

MAGNETIC RESONANCE CHOLANGIO-PANCREATOGRAPHY IN DIAGNOSIS OF BILIARY DISORDERS

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ABSTRACT

Background: Accurate diagnostic methods to detect biliary tract disorders and pancreatic disease in patients presenting with obstructive jaundice are critical for operating surgeon to carry out appropriate treatment. Therefore, surgeons elect the non-invasive, highly sensitive as well as safe diagnostic modality in diagnosing biliary tract disorder as the operative approach varies highly depending on the course and cause of obstruction. **Material & Methods:** In present cross-sectional study 100 patients of different age groups, having clinical sign and symptoms of biliary tract disease were included in the study after obtaining approval from the institutional ethics committee. Patients with cardiac pacemakers, prosthetic heart valves and cochlear implant or having any metallic implant were excluded from the study. **Results:** 46 patients (46%) followed by choledochal cyst (congenital) in 28 patients (28%) and gall bladder masses in 7 patients (7%). In present study, patients of biliary tract pathology especially masses, stricture and lesion in lower part of common bile duct were more effectively evaluated by MRCP. In patient diagnosed with Klatskin tumour, in which hepatic ducts were better depicted by MRCP than ERCP, histo-pathological reports along with post-operative pathologic reports findings were compared and found out 98% accuracy of MRCP in diagnosing the diseases. **Conclusion:** We concluded that, MRCP has high diagnostic accuracy in biliary tract disorders as well as evaluation of wall of duct, ductal lumen and surrounding soft tissue structures. MRCP has benefit of non-invasive nature and non-operator dependent and free of complications

Keywords: Magnetic resonance cholangiopancreatography; Biliary ducts; Gallstone; Cholangiocarcinoma; Cholangitis.

INTRODUCTION

Biliary tract disorders or obstructive jaundice are often having common presenting symptoms, and the greater part of these patients transpires to have cholelithiasis as primary disease. Females are more prone to have biliary disorders than males(1). Accurate diagnostic methods to detect biliary tract disorders and pancreatic disease in

patients presenting with obstructive jaundice are critical for operating surgeon to carry out appropriate treatment.

Therefore, surgeons elect the non invasive, highly sensitive as well as safe diagnostic modality in diagnosing biliary tract disorder as

the operative approach varies highly depending on the course and cause of obstruction. Diagnosis of suspected biliary tract disorder or obstruction has involved a variety of imaging modalities traditional as well as newer ones including Ultrasonography (USG), Computed Tomography (CT scan), Percutaneous Transhepatic Cholangiography (PTC) and Endoscopic Retrograde Cholangio-Pancreaticography (ERCP) in the category of invasive cholangiography. Ultrasonography (USG) and Computed Tomography (CT) are currently the main non-invasive methods for diagnosis of bile duct obstruction; but because of low sensitivity for the evaluation of stones in common bile duct the accuracy of these methods is restricted(2). Endoscopic Retrograde Cholangio-Pancreaticography (ERCP) is invasive and operator dependent procedure but when compared with USG and CT scan it is more accurate and associated with very low morbidity and mortality.

However ERCP is technically difficult than USG and CT scan and where anatomical transfiguration are come across or where anatomy is contorted due to previous operative procedures, ERCP is even impossible. Hence, it is difficult to rule out the synchronous lesions and to plan appropriate surgical intervention by using ERCP in case of upstream of obstruction to examine the biliary tract and pancreatic ducts(3). Now a day's Magnetic Resonance Cholangiopancreatography (MRCP) has emerged as a highly sensitive alternative approach to ERCP evaluate the pancreatobiliary system as it is a non-invasive approach as well as lack of radiation exposure, lack of need for sedation and IV contrast and able to depict and outline lesions at all levels(4). Therefore we were conducting present study to find out spectrum of findings in biliary tract disorders on MRCP and its utility in operative management of biliary disorders.

MATERIALS & METHODS

The present prospective cross sectional study was conducted in our tertiary care hospital, in department of radio diagnosis. This study was a cross sectional hospital based study. 100 patients of different age groups in whom there was clinical sign and symptoms of biliary tract disease were included in the study after obtaining approval from the institutional ethics committee. Patients with cardiac pacemakers, prosthetic heart valves and cochlear implant or having any metallic implant were excluded from the study. The data were analyzed using MS Excel 2010, Epi Info v7 and SPSS v22.

MRCP technique

The MRCP technique is accomplish with heavily T2-weighted turbo spin echo sequences and fast gradient echo sequences in which stationary fluid has effective high signal intensity (5). That's why there is advantage of high signal intensity of body fluids on T2-weighted MRI. Slow moving fluid filled structures (Static) appears as hyper intense areas such as bile duct. This difference in signal intensity enables MRCP to be operate without contrast(6).

