

Magnetic resonance cholangiopancreatography in diagnosis of biliary disorders in children — Sharing our experience

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Abstract

Objective: To evaluate the role of Magnetic Resonance Cholangio-pancreatography in the diagnosis of biliary disorders in children.

Methods: The retrospective study was conducted at Aga Khan University Hospital, Karachi, and comprised data related to the period between August 2005 and December 2013. All children from age of 1 day to 17 years who had undergone Magnetic Resonance Cholangio-pancreatography examination for suspected pancreaticobiliary disorders were included. Clinical presentation, Magnetic Resonance Cholangio-pancreatography findings, operative findings and histopathological results were recorded. Sensitivity and specificity of Magnetic Resonance Cholangio-pancreatography for different diseases was worked out.

Results: Of the 50 patients in the study, 12(24%) showed findings of choledochal cyst. Of these patients, 11(91.6%) underwent surgery and operative findings were consistent with choledochal cyst. Only 1(8.3%) who was assessed as biliary atresia was found to have choledochal cyst on surgery. Magnetic Resonance Cholangio-pancreatography was found to be 91% sensitive and 100% specific for diagnosis of choledochal cyst with diagnostic accuracy of 98%.

Conclusion: Magnetic Resonance Cholangio-pancreatography is a very accurate non-invasive investigation for the diagnosis of biliary disorders.

Keywords: Magnetic Resonance Cholangio-pancreatography , Biliary disorders. (JPMA 66: 27; 2016)

Introduction

Ultrasound is usually the first imaging modality used when question of pancreaticobiliary abnormality is raised in children¹ basically because of its easy availability, non-invasiveness and being radiation-free. If ultrasound fails to answer, then usually computed tomography (CT) scan is the second modality. Ultrasound and helical CT have been shown to be highly sensitive and specific for the diagnosis of many abdominal conditions in children.² If they fail to provide an accurate diagnosis, Endoscopic Retrograde Cholangio-pancreatography (ERCP) is often performed.³ But ERCP is an invasive procedure with its own complications, and it is rather more difficult and hazardous in paediatric population than when performed in adults.⁴ In many biliary pathological states Magnetic Resonance Cholangio-pancreatography (MRCP) is an alternative to ERCP.⁵

The technique of MRCP has evolved considerably over the last 2 decades, with technological advances in both acquisition and post-processing. It remains the investigation of choice for the non-invasive diagnosis of many pancreaticobiliary disorders.⁶ Given its success in adults, MRCP has begun to be used in children during the

past decade⁷ with reports on its application for suspected biliary atresia, choledochal cyst, cholelithiasis, choledocholithiasis, bile plug syndrome, pancreatitis, and in liver transplantation.⁸

No data on the experience of MRCP and its diagnostic accuracy is available in our country particularly in the paediatric population. Therefore, the current study was planned to share our experience regarding utilisation of MRCP in the diagnosis of pancreaticobiliary diseases in children.

Materials and Methods

The retrospective study was conducted at Aga Khan University Hospital, Karachi (AKUH) comprising records of all paediatric patients with age range from 1 day to 17 years who had undergone MRCP for suspected pancreaticobiliary abnormalities between August 2005 and December 2013. All patients had undergone MRCP on 1.5 tesla scanner with standard departmental protocol. Clinical presentation, MRCP findings, other imaging modalities findings, operative findings and histopathological results were recorded on Microsoft Excel 2010.

Results

Of the 50 cases in our records, 20(40) were related to females and 30(60%) to males. Overall, 12(24%) patients

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Figure: Fusiform dilatation of the CBD throughout its length up to the ampulla of Vater without any intraluminal calculus or mass lesion representing type-I choledochal cyst.

had been diagnosed with choledochal cyst, which were disproportional dilatation of biliary ducts excluding other causes of dilataions such as stones, strictures, tumours or inflammation. Of these 12 patients, 11 (91.6%) subsequently underwent surgery and the operative findings were consistent with choledochal cyst and were proven on histopathology also.

Only 1(8.3%) patient was given the MRCP finding of biliary atresia which is non-visualisation of intrahepatic or extrahepatic biliary channels with a small or atretic gall bladder. This patient was found to have choledochal cyst on surgery with biliary plugs, cholestasis and fibrosis on histopathology. Out of the 12 surgically and histopathologically proven cases of choledochal cyst, 8(66.6%) were females and 4(33.3%) were males; 6(50%) presented with jaundice and the remaining 6(50%) with abdominal pain.

Of the total, 1(2%) patient in the study had abnormal signal area in right hepatic lobe with biliary dilatation on MRCP. This patient underwent ultrasound-guided biopsy and histopathology showed inflammatory

myofibroblastic tumour.

