International Surgery Journal
Nirhale DS et al. Int Surg J. 2018 Jun;5(6):2233-2237
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20182228

Original Research Article

Role of magnetic resonance cholangiopancreatography in diagnosing pancreatobiliary pathologies: a prospective study

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Received: 05 April 2018
Revised: 12 April 2018
Accepted: 21 April 2018

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ABSTRACT

Background: Non-invasive techniques such as ultrasound and CT scan (abdomen and pelvis) are widely used in investigations of pancreaticobiliary disease, though easily available and cheap, have limitations in term of sensitivity. Invasive procedures like ERCP, though considered gold standard for diagnosis of pancreaticobiliary disease, requires highly skilled team of supporting doctors. MR Cholangio Pancreatography (MRCP) is evolving as an effective non-invasive imaging technique for examining patients with pancreatic or biliary diseases. The purpose is to illustrate the findings of MRCP in various abnormalities affecting the pancreaticobiliary diseases. Objective was to study the role of MRCP as non-invasive imaging modality for diagnosis of pancreatobiliary diseases, in diagnosing lower biliary tract pathologies, pancreatic duct pathologies, determining treatment modality in pancreatobiliary diseases, surgical or endoscopic

Methods: This is a prospective study conducted in Dr. D. Y. Patil Medical College and Hospital, Pimpri, Pune for a period of two years from July 2015 to September 2017. 60 patients were enrolled in the study, their MRCP was performed following ultrasonography.

Results: The MRCP diagnosed the following pathologies- cholelithiasis, choledocholithiasis, CBD stricture, chronic pancreatitis, choledochal cyst, cholangiocarcinoma, pseudocyst of pancreas, sclerosing cholangitis and GB perforation. Out of 60, 32 underwent surgical procedure and 20 underwent endoscopic procedure and 8 were treated medically.

Conclusions: MRCP is very accurate in diagnosing CBD and pancreatic duct pathologies. Its helps in deciding the treatment modality for the same. It decides whether the patient requires ERCP and thus cuts down the rate of 'negative' ERCP.

Keywords: ERCP, MRCP, Pancreatobiliary

INTRODUCTION

Accurate methods of detecting common bile duct and pancreatic disease in patients are important to both surgeons and endoscopists for planning an effective interventional strategy and therefore a need for less invasive, safe and highly sensitive diagnostic procedure.[1] Various invasive and non-invasive diagnostic techniques have been employed to achieve this aim.[2] Non-invasive techniques such as ultrasound and CT scan (abdomen and pelvis) are widely used in preliminary investigations of pancreaticobiliary disease, though easily available and

less expensive, have limitations in term of sensitivity such as low sensitivity of USG for detecting common duct calculi, which means that the diagnosis of several common conditions like tumours, calculi, sclerosing cholangitis and chronic pancreatitis may require invasive procedure.[2] Invasive procedures like ERCP, though considered gold standard for diagnosis of pancreaticobiliary disease, requires highly skilled team of supporting doctors, for cannulation of pancreatic and common bile duct, as also the use of sedation and ionizing radiations.[2] MR Cholangio Pancreatography (MRCP) is evolving as an effective non invasive imaging technique for examining patients with suspected pancreatic or biliary diseases.

The projectional images rendered by this technique resemble those provided by direct cholangiography or pancreatography obtained via invasive procedures such as endoscopic retrograde cholangiopancreatography or percutaneous transhepatic cholangiography. The purpose of this study is to illustrate the findings of MRCP in various abnormalities affecting the pancreaticobiliary diseases.[3]

MRCP was first performed in 1991 by a scientist named Wallen. Since its first clinical introduction, MRCP has proved to be a reliable technique in the evaluation of biliary and pancreatic duct obstruction. In early phases of its clinical application, it was considered a second level examination in the diagnostic workup of obstructive pathologies, following percutaneous transhepatic cholangiography and endoscopic retrograde cholangiopancreatography which were considered first level examinations.

