

SIGNIFICANCE OF MRCP IN ASSESSING HEPATOBILIARY ABNORMALITIES**¹Junaid Ul Islam, ¹Babina Aryal*, ²Arpita Chakraborty, ³Adil Ahmad Wani,****⁴Mohsin Rasool Bhat, ⁵Sathi Barman**^{1,2,3,4}Assistant Professor, Department of Allied Health Science, Brainwre University, India⁵MRIT, Department of Allied Health Science, Brainwre University, India**Corresponding Author:** Babina Aryal**ABSTRACT**

Background: Magnetic Resonance Cholangiopancreatography (MRCP) has become integral in diagnosing hepatobiliary abnormalities due to its non-invasive nature and high-resolution imaging. This review highlights MRCP's effectiveness in assessing conditions such as biliary obstruction, choledocholithiasis, strictures, and congenital anomalies. **Aim & Objective:** The main objective of this study was to evaluate the significance of MRCP in evaluating hepatobiliary abnormalities. **Methods & Methodology:** A prospective study conducted in a Kolkata private hospital from December 2023 to March 2024 included 60 patients with suspected hepatobiliary diseases. Patients suspected with clinical, biochemical or radiological suspicion of hepatobiliary diseases were included in the study. **Result:** Our study of 60 patients with suspected hepatobiliary pathologies (aged 19-82 years, mean age 49.8) revealed tenderness at the epigastric area (54%) as the most common clinical symptom, followed by upper abdominal pain (27%), recurrent vomiting (13%), and gastric problems (6%). MRCP diagnosed hepatomegaly (26.6%) as the most frequent condition, followed by gallbladder sludge (21.6%), cholecystitis (18.3%), cholelithiasis (15%), choledocholithiasis (11.6%), and dilated common bile duct (6%). **Conclusion:** In conclusion, our study underscores the pivotal role of MRCP in diagnosing hepatobiliary abnormalities with non-invasive, high-resolution imaging. It effectively identifies various pathologies including hepatomegaly and gallbladder disorders. MRCP emerges as a valuable tool for comprehensive assessment, guiding effective management strategies for patients with suspected hepatobiliary diseases.

Keywords: MRCP, Sequence, Breath-hold, MRI, Biliary diseases**Received: July-25, 2024****Accepted: August-28, 2024****September: 30, 2024****INTRODUCTION**

MRCP MRI, a specialized MRI technique, is tailored to visualize the intricate biliary and pancreatic ductal systems. It offers intricate imaging of the bile ducts, pancreatic duct, and adjacent structures, all achieved without the requirement of contrast agents or invasive interventions. This imaging modality proves especially advantageous in assessing a spectrum of hepatobiliary abnormalities, ranging from bile duct strictures, stones, and tumors to congenital anomalies. With its provision of high-resolution images and multi-planar reconstructions, MRCP MRI assists clinicians in diagnosing and formulating suitable management plans for diverse hepatobiliary conditions. MRCP serves as a significant non-invasive tool for diagnosing biliopancreatic diseases, demonstrating a similar level of accuracy to ERCP ^[1] Magnetic Resonance Cholangiopancreatography (MRCP) is a non-invasive imaging modality employed for the visualization of the bile ducts, pancreatic ducts, and gallbladder using the resonating protons in our body. MRCP is a safe imaging modality that does not involve ionizing radiation or iodinated contrast. It effectively displays the biliary tree by merging the benefits of both projectional and cross-sectional imaging techniques ^[2]. For diagnosing obstructive jaundice and determining the cause, location, and severity of the lesion, MRCP emerges as a precise and

preferable option due to its non-invasive and non-ionizing nature^[3]. The intricate network of the biliary system is pivotal in facilitating digestive processes, acting as a vital conduit for the secretion and transportation of bile essential for digestion and waste elimination. However, disruptions within this complex network, manifested through biliary diseases, can upset this delicate balance, giving rise to a spectrum of clinical manifestations spanning from discomfort to severe complications. In the quest for precise diagnosis and effective management, medical imaging emerges as an indispensable cornerstone, furnishing clinicians with invaluable insights into the underlying pathology. Amidst the array of imaging modalities available, Magnetic Resonance Imaging (MRI) stands out as a formidable tool, renowned for its unparalleled clarity and precision in evaluating biliary diseases. Harnessing the principles of magnetic resonance, MRI empowers clinicians to delve deep into the anatomical intricacies of the biliary system, discerning even the most subtle abnormalities and facilitating therapeutic interventions with unprecedented accuracy. MRCP makes use of heavily T2-weighted pulse sequences, thus exploiting the inherent differences in the T2-weighted contrast between stationary fluid-filled structures in the abdomen (which have a long T2 relaxation time) and adjacent soft tissue (which has a much shorter T2 relaxation time). Static or slow moving fluids within the biliary tree and pancreatic duct appear of high signal intensity on MRCP, whilst surrounding tissue is of reduced signal intensity^[4]. MRCP stands as a dependable method for identifying common bile duct (CBD) stones, decreasing the likelihood of misdiagnosing retained choledocholithiasis especially when biochemical predictors and ultrasound examination appear normal^[5].

Rapid acquisition and relaxation enhancement, FRFSE: Fast-recovery fast spin-echo coronal oblique 3D with respiratory triggering, HASTE: Half-Fourier acquisition single shot turbo spin echo-axial 2D breath-hold sequence, offering superior imaging quality achievable within a single breath hold (<20 s), alongside a fat-suppressed sequence are used. Undergoing MRCP prior to ERCP yields significant benefits, notably reducing the frequency of unnecessary ERCP procedures and lowering the occurrence of postoperative complications associated with ERCP^[6]. Magnetic resonance cholangiopancreatography is considered to be the investigation of choice in the evaluation of biliary tract and GB pathologies^[7]. MRCP is the investigation of choice for suspected choledocholithiasis, choledochal cyst and primary sclerosing cholangitis^[8]. **AIM AND OBJECTIVE:** The main aim and objective of the study was to evaluate the significance of MRI in evaluating hepatobiliary abnormalities.