Four (8%) patients were given cholelithiasis or pseudolithiasis gall bladder on MRCP which was also seen either on gall bladder ultrasound or peroperatively. One (2%) patient had findings of pancreatic duct stone with pancreatic pseudocyst which was confirmed in later ERCP examination.

Two (4%) patients had acute pancreatitis and six (12%) had pancreatic pseudocyst on MRCP. Two (4%) patients had irregular and beaded biliary channels and were suspected for Alagile syndrome. MRCP of three (6%) patients had finding of pancreatic divisium. In 13(26%) patients, examination was almost normal.

The sensitivity of MRCP in the diagnosis of choledochal cyst was 91% and specificity was 100%. Positive predictive value (PPV) was 100% and Negative predictive value (NPV) was 97%. Diagnostic accuracy for choledochal cyst was calculated to be 98%.For cholelithiasis, the sensitivity and specificity of MRCP were 100%.

Discussion

Our study gives a brief overview of the use of MRCP in evaluation and diagnosis of hepatic and pancreaticobiliary disorders in children. We also observed the female predilection in cases of choledochal cyst as reported in previous studies.⁹ Our sensitivity and specificity of 91% and 100% for the diagnosis of choledochal cyst are comparable with an earlier study.¹⁰ However, we did not find a single true positive case of biliary atresia. Therefore, we were unable to calculate the diagnostic accuracy of MRCP for biliary atresia. In cases of cholelithiasis and pancreatic duct calculi, we found 100% sensitivity and specificity which is somewhat higher than previously done studies. The reason of such high values may be the small number of these cases in our study.

Being a retrospective effort, our study had inherent drawbacks. Also, the MRCP findings were only reported by a single radiologist without any consensus. Besides, although the number of MRCP cases were not too small, but the number of cases of each diagnostic entity was not sufficient. Many of the MRCP findings in some diseases were not even confirmed either by surgery or other diagnostic modalities. However, in some disease entities, such as choledochal cyst or biliary tract calculi, the findings of MRCP were almost correct and stood proven with surgery or ERCP.

Conclusion

MRCP is a reliable and safe technique for the evaluation of pancreaticobiliary diseases, especially in children . It has a

very high diagnostic accuracy for choledochal cyst and pancreaticobiliary stones and it can be used as an alternative modality for ERCP and in situations where ultrasound and CT scan are fail to provide diagnostic help.

References

1. Fitoz S, Erden A, Boruban S. Magnetic resonance cholangiopancreatography of biliary system abnormalities in children. *Clin Imaging* 2007; 31: 93-101.
 2. John SD. TRENDS IN PEDIATRIC EMERGENCY IMAGING. *Radiologic Clinics* 1999; 37: 995-1034.
 3. Fitoz S, Erden A, Boruban S. Magnetic resonance cholangiopancreatography of biliary system abnormalities in children. *Clin Imaging* 2007; 31: 93-101
 4. Metreweli C, So NM, Chu WC, Lam WW. Magnetic resonance cholangiography in children. *Br J Radiol* 2004; 77: 1059-64
 5. Kaltenthaler EC, Walters SJ, Chilcott J, Blakeborough A, Vergel YB, Thomas S. MRCP compared to diagnostic ERCP for diagnosis when biliary obstruction is suspected: a systematic review. *BMC Medical Imaging* 2006; 6: 9
 6. Griffin N, Edwards GC, Grant LA. Magnetic resonance cholangiopancreatography: the ABC of MRCP. *Insights Imaging* 2012; 3: 11-21.
 7. Schaefer JF, Kirschner HJ, Lichy M, Schlemmer HP, Schick F, Claussen CD, et al. Highly resolved freebreathing magnetic resonance cholangiopancreatography in the diagnostic workup of pancreaticobiliary diseases in infants and young children: initial experiences. *J Pediatr Surg* 2006; 41: 1645-51
 8. Norton KI, Glass RB, Kogan D, Lee JS, Emre S, Shneider BL. MR cholangiography in the evaluation of neonatal cholestasis: initial results. *Radiology* 2002; 222: 687-91.
 9. Singhavejsakul J, Ukarapol N. "Choledochal cysts in children: epidemiology and outcomes". *World J Surg* 2008; 32: 1385-8.
 10. Mumtaz N, Akram MH. Comparison of Magnetic Resonance Cholangiopancreatography and Endoscopic Retrograde Cholangiopancreatography in Hepatobiliary Disorders. *Pak Armed Forces Med J* 2011;61: 240-5.
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