Since decades, this imaging technique has significantly increased its diagnostic role in diagnosis of obstructive biliary pathologies. Now a days MRCP is widely used as a primary noninvasive imaging modality in the diagnosis of obstructive biliary pathologies. It plays a primary role in its workup and therapeutic operative planning.[4]

It makes use of heavily T2 weighted pulse sequences, thus exploiting the inherent differences in the T2 weighted contrast between stationary fluid filed structures in the abdomen (which have long T2 relaxation time) and adjacent soft tissue (which has a much shorter T2 relaxation time).[5,6]

Heavily T2-weighted fat suppressed sequences are used to produce images, in which static fluid is hyperintense, and background signal is suppressed. These images are suitable for postprocessing into projection images that resemble direct cholangiogram produced by ERCP or percutaneous transhepatic cholangiopancreatography.[7]

MRCP is the investigation of choice for the upper biliary tract pathologies as ERCP is not very helpful in those circumstances due to technical shortcomings. But ERCP is the gold standard of investigation as far as lower pancreatobiliary pathologies are concerned. In this study, we are going to study the role of MRCP in diagnosing as well as in planning the treatment modality of the lower pancreatico biliary diseases.

METHODS

This is a prospective study conducted in Dr DY Patil Medical College, Hospital and Research Centre from July 2015 to September 2017. 60 patients were enrolled in the study after obtaining clearance from Institutional Ethics Committee and informed written consent from each patient.

Inclusion criteria included age group of 18-80 years of any sex suffering from common bile duct and pancreatic pathologies, while patients having congenital abnormalities or could not undergo MRCP due to metallic implants or claustrophobia were excluded. enrolled patients underwent MRCP (HASTE coronal and axial, T1 weighted axial, MRCP using heavily T2 weighted sequences) in Siemens 1.5 Tesla Magnetom Avanto.

Following diagnosis of common bile duct or pancreatic pathology after blood investigations (hemogram, complete blood count, liver and renal function tests, coagulation and lipid profile, serum pancreatic enzymes) and ultrasonography of abdomen and pelvis, MRCP was done. On basis of MRCP, patients were subjected to either endoscopic/surgical procedure or medical treatment and histopathological examination was done.

RESULTS

Our study was a hospital based prospective study of 60 patients with clinical, biochemical or radiological suspicion of hepatobiliary pathologies.

Patients were of age group 25-70 years with a mean age of 46.33 years. Out of 60 patients, 35 patients were females (58.3%). 13 out of 60 patients had a surgical history in the past either open or laproscopic (21.67%). Alcoholic history was present in 5 out of 60 patients (8.3%).

Out of 60 patients, 13 patients had icterus (21.67%). Elevated levels of direct bilirubin were present in 14 out of 60 patients (23.3%). Increased levels of alkaline phosphatase enzyme were present in 14 out of 60 patients (23.3%).

1 patient out of 60 has sclerosing cholangitis (1.7%). Gall bladder perforation was found in 1 out of 60 patients (1.7%). Extraluminal common bile duct compression was found in 1 out of 60 patients (1.7%). Iatrogenic common bile duct injury was found in 1 out of 60 patients (1.7%). Postoperative follow up was done in 1 out of 60 patients (1.7%).

Table 1: Biographical data.

Feature	No. of patients (n=60)	%
Sex		
Male	25	41.7
Female	35	58.3
Age group		
≤30	13	21.7
31-40	11	18.3
41-50	16	26.7
51-60	7	11.7
>60	13	21.7
History of present illness		
Pain in abdomen	59	98.33
Yellowish discolouration of urine	5	8.33
Lump in abdomen	1	1.67
Medical past history		
hypertension	8	13.33
diabetes	1	1.67
Tuberculosis	1	1.67
No medical past history	51	85.00
Surgical history		
Yes	13	21.67
No	47	78.33
Addiction		
Alcohol	5	8.3
No addiction	55	91.7
General examination		
Pallor	3	5.0
Icterus	13	21.7
Direct bilirubin		
Abnormal	14	23.3
Normal	46	76.7
ALP		
Abnormal	14	23.3
Normal	46	76.7
Obstructive jaundice		
Yes	14	23.3
No	46	76.7

