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Clinicodemographic Evaluation of Biliary and Pancreatic Disorders Using Magnetic Resonance Cholangiopancreatography (MRCP)

Rahul Pal

Assistant Professor, Department of Medical Radiology and Imaging Technology, Tripura Institute of Paramedical Sciences
Email: *2020rahulpal[at]gmail.com*

Abstract: ***Magnetic Resonance Cholangiopancreatography (MRCP) is a non-invasive imaging technique used to evaluate biliary and pancreatic disorders. This study aimed to assess the spectrum and clinical and demographic distribution of these disorders using MRCP. A prospective observational study was conducted on 70 patients referred for MRCP over six months. Demographic data and imaging findings were analyzed using descriptive statistics. Abnormal findings were observed in 91.43% of patients, with cholelithiasis being the most common condition (56.25%), followed by dilated common bile duct (15.62%). Female patients (64.29%) and individuals aged 31 to 40 years (22.85%) were most frequently affected. MRCP demonstrated high diagnostic utility in identifying a range of biliary and pancreatic conditions. The findings support its role as a non-invasive diagnostic tool; however, larger multi-center studies are needed to confirm generalizability.***

Keywords: Magnetic Resonance Cholangiopancreatography (MRCP), Cholelithiasis, Biliary disorders, Pancreatic disorders, Clinicodemographic study, Obstructive jaundice

1. Introduction

Magnetic Resonance Cholangiopancreatography (MRCP) is a specialized magnetic resonance imaging technique that enables non-invasive visualization of the biliary and pancreatic ductal system. It has become an essential diagnostic tool due to its high spatial resolution and absence of ionizing radiation [1–3].

Biliary and pancreatic disorders represent a significant proportion of abdominal diseases and often require accurate imaging for timely diagnosis and management. Conventional imaging modalities and invasive procedures such as Endoscopic Retrograde Cholangiopancreatography (ERCP) are associated with procedural risks and technical limitations [4–6].

In recent years, MRCP has emerged as a reliable alternative and provides detailed anatomical information without the complications associated with invasive techniques. Additionally, it contributes to understanding the clinicodemographic patterns of hepatobiliary and pancreatic diseases [5–8].

The present study was conducted to evaluate the spectrum and demographic distribution of biliary and pancreatic disorders using MRCP in a tertiary care setting.

2. Materials and Methods

Study Design and Setting:
This prospective observational study was conducted in the Department of Radiology at a tertiary hospital in Northeast India over a period of six months.

Study population:
A total of 70 patients referred for Magnetic Resonance Cholangiopancreatography (MRCP) for suspected biliary and pancreatic disorders were included in the study.

Inclusion Criteria:
- Patients of all age groups referred for MRCP
- Patients with suspected biliary or pancreatic pathology

Exclusion Criteria:
- Patients with contraindications to MRI (e.g., metallic implants, pacemakers)
- Patients with incomplete clinical or imaging data

Imaging Technique:
Magnetic Resonance Cholangiopancreatography (MRCP) examinations were performed on a 3 Tesla MRI system using a standardized imaging protocol optimized for hepatobiliary and pancreatic ductal evaluation. The protocol predominantly employed heavily T2-weighted sequences, which exploit the high signal intensity of static or slow-moving fluids, thereby providing excellent contrast between the fluid-filled biliary and pancreatic ducts and the surrounding soft tissues.

Thick-slab and thin-section T2-weighted sequences, such as single-shot fast spin-echo (SSFSE) or Half-Fourier Acquisition Single-shot Turbo Spin Echo (HASTE) were utilized to obtain high-resolution images of the ductal anatomy. Images were acquired in multiple planes, including axial and coronal orientations, to ensure comprehensive anatomical coverage and accurate delineation of the hepatobiliary system. Maximum intensity projection (MIP) reconstructions were generated from thin-slice datasets to provide a three-dimensional overview of the biliary and pancreatic ductal tree, facilitating better visualization of ductal

continuity, strictures, and obstructions. Patients were instructed to fast for at least 6–8 hours prior to the examination to reduce gastrointestinal fluid and peristaltic activity, thereby minimizing motion artifacts and improving image quality. Breath-hold and respiratory-triggered techniques were employed, when applicable, to further reduce motion-related artifacts and enhance image clarity.