METHODS

This is a prospective study conducted in a private hospital of Kolkata, West Bengal from December 2023 to March 2024. A total of 60 patients were enrolled in the study after obtaining clearance from the Institutional Ethics Committee and informed written consent from each patient. Patients suspected with clinical, biochemical or radiological suspicion of hepatobiliary diseases were included in the study. Claustrophobia, Non-Cooperative patients, patients with MRI incompatible devices were excluded from this study. Before starting the procedure, the patients were asked to drink an iron rich supplement (50 ml) for signal suppression during MRCP and for improving visualization of various pancreatobiliary structures. Patients were then positioned in supine and a phased-array body coil was placed over the abdomen. MRCP was performed for all patients on a 3 Tesla Siemens MRI machine using a phased array coil. A slice thickness of 5 mm was taken from the right dome of the diaphragm to the lower edge of the liver. No contrast was administered within the body. The sequences included 3 plane localiser, Axial T1, Axial T2 HASTE FS (free breath), Coronal T2 HASTE FS AXIAL free breath, T1 FLASH AXIAL breath hold, T2 HASTE CORONAL free breath, 3D MRCP free breath, thick/thin slab HASTE (breath hold). A 3D reconstruction was performed by MIP post processing. MIP image and thick angled coronal sections provided views of pancreato-biliary tree.

RESULTS

Our study shows 60 patients with clinical, biochemical or radiological suspicion of hepatobiliary pathologies. Patients were of age group 19 -82 years with a mean age of 49.8 years as shown in (Table-

1).

Table-1: Table showing the age distribution of the patient.

Gender	Min	Mean	Max
Male	20	44.4	77
Female	19-82	54.6	82

Out of 60 patients, 24 patients were females (40%) and remaining 36 were males (60%) as shown in (Figure-1).

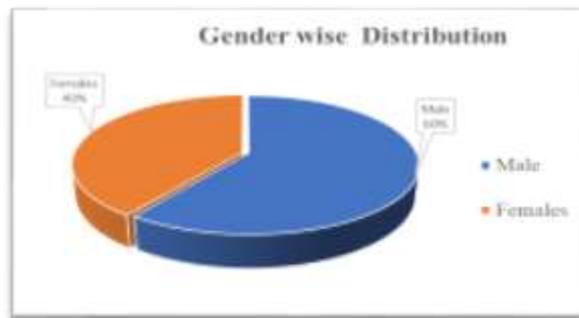


Figure-1: Pie chart showing the distribution of patients

Most common clinical history of the patient was tenderness at epigastric area (54%), followed by upper abdominal pain (27%), recurrent vomiting (13%) and gastric problem (6%). In this study, the maximum cases diagnosed on MRCP were Hepatomegaly 26.6 %) followed by Gallbladder Sludge (21.6%), Cholecystitis (18.3%), Cholelithiasis (15%), Choledocholithiasis (11.6%) and Dilated Common Bile Duct (6%) respectively as shown in the (Table 2).

Table-2: Table showing the MRCP findings in MRCP

S.NO	Findings of MRCP	Number of patients
1	Hepatomegaly	16
2	Cholelithiasis	9
3	Gallbladder Sludge	13
4	Choledocholithiasis	7
5	Cholecystitis	11
6	Dilated CBD	4
TOTAL		60

DISCUSSION

The study included 60 patients who presented with clinical, biochemical, or radiological signs suggestive of hepatobiliary disorders, spanning ages from 19 to 82 years, with an average age of 49.8

years. Among the participants, 24 were females (40%) and 36 were males (60%). The most commonly reported clinical symptoms were tenderness at the epigastric area (54%), upper abdominal pain (27%), recurrent vomiting (13%), and gastric issues (6%). Analysis of the study's findings revealed a range of hepatobiliary abnormalities diagnosed using Magnetic Resonance Cholangiopancreatography (MRCP). Notably, hepatomegaly was the most prevalent condition (26.6%), followed by gallbladder sludge (21.6%), cholecystitis (18.3%), cholelithiasis (15%), choledocholithiasis (11.6%), and dilated common bile duct (6%). These results highlight the clinical significance of MRCP in diagnosing various hepatobiliary pathologies. The prevalence of hepatomegaly and gallbladder-related conditions underscores MRCP's role in identifying structural abnormalities and guiding appropriate treatment strategies. Additionally, the diverse range of clinical presentations observed underscores the importance of comprehensive imaging techniques like MRCP in the thorough assessment and management of patients suspected of having hepatobiliary disorders.

CONCLUSION

MRI plays a crucial role in thoroughly assessing hepatobiliary abnormalities due to its non-invasive nature, exceptional spatial resolution, and multifaceted imaging capabilities. These attributes grant unparalleled advantages in diagnosing, characterizing, and staging hepatic and biliary diseases. MRI's ability to detect even the most-subtle lesions and provide detailed insights into vascular and biliary anatomy equips clinicians with invaluable information crucial for devising treatment plans and managing patients effectively. Furthermore, ongoing advancements in imaging techniques and contrast agents continually refine MRI's diagnostic accuracy and clinical utility in evaluating hepatobiliary pathology. As a versatile imaging modality, MRI stands as an indispensable tool in the arsenal of healthcare providers, facilitating prompt and precise diagnoses that ultimately lead to improved patient outcomes.

ETHICAL STATEMENT

Ethical Approval: Yes

Source of Funding: There is no financial support or sponsorship involved in this study.

Conflict of Interest: There are no conflicts of interest to declare.

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