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Radiology

EVALUATION OF PANCREATICOBILIARY DISEASES WITH MAGNETIC RESONANCE CHOLANGIO-PANCREATICOGRAPHY AND COMPARISON WITH INVASIVE ENDOSCOPIC RETROGRADE CHOLANGIO-PANCRAETICOGRAPHY WITH MAGNETIC RESONANCE CHOLANGIO-PANCREATICOGRAPHY.

Dr Preeti meena	Junior Resident, Department of Radiodiagnosis, Dr. Sampurnanand medical college, Jodhpur, Rajasthan, India.
Dr Kirti rana	Professor, Department of Radiodiagnosis, Dr. Sampurnanand medical college, Jodhpur, Rajasthan, India.
Dr Ramanand gehlot	Professor, Department of Radiodiagnosis, Dr. Sampurnanand medical college, Jodhpur, Rajasthan, India.
Dr Navjeet kaur	Resident, Department of Radiodiagnosis, Dr. Sampurnanand medical college, Jodhpur, Rajasthan, India.

ABSTRACT **Objectives:** Study aims at characterising pancreatico-biliary diseases on MRCP, outlining extent of diseases, identifying anatomical variants and comparing to ERCP whenever possible.

Methodology: This prospective study was conducted on 67 patients, underwent MRCP [14 patients were also underwent ERCP (endoscopic retrograde cholangio-pancreaticography)]. Specificity, sensitivity, positive predictive value, negative predictive value and accuracy were calculated; ERCP was considered the gold standard.

Results: The majority of patients were having benign diseases while commonest finding was malignant stricture. Most common cause of malignant stricture was cholangiocarcinoma. Iatrogenic etiologies and portal biliopathy contribute equally for benign strictures. Sensitivity, specificity, PPV, NPV and accuracy of MRCP were highest for CHD and confluence stricture while for CBD stricture and for choledocholithiasis these were slightly less.

Conclusion: Our study concluded that MRCP is comparable or better than ERCP for some pathologies, however ERCP is still considered gold standard.

KEYWORDS : MRCP, ERCP, Cholangiocarcinoma, Choledocholithiasis.

INTRODUCTION

MRCP means magnetic resonance cholangio-pancreatography. First described in clinical practice in 1991.[1]

Magnetic resonance (MR) cholangiopancreatography (MRCP) has emersed as a new MR imaging technique that is used as an alternative approch to evaluate pancreaticobiliary system and become a well established, noninvasive diagnostic tool for assessing the biliary tree and also allows evaluation of surrounding structures.[2]

MRCP is based on high signal intensity of bile and pancreatic secretions on heavily T2 weighted MR sequences, in the dark background tissues. MRCP is usually performed with heavily T2W sequences by using fast spin echo or SSFSE (Single Shot Fast Spin Echo) technique and both a thick collimation and thin collimation techniques with a torso phased array coil.

MRCP is principally used to examine diseases of the bile ducts, pancreas, pancreatic duct and gallbladder, to identify congenital anomalies of the cystic and hepatic ducts, to demonstrate post-surgical biliary anatomy and to detect biliary complications. MRCP can assist detection of anomalous pancreaticobiliary junction.

MRCP has potentially two major advantages in neoplastic pancreatico-biliary obstruction. Firstly, MRCP can directly reveal extra ductal tumour whereas ERCP depicts only the duct lumen. Second, MRCP lacks the major complication (sepsis, bleeding, bile leak and death) rate of approximately 3% associated with ERCP. Overall the purpose of this study will be to prospectively assess the accuracy of MR imaging.

MATERIALS AND METHODS

This prospective study was done on total 67 patients presented with features suggesting pancreaticobiliary diseases, in the period of one year. All patients were underwent MRCP. Of total 67 patients 14 patients also underwent ERCP.