Fat spin echo or Single Shot Fast Spin Echo (SSFSE) technique usually used in MRCP performed by both thick collimation and thin collimation multi section technique with a torso phased array coil. The axial plane is used to potray CBD and the coronal plane is used to outline the cholangiographic display. Patients should be instructed for nil by mouth for 3-4 hours prior to the MRCP for reduce the fluid content in the stomach and decrease peristalsis to promote the filling of gall bladder. Patient should be instructed to breath-hold and non-breath-hold sequences. The breath-hold sequence (1-2 seconds) acquires a thick slab of data between 40 and 80 mm or thin slabs (4 mm thick) using the half Fourier acquisition single-shot turbo spin

echo (HASTE) sequences in coronal or oblique coronal planes. In non-breath-hold T2-weighted sequence, respiratory-triggered 3D turbo spin-echo (TSE), (1.5 mm) can be post-processed on an imaging workstation(7). In order to demonstrate intraductal pathology or small stones, thin collimation multislice acquisition are reviewed along with the reconstructed images.

RESULTS

In the present study out of hundred patients the cases of calculus in biliary tract predominated and was seen in 46 patients (46%) followed by choledochal cyst (congenital) in 28 patients (28%) and gall bladder masses in 7 patients (7%). In present study, patients of biliary tract pathology especially masses, stricture and lesion in lower part of common bile duct were more effectively evaluated by MRCP.

In patient diagnosed with Klatskin tumour, in which hepatic ducts were better depicted by MRCP than ERCP, histopathological reports along with post-operative pathologic reports findings were compared and found out 98% accuracy of MRCP in diagnosing the diseases.

There was false negative result due to technical in one patient. In this patient MRCP evaluate the mass lesion in 2nd part of duodenum, but on operating it was found as pancreatic head carcinoma.

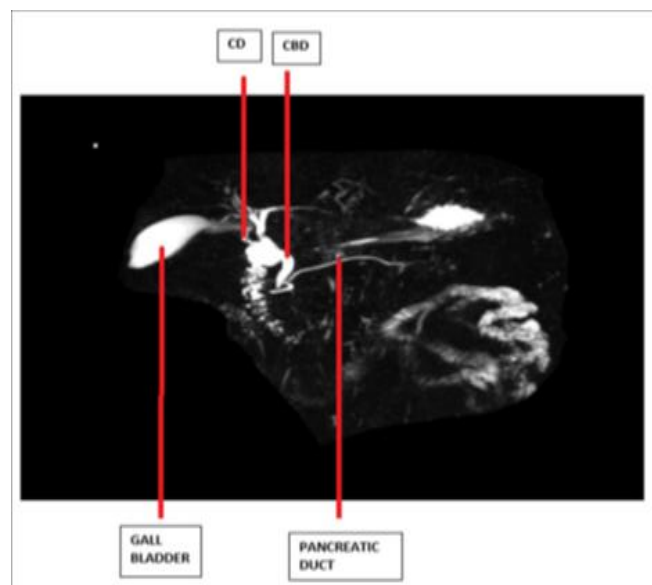
Table No.-1: Sex wise Distribution in the Biliary Diseases.

Sex	No. of Cases	Percentage%
Males	40	40%
Females	60	60%
Total	100	100

Table No.-2: Age Wise Distribution in Biliary Diseases.

Age (Years)	No. of Patients	Percentage (%)
0-18	6	6
18-40	30	30
>40	64	64
Total	100	100%

Fig 1: Normal anatomy of biliary system on MRCP.



#CD: Cystic Duct.CBD: Common Bile Duct.

Fig 2: Gall Bladder Mass on MRCP

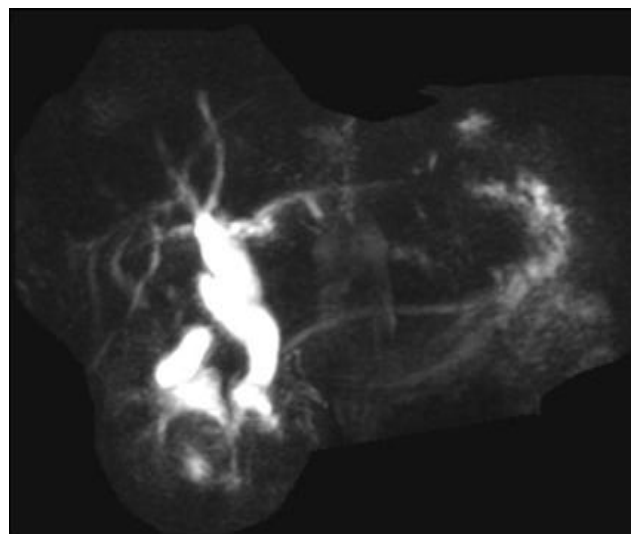
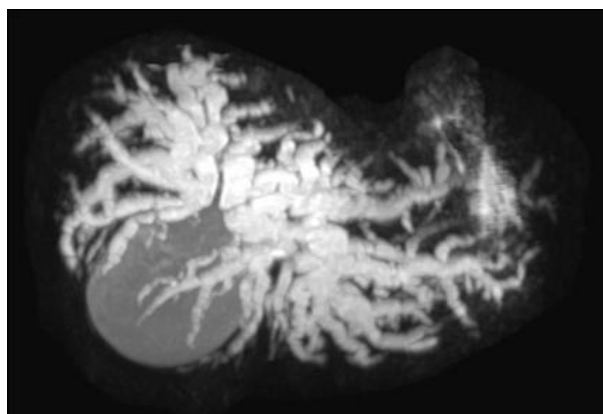


Table No.-3: Age Wise Distribution in Biliary Diseases.