Data Collection

Demographic data including age and gender were recorded. MRCP findings were analyzed and categorized into normal and abnormal findings. Abnormal findings were further classified into specific pathological conditions such as cholelithiasis, dilated common bile duct, strictures, carcinoma, pancreatitis, and pancreatic fistula. All imaging findings were documented in a structured data collection format to ensure consistency and accuracy of analysis.

Statistical Analysis

Data were entered and analyzed using descriptive statistical methods. The findings were expressed in terms of frequency and percentage. The results were presented in tabular and graphical formats for better interpretation.

Ethical Considerations

The study was conducted in accordance with established ethical standards and principles. Patient confidentiality and privacy were strictly maintained throughout the study, and no personally identifiable information was recorded or disclosed. The study utilized anonymized data collected as part of routine clinical practice.

3. Results

A total of 70 patients were included in the present study. Among them, 64 patients (91.43%) demonstrated abnormal findings on Magnetic Resonance Cholangiopancreatography (MRCP), while 6 patients (8.57%) showed normal findings (Table 1, Fig. 1).

Table 1: Distribution of Normal and Abnormal MRCP Findings

Findings	Number	Percentage
Normal	6	8.57%
Abnormal	64	91.43%

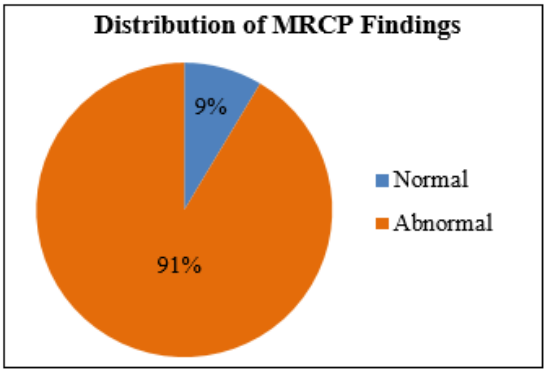

Figure 1: Pie chart showing distribution of normal and abnormal MRCP findings.

The age-wise distribution of patients (Table 2) revealed that the most commonly affected age group was 31–40 years, accounting for 16 patients (22.85%), followed by the 41–50 years age group with 12 patients (17.14%). Patients in the 21–30 years and 61–70 years age groups each contributed 11 cases (15.71%). The 51–60 years age group accounted for 9 cases (12.85%), while the 71–80 years and 11–20 years groups included 7 patients (10.00%) and 4 patients (5.71%), respectively.

Table 2: Age-wise Distribution of Patients Undergoing MRCP

Age group (Years)	Number	Percentage
11–20	4	5.71%
21–30	11	15.71%
31–40	16	22.85%
41–50	12	17.14%
51–60	9	12.85%
61–70	11	15.71%
71–80	7	10.00%

A female predominance was observed, with 45 patients (64.29%) being female and 25 patients (35.71%) being male (Table 3).

Table 3: Gender Distribution of Patients Undergoing MRCP

Gender	Number	Percentage
Male	25	35.71%
Female	45	64.29%

Among the 64 patients with abnormal MRCP findings, a range of biliary and pancreatic pathologies was observed (Table 4, Fig. 2). Cholelithiasis was the most common finding, identified in 36 patients (56.25%), followed by dilatation of the common bile duct (CBD) in 10 patients (15.62%). Biliary strictures and carcinoma were each detected in 6 patients (9.38%), while pancreatitis was observed in 4 patients (6.25%). Pancreatic fistula was the least common finding, seen in 2 patients (3.12%).