32 out of 60 patients underwent a surgical procedure either laproscopic or open (53.34%) while 20 underwent endoscopic procedure (33.34%). 8 patients were managed medically (13.34%). 29 out of 60 patients underwent cholecystectomy either open or laproscopic (48.33%). 8 out of 60 patients underwent endoscopic stone retrieval (13.34%). Endoscopic common bile duct stenting was done in 8 out of 60 patients (13.34%). Medical management was given to 7 out of 60 patients (11.67%). Cystogastrostomy was carried out in 2 out of 60 patients (3.33%). Endoscopic pancreatic duct stenting was done in 2 out of 60 patients (3.33%). Chemotherapy was given to 1 out of 60 patients (1.67%). Endoscopic biopsy was taken in 1 out of 60 patients (1.67%). Open hepaticojejunostomy was done in 1 out of 60 patients (1.67%). Endoscopic drainage of psuedocyst of pancreas with pancreatic duct stenting was done in 1 out of 60 patients (1.67%).

Table 2: Analysis of diagnosis after MRCP.

Diagnosis	No. of patients (n = 60)	%
CBD stricture	7	11.7
Cholangiocarcinoma	2	3.3
Choledochal cyst	2	3.3
Choledocholithiasis	10	16.7
Cholelithiaisis	24	40.0
Chronic pancreatitis	6	10.0
GB perforation	1	1.7
Extraluminal CBD compression	1	1.7
Post op. complication, CBD injury	1	1.7
Post op. follow up	1	1.7
Pseudocyst of pancreas	4	6.7
Sclerosing cholangitis	1	1.7

Table 3: Analysis of treatment given.

Treatment modality	No. of patients	%
Cholecystectomy (open/laproscopy)	29	48.33
Endoscopic CBD Stenting	8	13.34
Endoscopic stone retrieval	8	13.34
Medical management	7	11.66
Cystogastrostomy	2	3.33
Endoscopic pancreatic duct stenting	2	3.33
Chemotherapy	1	1.67
Endoscopic biopsy	1	1.67
Endoscopic drainage of pseudocyst with pancreatic duct stenting	1	1.67
Open hepaticojejunostomy	1	1.67

DISCUSSION

Features of obstructive jaundice were present in 14 out of 60 patients (23.3%). The most common presenting complaints of the subjects in our study was jaundice (92%) which is consistent with the study by Verma et al.[8] Out of 60 patients, 24 patients had cholelithiasis (40.0%). Choledocholithiasis was present among 10 out of 60 patients (16.7%). Several studies have been conducted which have reported a significantly high accuracy in detecting the biliary dilatation and obstruction level. Regan et al showed dilatation of biliary tract in 100% cases and diagnosed the obstruction level in 87% cases.[9] Magnuson et al diagnosed the level of obstruction in 24 cases and cause of obstruction in 21 patients out the 25 patients with obstruction due to malignancy. Of 48 patients with a benign iteology, they were able to diagnose 45.[10] Georgopoulos et al diagnosed the obstruction level accurately in 13 (87%) of 15 patients

with malignant obstruction.[11] Adamek et al showed that MRCP can identify the biliary obstruction level with a high sensitivity of 90% and a specificity about 100%.[12] Common bile duct stricture was present in 7 out of 60 patients (11.7%). All the strictures were benign in nature. In a study by Obaidi et al the sensitivity was 100%, specificity 98.5%, negative predictive value 100%, positive predictive value 91.6%, and diagnostic accuracy 98.7% for benign strictures.[13]

The criteria for differentiation of benign and malignant strictures included

- irregular margin
- biliary radicles asymmetrically dilated
- abrupt or graded tapering of stricture
- presence or absence of a mass
- length of the structure.