RESULTS

- Majority of patients in study population were males, rest were females.
- Pain abdomen, jaundice, nausea and vomiting were the most frequent presenting complaints. Most of patients presented with combination of symptoms.
- The mean age of the study sample was 50 years with a range of 3-85 years. Majority of benign causes were seen in 51-60 years of age group, while malignant causes were more common between 41-60 years of age group.
- Majority of pathologies observed were benign 41 (61%). Most common benign disorder observed was cholelithiasis (34%), followed by choledocholithiasis (12%) and chronic pancreatitis (12%). Least commonly observed benign pathologies were benign GB polyp, hepatic hydatid and pancreatic divisum each consist of one case.
- Choledochal cyst was seen in two cases, one was in 1st and other was in 6th decade of life with. One male patient had todani type I and a female patient had todani type IV a. Associated findings were cholelithiasis and choledocholithiasis. Chodecochal cyst is shown in figure 1.

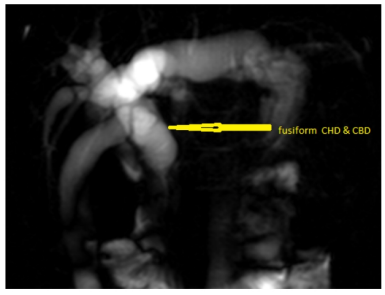

Figure 1.Thick slab MRCP image in a patient showing fusiform dilatation of CHD and CBD (yellow arrow) and intra-hepatic ducts diagnosed as type IV A CHOLEDOCHAL CYST

- Choledocholithiasis observed in 9 patients with female preponderance. Most common location of calculi was CBD as shown in figure 2. In a patient of portal biliopathy calculi were seen

in CHD, left duct and segmental ducts. In one patient of chronic pancreatitis calculus was found at papilla that was missed on MRCP while detected on ERCP. Associated findings were gall stone disease, calculus cholecystitis, acute pancreatitis in decreasing order of frequency.

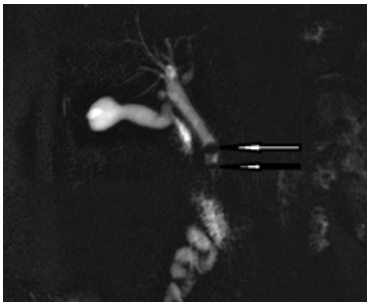

Figure 2.Thick slab MRCP image showing multiple calculi (arrows) in lower CBD

- Majority of CBD strictures were malignant (37%). Commonest cause of malignant stricture was cholangiocarcinoma in 52%, while gall bladder mass and periampullary mass were less common. Majority of cholangiocarcinoma were hilar (55%) as shown in figure 3, in which most common type was bismuth type II (57%).

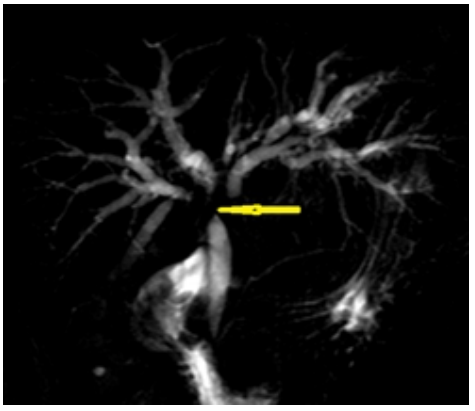

Figure 3. Thick slab MRCP in a patient with klatskin tumour showing abrupt cut off / malignant stricture of confluence and CHD (yellow arrow)

- Acute pancreatitis was observed in 6% patients. In 75% cases etiology was gall stone, while in rest 25% was bile stones.
- Majority of cases of chronic pancreatitis had dilated and tortuous MPD.
- Anatomic variations in biliary duct anatomy were found in 13% patients. Most common were type 2 and type 3a, followed by type 3b, 3c and type 4.
- In patients who underwent MRCP and ERCP both, sensitivity, specificity, negative predictive value, positive predictive value and accuracy of MRCP for bile stone was 80.0%, 87.5%, 80.0%, 87.5% and 84.61% respectively. Similarly sensitivity, specificity, negative predictive value, positive predictive value and accuracy of MRCP for CBD stricture was 100%, 83.33%, 87.50%,100% and 100% respectively.
- Sensitivity, specificity, negative predictive value, positive predi ctive value and accuracy of MRCP for CHD and confluence stricture were 100%.

