



EVALUATION OF PANCREATICO-BILIARY DISEASE USING MRCP: SCREENING MODALITY

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ABSTRACT

MRCP takes the advantage of the high signal intensity of body fluids on heavily T2W MRI. Static or slow moving fluid filled structures such as the bile and pancreatic ducts appear as hyperintense areas, whereas background tissues generate some signal. This inherent difference in signal intensity enables MRCP to be carried out without a contrast agent. Once the patient agrees to participate in the study, information is obtained as per the proforma. The MRCP is done; my guide will confirm findings and MRCP images will be stored in a Compact disk. Data analysis will be done using Rates, ratios and Percentages of different diagnosis and outcome made by MRCP will be computed and compiled. The present study revealed malignant strictures to be more common in the proximal common bile duct.

Key words:- MRCP, CBD, Screening.

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INTRODUCTION

At the time of the first clinical application of MRCP over a decade ago, MRCP was regarded at best, as a novel technique and with a questionable potential for imaging the biliary and pancreatic duct.

MRCP is performed by using heavily T2W turbo spin echo sequences and fast gradient echo sequences, in which stationary fluid has resultant high signal intensity [1].

MRCP takes the advantage of the high signal intensity of body fluids on heavily T2W MRI. Static or slow moving fluid filled structures such as the bile and

pancreatic ducts appear as hyperintense areas, whereas background tissues generate some signal. This inherent difference in signal intensity enables MRCP to be carried out without a contrast agent [2,3].

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 (single section) and thin collimation multisection technique with a torso phased array coil. The coronal plane is used to provide a cholangiographic display and the axial plane is used to evaluate the pancreatic duct and CBD [4].

Wallner BK et al in 1991 used a breath hold T2W gradient echo sequence using SSFP. These sequences provided projection cholangiograms. The quality of these images for a dilated biliary tree was acceptable. However visualization of normal caliber pancreatic and bile ducts was extremely limited.

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Depiction of small structures was not possible essentially due to high signal intensity from intra-abdominal fat reducing contrast between extra hepatic bile ducts and abdominal background.

Other drawbacks of this sequence were; low signal to noise ratio, requirement to use thick sections and large field of view.

Morimoto et al tried to improve the image quality by introducing 3D- SSFP sequences thereby being able to use thinner slices. However, both 2-D and 3-D sequences suffer from limitations of gradient echo sequences. These sequences are extremely susceptible to motion and magnetic susceptibility artifacts such as bowel and metallic clips. The SSFP sequences also required long breath holds, thereby limiting their image to co-operative and highly motivated patients to overcome these problems. Fast spin echo sequences were introduced. These sequences were less susceptible to motion artifacts, slow flow and magnetic susceptibility. The signal to noise ratio and contrast to noise ratio was significantly higher than SSFP sequences. Initially 2D Fast Spin Echo (FSE) sequences were introduced; subsequently 3D FSE respiratory triggered sequences were introduced permitting thinner slices. Fast spin echo sequences that are used in MRCP may be breath hold or non breath hold, the non-breath hold essentially being used for uncooperative patients or who are unable to hold their breath for a long period of time. The image qualities of non breath hold were inferior to the breath hold sequences [5].

The breath hold sequences introduced by Tahera et al required a breath hold of 44 seconds. In view of this long breath hold time, there was a need for shorter breath hold sequences. Modified FSE sequences were introduced recently. These are RARE (Rapid Acquisition with Relaxation Enhancement) and Half Fourier Acquisition Single Shot Turbo spin Echo sequences (HASTE) [6].

The RARE sequence is a single shot echo planar sequences introduced by Laubenberg; using a single thick oblique coronal slice 2-7 cms in thickness. This sequence provides a single projectional image of the biliary tree and pancreatic ducts. The advantage of this sequence is that it requires a breath hold of only 2-7 seconds. The disadvantage of this sequence is that, they are single projection images, no source images are available and post processing is not possible. To compensate for this, multiple oblique coronal images are obtained in different planes [7].

HASTE is a Half Fourier Acquisition Single Shot Turbo spin Echo sequence. Multiple thin slices ranging from 2-7 mm in thickness are obtained in 18-20 second breath hold. This technique has the advantages like RARE of eliminating respiratory motion artifacts as well as negligible magnetic susceptibility artifacts from bowel and surgical clips.

Numerous studies have compared the multislice

HASTE sequences with 2D / 3D FSE and Gradient Echo (GRE) SSFP sequences. All the studies concluded that multislice HASTE sequences were significantly superior to other sequences especially in terms of Signal to Noise (S/N) ratio and Contrast to Noise (C/N) ratio. Many recent studies have also compared RARE and HASTE sequences to identify the optimal MRCP sequence.

As mentioned earlier RARE sequences suffer from the drawback of direct projectional images and provide no source images for post processing. The S/N and C/N ratio of RARE are significantly lower than HASTE multi slice sequences. The image quality of HASTE multi slice images appears superior. However in the visualization of the ampulla, periampullary region and anomalies of pancreatico-biliary tree, the RARE sequences are superior to HASTE. Half- Fourier RARE MRCP is a reliable imaging technique for the evaluation of anatomy and complications associated with a surgically altered pancreatico-biliary duct system [8].

