16 and type D in 4. The difference was significant (P< 0.05).

DISCUSSION

Extrahepatic bile ducts constitute a greatly important anatomic site for medical practice where surgeons frequently perform.[6] It is indispensible for the surgeon to know thoroughly the anatomy of this region, as well as its morphologic and topographic variations in order to avoid complications during the operation.[7] The length of the common hepatic and cystic ducts, as well as the existence of anatomic variations in the biliary tree are closely related to the existence, extension of the surface area, and position of the cystohepatic triangle (Calot's Triangle).[8] The importance of this anatomical landmark is indisputable for performing the cholecystectomy – a common surgical procedure, which consists of the ligature of the cystic artery and the cystic duct for the subsequent removal of the gallbladder.[9] The present study was conducted to assess intrahepatic and extrahepatic bile duct variation.

In present study, out of 102 patients, males were 62 and females were 40. Cachoeira et al[10] analysed the configuration of the extrahepatic biliary tree and its possible variations, as well as measure the components that make up the cystohepatic triangle. For this task 41 samples from fixated human cadavers were analysed, with 25 consisting of anatomic parts (liver and biliary tree) and 16 in situ samples. The extrahepatic biliary trees were dissected in order to measure the length of the common hepatic and cystic ducts with a digital caliper, and all anatomic variations were registered. The length of the common hepatic duct varied between 4.18 mm and 50.64 mm, with an average of 21.76 ± 9.51 mm. The length of the cystic duct varied between 7.28 and 38.88 mm, with an average of 19.11 ± 6.77 mm. Anatomic variations were found in 3 samples (7.3%): in one of them the cystic duct connected to the left hepatic duct; in another, the cystic duct connected to the right hepatic duct; in the third, there was a triple confluence

of hepatic ducts (two right ducts and one left duct). The results are a contribution to the clinical and surgical anatomy of this region

We observed that branching patterns of right hepatic bile duct was type I seen in 70, II in 4, III in 16, IV in 7 and V in 5. According to Lahma et al[11] first variation was represented by the cystic duct joining the right hepatic duct variation presents an intrinsic surgical risk to a cholecystectomy, as the right hepatic duct may be confused with the cystic duct and so cut and ligated, producing a potentially dangerous outcome

We observed that branching patterns of left hepatic bile duct was type A pattern seen in 70, type B in 12, type C in 16 and type D in 4. Anatomic variations of the biliary tract are usually also accompanied by variations in the portal venous system and the hepatic arterial system, which are also important in hepatobiliary surgeries. More specifically, portal venous anomalies have been demonstrated to significantly correlate with anomalous biliary drainage.[12]

CONCLUSION

Authors found that detailed knowledge of normal anatomy, and common and uncommon variations is of utmost importance for radiologists who are reporting these MRCP images.

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