DISCUSSION

Today MRCP is a non-invasive technique with no morbidity, has gained a role in the evaluation of bile duct and pancreatic duct diseases. Preliminary results show high sensitivity in detecting benign or malignant lesions affecting the biliary tree and pancreas as well as intrahepatic and common bile duct lithiasis. [3]

Recently, ERCP has been challenged not only by MRCP but also by endoscopic ultrasonography (EUS), which has proved to have an equal or superior sensitivity in diagnosing choledocholithiasis. [4]

This study was conducted to describe features of various pancreatico-biliary disorders by MRCP and in selected patients to compare the accuracy of MRCP as a diagnostic tool at our institution with invasive ERCP in the diagnosis of bile duct abnormalities, using specificity, sensitivity, and positive and negative predictive values.

In our study 63% patients were male and 37% were female, closely matches with Miyazaki et al 5 (66% were male and 34% were female). Percentage distribution of male-to-female is more in our study.

The most common presenting sign and symptoms of study population was jaundice in 94% followed by abdominal pain in 54% while least common was abdominal lump in 15%. Almost all patients presented with combination of symptoms. These results closely matches with study of Schwartz et al. 6, in which most common presented sign/ symptom was jaundice seen in 68% patients followed by pain in abdomen seen in 25% patients.

Bile stones observed in 9 patients in size range of 4-22 mm. Associated cholelithiasis seen in 56% patients. CBD was dilated in all patients. All patients had calculi within CBD; one patient of portal biliopathy also had calculi within intrahepatic bile ducts. Five of these patients also underwent ERCP; one patient had calculus at ampulla which was missed on MRCP and further on detected on ERCP, considered as false negative on MRCP. Similarly in one patient calculus was detected in lower CBD on MRCP, while on ERCP it was missed; the cause may be passing out of calculus during procedure; so this patient was considered as false positive for stone disease on MRCP. These results are closely matched with study done by Regan et al. He observed total 15 patients of choledocholithiasis; ranged from 3 mm to 35 mm. Most were situated at the distal common duct. In two patients the stone was impacted at the ampulla. [7]

The sensitivity and specificity of MRCP for stone disease in our study was less as compared to other studies due to false negative and false positive patient respectively or may be because of small population of comparative study.

In our study bile duct stricture seen in 30 patients (7 patients also underwent ERCP). Benign stricture seen in 17 % patients (5) and rest of the patients had malignant stricture (25).

Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were as –

- for CBD stricture 100%, 83.33%, 87.50%, 100%, 100% respectively
- for confluence stricture 100%, 100%, 100%, 100%, 100% respectively
- for CHD stricture 100%, 100%, 100%, 100%, 100% respectively.
- From above results it was evident that MRCP is more accurate for detection of more proximally located strictures than ERCP. While for detection of distally located strictures ERCP have 100 % accuracy.

Cause of benign stricture was iatrogenic injury in 40% patients, portal biliopathy in another 40% while traumatic injury in rest 20% patients. Smooth, symmetrical and long segment tapered narrowing was most commonly seen pattern in benign stricture. Similarly Park M. et al8 studied that an irregular and asymmetric stricture margin was more common in cholangiocarcinoma, and a smooth and symmetric stricture margin was more common in benign.

Iatrogenic strictures were classified using bismuth classification. In 50% patients (1 out of 2) one stricture was bismuth type 1 and in another 50% patient bismuth type 4. Similarly a study by alfonso R et al9 revealed bismuth type 1 injury in 2 patients, type 2 injury in 1 patient, type 3 in 11 patients and bismuth type 4 and 5 injury in 1 patient each.