Malignant strictures are long as they have an infiltrative growth fashion, which spreads intramurally beneath the epithelial lining. They are irregular in nature with an asymmetrically dilated biliary duct because of the nature of infiltration of the bile duct by the tumor. Presence of a mass, stricture of long length (3 cm vs. 1.2 cm), and an irregular margin and asymmetrically dilated bile ducts pointed towards the diagnosis of a malignant stricture. Park et al found out that stricture length (3 cm vs. 1.3 cm) with capricious margin and asymmetric narrowing of bile ducts were suggestive of malignant etiology.[14] Bain et al found out that lengthy stricture (3 cm vs. 0.8 cm) and the dilated intrahepatic duct (93% vs. 36%) were suggestive of malignant etiology.[15] 6 out of 60 patients had chronic pancreatitis (10%). 4 out of 60 patients had pseudocyst of pancreas (6.7%). Choledochal cyst was present in 2 cases out of 60 (3.3%). Cholangiocarcinoma was found in 2 out of 60 patients (3.3%). The sensitivity and specificity of MRCP was 81% and 100% compared to that of ERCP which was 93% and 94% for the detection of malignancy Bile Duct. Manfriedi et al found at the level and extent of the bile duct involvement with cholangiocarcinoma using the Bismuth-corlette classification was accurately depicted on MRCP in 84% (10 of 12) of their patients. MRCP can accurately depict the presence and level of obstruction and has been shown to be more effective than ERCP in delineating anatomic extent of the cancerous infilteration.[16]

According to current studies, MRCP has the aptitude to replace diagnostic ERCP and avoid complications related to it. The accuracy of MRCP has been documented in various studies, with sensitivity being 85-97%, specificity 75-98%, positive predictive values 83-89%, and negative predictive values 82-98%.[3,17,18] MRCP is a non-invasive imaging modality that has alpine sensitivity and specificity for the detection of pancreatobiliary pathologies. It is relatively safe, well tolerated by the patients, and has less contraindications and negligible morbidity or mortality. Dalton SJ et al compared MRCP with ERCP and their outcome have confirmed that MRCP has an accuracy of about 95%; and especially negative predictive value reaches 100%.[19] Topal B et al compared MRCP findings with that of ERCP have concluded that dependence upon MRCP might have cut down the requirement for ERCP and sphincterotomy by up to 75%.[20] For these reasons, MRCP has been included in the investigation of pancreatobiliary pathologies. Barring few claustrophobic patients, it has proved highly acceptable, and has been cardinal in reducing the rate of 'negative' ERCPs. None of the patient whose MRCP suggested a clear CBD returned with symptomatic CBD stones during the duration of our study, thus assuring the tall negative predictive value for MRCP.

CONCLUSION

MRCP is the modality of choice for optimal characterization of the causative lesions in most of the cases of pancreatobiliary pathogies. It has sensitivity and specificity of 91-94% and 93-100% in detecting common bile duct pathologies. It has a very high accuracy in detecting pancreatic duct pathologies. It can detect a pancreatic duct calculus as small as 2mm. It helps in determining the modality of treatment either surgical or endoscopic and helps in reducing the invasive intervention done in the patient. It has significantly reduced the number of negative ERCPs in the patients. It provides the benefit of secondary opinion wherever necessary. On the contrary, ERCP is a singular-vision procedure. It proves to be a suitable mode of investigation when the patient is unfit for an invasive ERCP. A female preponderance for pancreatobiliary pathologies was noted in our study. It also has some drawbacks. MRCP is a solely diagnostic procedure with no therapeutic potential. There is delay in the treatment offered to the patient and ERCP can diagnose and treat the condition in the same setting. MRCP has been entirely futile in following cases.

- Claustrophobic patients
- Patients with metallic implants in the body

ACKNOWLEDGEMENTS

Authors would like to thank Dr. Shahji Chavan and Dr. (Mrs) D. S. Nirhale for their valuble support during study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Nirhale DS, Kulkarni GC, Shingade P, Chavan S, Sonawane T, Dhende M. Role of magnetic resonance cholangiopancreatography in diagnosing pancreatobiliary pathologies: a prospective study. Int Surg J 2018;5:2233-7.