A study conducted by Morimoto et al shows that single shot RARE provides superior image quality, duct conspicuity with the added advantage of less image artifact and short acquisition time. However, volume averaging can cause bile duct stones to be missed. Therefore multislice HASTE sequences should still be acquired if choledocholithiasis is suspected. Larger studies are required to assess the diagnostic efficiency of single shot RARE sequences in pancreatic duct and intra hepatic duct disease [9].

METHODOLOGY

Study Design

A Cross sectional study.

Source of Data

All patients referred for MRCP with clinically suspected pancreaticobiliary disease attending Hospital

Sample Size

The study comprised a total of fifty patients of pancreatico-biliary disease which was calculated by taking in to account 80% of the average of similar cases in the previous 3 years hospitalized

Inclusion Criteria

All cases referred for MRCP in clinically suspected cases of pancreaticobiliary disease attending hospital

Exclusion Criteria

Patients having Cardiac pacemakers, prosthetic heart valves, cochlear implants or any metallic orthopedic implants.

Statistical Analysis

Once the patient agrees to participate in the .

study, information is obtained as per the proforma.

The MRCP is done; my guide will confirm findings and MRCP images will be stored in a Compact disk.

Data analysis will be done using Rates, ratios and Percentages of different diagnosis and outcome made by MRCP will be computed and compiled.

Equipments

The patient was scanned using 1.5 Tesla superconducting magnet, MAGNETOM SYMPHONY SIEMENS SOFTWARE VERSION 2002 OF GERMANY.

A complete clinical history of patients was taken

which included name, age, sex, occupation, presenting complaints. This was followed by general physical examination and detailed abdominal examination with examination of other significant systems.

PREPARATION OF THE PATIENT FOR THE SCAN

All patients were instructed to fast for 6 hours prior to examination. Examination was carried out in supine position with breath holding in inspiration. In a few critically ill and un co-operative patients and children, respiratory triggering was used.

Results:

Table 1. Distribution of Pancreatico-Biliary Disease Based On Type of Stricture as Observed on MRCP

Type of Stricture	No. of Patients	Percentage (%)
Benign	06	33.3
Malignant	12	66.6
Total	18	100 %

In the present study malignant strictures predominated over that of benign.

Table 2. Distribution of Site of Stricture among Benign Involving Pancreatico-Biliary System as Observed On MRCP

Site of Benign Stricture	No. of Patients	Percentage (%)
Proximal CBD	04	66.6
Distal CBD	02	33.3
Total	06	100 %

Present study revealed benign strictures to be more common in proximal common bile duct.

Table 3. Distribution of Site of Malignant Stricture Involving Pancreatico-Biliary System as Observed On MRCP

Site of malignant stricture	No. of Patients	Percentage
Right main hepatic duct	02	16.6
Left main hepatic duct	01	08.3
Confluence of right and left main hepatic ducts	02	16.6
Proximal CBD	04	33.3
Distal CBD	03	25.0
Total	12	100 %

The present study revealed malignant strictures to be more common in the proximal common bile duct.

DISCUSSION

Ultrasound will not show much significant changes in cases of acute pancreatitis. Pseudocyst and necrotic changes were detected rarely. Exact extent was not appreciated due to bowel gas and probe tenderness. In cases of chronic pancreatitis the altered morphology of the gland can be seen but the caliber of main pancreatic duct was difficult to visualize.

In 6 cases of choledocholithiasis, MRCP clearly shows the IHBR dilatation, caliber of CBD and the site of the calculus, especially in the distal CBD which is difficult to visualize on ultrasound. Varghese et al who reported 91% sensitivity, specificity of 98% and diagnostic accuracy of 97% on MRCP [10]. Sugiyama et al reported 91% sensitivity, specificity of 100% and diagnostic accuracy of 97% on [11]. Caroline Reinhold et

al showed a sensitivity of 90%, specificity of 100% and accuracy of 97 % on MRCP [12].

In 2 cases of choledochal cysts MRCP yielded diagnostic information by providing exact anatomic map in pre surgical evaluation. Kim et al in his study of 20 patients concluded the same [13].

In 1 case of biliary atresia, MRCP detected with an accuracy of 100%. Seok Joo Han and Myung-Jun Kim in a study of 47 patients showed MRCP had a sensitivity, specificity and diagnostic accuracy of 100%, 96% and 98% [14]. Ultrasound serves as good initial modality for evaluation in neonates presenting with cholestatic jaundice.

A total of 50 patients, suspected clinically of pancreatobiliary diseases underwent MRCP examination, were taken for the purpose of the study.

1. The mean age of the study sample was 40.5 years with a range of 0-81 years.
2. Maximum number of cases were in > 40 years age group.
3. Majority of patients were males.
4. Pain abdomen, Steatorrhea, weight loss, Jaundice and vomiting were the most frequent presenting complaints.
5. Cholangiocarcinoma was the most common finding followed by pancreatitis, choledocholithiasis, periampullary carcinoma and carcinoma pancreas.
6. Cholangiocarcinoma is common in both male and females followed by pancreatitis and these are predominated in the males.

7. Malignant strictures commonest than the benign strictures.
8. Both Benign and malignant strictures are more common in the proximal common bile duct.
9. MRI and MRCP proved to be a sensitive, non-invasive imaging modality that helps in detection, diagnosis of the disease and provides valuable information of therapeutic and prognostic significance.

CONCLUSION

There is now enough evidence to suggest that the efficacy of MRI and MRCP is at par with that of ERCP and can be considered as the gold standard for evaluation of the pancreatico-biliary system.

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