In 2 (3%) patients of choledochal cyst, 50% patient was type1 and another 50% patient was type 4a. Bile stones and gall stones seen as

complications. Irie H et at[10] observed 69% cases of type 1choledochal cyst and 31% cases of type 4 choledochal cysts with common bile duct calculi in 50% patients.

Continuity of the cyst with bile duct was demonstrated in every patient that was helpful to differentiate choledochal cyst from the other differentials like enteric duplication cyst of duodenum, pseudocyst of pancreas.

In our study total 23 patients of cholelithiasis were found. The common associated findings were pancreatitis (6), cholecystitis (4) and bile duct stone (4).

One patient in this study had mirrzi syndrome with stone impacted in cystic duct with resultant compression over common bile duct with proximal dilatation of biliary radicals was noted in one patient. Stone was better visualised on T2W imaging with status of the biliary apparatus was better demonstrated on MRCP.

These results are concordant with study results of Choi W et a1.[11] that T2 weighted images can detect all diagnostic components of the mirrzi syndrome, while MRCP can delineate the extent and shape of the stricture and detect fistula.

In our study total 10 patients of chronic pancreatitis were found. MPD was dilated and smooth in 2 patients, dilated and tortuous in 5 patients and in 2 patients, dilatation of side branches also seen. Similarly in a preliminary study various appearances of MPD were studied in chronic pancreatitis ranging from normal looking MPD to mild irregularity of MPD and side branches. Severe ductal changes in the form of irregular dilatation of both MPD and side branches along with interposed strictures gives the appearance of chain of lakes on MRCP.[12]

In 1 patient (10%) of chronic pancreatitis there was pancreas divisum. Deng-Bin Wang et al reported pancreatitis in 173 cases. Totally, 16 cases with complete divisum and 1 with incomplete divisum comprised dorsal pancreatitis in patients with PD found.[13]

Malignant stricture of the bile duct was the most common pathology in our study comprising 37% patients. Abdurrahim dusak et al[14] reported that most common finding was pancreatico-biliary tumours causing malignant bile duct stricture.

Most common cause of malignant bile duct stricture was cholangio carcinoma (52%), followed by gall bladder mass (24%), periampullary mass (20%) and advanced gastric carcinoma (4%).

Among all cases of the cholangiocarcinoma, hilar cholangiocarcinoma was the most common type 7 (61%). Other types were intrahepatic (peripheral) cholangiocarcinoma in 1 patient and extrahepatic cholangiocarcinoma 5 (38%).

Among total cases of hilar cholangiocarcinoma 4 were of Bismuth type 2 which involves only primary confluence, while 1 patient of type 1, 2 and 3 each. MRCP was able to identify proximal and distal extent of the disease in all patients. In a preliminary study percentage of tumors according to the bismuth classification were, type I 1(12%), type III 3 (38%) and type IV 4 (50%).[14]

Portal vein invasion is seen in 2 (15.38%) patients of cholangio carcinoma. Eight percent patients of cholangiocarcinoma also showed multiple liver metastases on T2WI. Masselli et al15 reported that MRI correctly predicted vascular involvement in 73% and liver involvement in 80% of the cases.

This study reported total 7 cases of GB carcinoma. Biliary infiltration was seen in 6 cases.

CONCLUSION

MRCP is non-invasive, non-ionizing imaging method for evaluation of pancreaticobiliary anatomy and pathology. It is superior diagnostic modality in detection and characterization of pancreaticobiliary pathologies. MRCP with its high resolution, multiplanar imaging and 3D reconstruction capability is effective investigation for detection of pancreaticobiliary pathologies.

MRCP is superior in cases where ERCP is not possible (unfavorable anatomy, mechanical obstruction to the scope or patient refusal) and for evaluation of extra ductal pathologies. MRCP is also free of complication that occurs during or after ERCP.

ERCP provided additional therapeutic capacity along with its high diagnostic efficacy.

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