Diagnosis	No. of Cases	MRCP Diagnosis Accuracy (Based on Final Diagnosis of ERCP, Histology, Operative Findings)
A) Congenital	28	
Choledochal cyst	28	100%
B) Duct Calculi	46	
In lower end of CBD	20	100%
In mid part of CBD	15	100%
In CHD	11	100%
C) Stricture	19	
Benign	17	100%
Malignant	2	100%
D) Mass Lesion	07	
Klaskin tumour	01	98%
Periampullary carcinoma	01	86%
GB mass	05	100%
Total	100	

Fig 3: Hilar Cholangiocarcinoma on MRCP



DISCUSSION

Anatomy of biliary system

Biliary tract comprises of right and left hepatic ducts and they join to form the common hepatic

duct (CHD). From gall bladder cystic duct joins with CHD to form the common bile duct (CBD). CBD have supraduodenal, retroduodenal, intraduodenal and pancreatic segments. The common channel of pancreatic ducts and the terminal portions of biliary ducts typically encircled by Sphincter of oddi. (8)

Cholelithiasis and choledocholithiasis

Choledocholithiasis are the most common cause of biliary tract obstruction. Patients with ileal disease, hyper alimentation, rapid weight reduction or abdominal obesity, increasing age are considered as high risk factors for choledocholithiasis. Gall stones in western countries are most commonly cholesterol (70-

80%) and the rest are pigment stones. On MRCP, gall stones appear as point of low or no signal intensity regardless of their composition. A combination of thick slab and thin section multi-slice MRCP technique increases the sensitivity and accuracy for detection of as small as 1-4 mm stones. MRCP has a sensitivity up to 93% and specificity up to 95% in the detection of common bile stones which is better than sensitivity and specificity of ERCP (9).

Gall stones produce three patterns of shadowing

- a. The 1st is a disjunction shadow emerging from a solitary stone.
- b. The 2nd pattern is confluent shadowing due to multiple small stones that adjoin each other in gall bladder.
- c. The 3rd pattern is echo shadow complex of wall which occurs due to contracted gall bladder filled with stones.

Choledochal cyst

This may also cause of obstructive jaundice. It is more common in female than males and in Asian infants. It presents with classical triad of right upper quadrant mass, pain and jaundice. MRCP is a noninvasive imaging method and impart the best possible projection image for divulge the extent of choledochal cyst in adults as well as children. In infants and children who are not able to hold the breath for the single shot fast spinecho (SSFE) sequence made it possible to portray biliary tree.

Carcinoma of the gall bladder

The fifth most common malignancy of the gastrointestinal tract is Carcinoma of gall bladder. Gall stones act as most common risk factor for gall bladder carcinoma in 65-95% of

cases, second is history of chronic cholecystitis (40-50%) and patients with porcelain gall bladder (22%). Age also act as a risk factor for Gall bladder carcinoma and shows a peak in 6th decade of life (10).

The primary tumor and its metastasis beyond gall bladder appears hyper intense areas on T2 weighted imaging and hypo intense on T1 weighted imaging when compared with parenchyma of liver. MRCP with spoiled gradient pulse sequence may differentiate between benign and malignant bladder lesions. Malignant lesions exhibit early and prolonged enhancement whereas the benign lesion unveil different pattern. MRCP used for distinction between chronic cholecystitis and carcinoma and for detection tumor metastasis(11).

Cholangiocarcinoma

The most common tumor of bile ductis is Cholangiocarcinoma. it is classified as Intrahepatic or peripheral tumours, Klastkin tumours (Hilar lesions occurring just past the junction of right and left hepatic ducts) and Distal ductal tumours(12). While diagnosing the cholangiocarcinoma, the fallowing points should be assessed: presence of mass, biliary dilatation, focal or diffuse thickening of bile duct walls, and level of obstruction, cholelithiasis, hepatic metastasis, portal vein thrombosis and lymph nodes(13). The diagnostic accuracy of MRCP in presence of obstruction varies from 91-100% whereas 85-100% accuracy in diagnosing the level of obstruction. However accuracy in the differentiation of benign and malignant obstruction ranges from 30-98 %.

CONCLUSION

We concluded Based on the results of present study that, introduction of MRCP technique has

the revolutionary step in diagnosing biliary tract disorders as well as evaluation of wall of duct, ductal lumen and surrounding soft tissue structures. MRCP has benefit of non-invasive nature and non-operator dependent and free of complications with high diagnostic accuracy.

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