Table 4: Spectrum of Biliary and Pancreatic Disorders Detected on MRCP

Disorder	Number	Percentage
Cholelithiasis	36	56.25%
Dilated CBD	10	15.62%
Stricture	6	9.38%
Carcinoma	6	9.38%
Pancreatitis	4	6.25%
Pancreatic fistula	2	3.12%

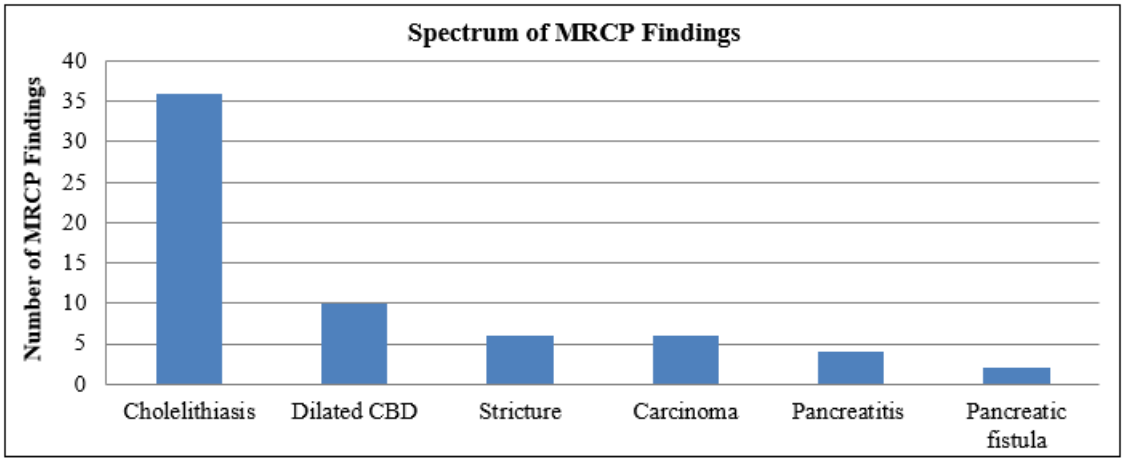

Figure 2: Bar diagram illustrating the spectrum of biliary and pancreatic disorders detected on MRCP
Overall distribution of findings is summarized in tables and figures.

4. Discussion

The findings of the present study reinforce the role of MRCP as a non-invasive alternative to ERCP, particularly in patients with suspected biliary obstruction, where it can reduce unnecessary invasive procedures.

The present study evaluated the spectrum and clinicodemographic distribution of biliary and pancreatic disorders using MRCP. A high rate of abnormal findings (91.43%) was observed, emphasizing the clinical utility of MRCP in the evaluation of hepatobiliary diseases [1–3]. The high proportion of abnormal findings observed in this study supports the effectiveness of MRCP in detecting biliary and pancreatic pathologies in patients with clinical suspicion.

Cholelithiasis was identified as the most common pathology, accounting for 56.25% of cases. This observation is consistent with previously reported studies, where gallstone disease represents the prevalent biliary pathology [4,7]. The high incidence may be influenced by dietary habits, metabolic factors, and lifestyle-related changes.

A higher prevalence of disease was noted among female patients (64.29%), which may be attributed to hormonal influences, particularly estrogen, known to increase cholesterol saturation in bile and predispose gallstone formation [7]. The observed female predominance in the present study further supports the known epidemiological pattern of biliary diseases.

The most affected age group in the present study was 31–40 years, suggesting a greater burden of disease among middle-aged individuals. Similar age-related trends have been reported in earlier studies evaluating biliary disorders [8].

MRCP proved to be a reliable and effective imaging modality, offering excellent visualization of the biliary and pancreatic ducts without exposure to ionizing radiation. Furthermore, it eliminates the risks associated with invasive procedures such as ERCP, making it a preferred diagnostic tool in suspected biliary obstruction. The ability of MRCP to detect a wide range of obstructive and inflammatory conditions further highlights its diagnostic capability [5,6,10].

However, the study has certain limitations, including a relatively small sample size and its single-center design, which may limit the generalizability of the findings. Additionally, inferential statistical analysis was not performed.

5. Conclusion

MRCP is a useful non-invasive imaging modality for evaluating biliary and pancreatic disorders, with high detection rates observed in this study. Cholelithiasis was the most common finding, with higher prevalence in females and middle-aged patients. While MRCP shows strong diagnostic value, the findings should be interpreted with caution due to the limited sample size and single-center design. Further large-scale studies are recommended to validate these results.

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