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"ROLE OF MAGNETIC RESONANCE CHOLANGIOPANCREATOGRAPHY (MRCP) IN EVALUATION OF PATIENTS WITH OBSTRUCTIVE JAUNDICE AT TERTIARY CARE CENTER"

Radio-Diagnosis

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ABSTRACT

This study evaluates the effectiveness of Magnetic Resonance Cholangiopancreatography (MRCP) in diagnosing patients with obstructive jaundice at a tertiary care center. Obstructive jaundice is a significant medical and surgical issue that can lead to severe complications if not promptly diagnosed and treated. While various diagnostic methods exist, including invasive procedures like ERCP and non-invasive ones such as USG and MDCT, MRCP is highlighted as a reliable non-invasive technique. The study included 50 patients with suspected obstructive jaundice referred to the Department of Radiology, Pandit Deendayal Upadhyay Government Medical College & Civil Hospital, Rajkot, Gujarat, India. Patients under 10 years of age, those with contraindications to MRI, or evidence of perihepatic/hepatic jaundice were excluded. MRCP scans were performed using Siemens Magnetom Sempra 1.5T/MRI 1.5T GE systems, utilizing various T1W, T2W, STIR, HASTE, and 3D sequences. The study aimed to determine the etiology, level, and degree of biliary obstruction. The findings revealed that the majority of cases (60%) were in adults aged 31-60 years. Cholelithiasis and choledocholithiasis were the most common causes of obstructive jaundice (30%), followed by cholecystitis (16%) and pancreatitis (10%). Abdominal pain was the most frequent symptom (96%), and 58% of patients had confirmed obstructive jaundice with abnormal direct bilirubin and ALP levels. The study concluded that MRCP is an indispensable tool for the diagnostic workup of obstructive jaundice, providing detailed anatomical and pathological information crucial for patient management and therapeutic planning, often reducing the need for more invasive procedures.

KEYWORDS

INTRODUCTION: -

Obstructive jaundice is a common problem in medical and surgical gastroenterological practice. The surgical jaundice can be caused by the obstruction of the bile duct as with gall stones, strictures, malignancy such as cholangiocarcinoma, periampullary carcinoma, carcinoma gall bladder and carcinoma head of pancreas. Various rare causes like the Castleman disease; Caroli's syndrome and metastatic liver tumor have also been reported.

The symptoms of obstructive jaundice include jaundice with or without pain, dark urine, pruritis, pale stools, weight loss and anorexia.

A wide array of diagnostic procedures including the invasive procedures like endoscopic retrograde cholangiopancreatography (ERCP), percutaneous transhepatic cholangiography (PTC), endoscopic ultrasound (EUS) as well as noninvasive investigations like ultrasonography (USG), multidetector CT (MDCT) and magnetic resonance imaging (MRI).

Magnetic Resonance Cholangiography (MRCP) have been utilized for evaluating the biliary tract in suspected obstructive jaundice.

Ultrasonography (USG) is considered as the first-line investigation in imaging obstructive jaundice as it is not only non-invasive but also cost effective and widely available; however, it has less sensitivity and specificity; thus, it can be used in the initial screening to further guide patients for MDCT, MRCP or ERCP in appropriate setting for accurate diagnosis.

MRCP though is considered the most reliable non-invasive technique, it has certain disadvantages. It is an expensive imaging technique utilizing prolonged examination time. It is also not widely available as a resource compared to MDCT. Patients with pacemakers and ferromagnetic implants, as well as claustrophobia cannot be imaged with MRI/MRCP. In the recent era MRCP is considered an important noninvasive imaging modality for preoperative evaluation of patients with obstructive jaundice. It can replace the more invasive ERCP and PTC which were considered as first-line investigations in the past. MRCP consists of heavily T2 weighted sequences highlighting static fluid which would be present in dilated pancreatic and biliary ducts. Due to availability of the ultrafast sequences and the newer 3D sequences, the images after post-processing resemble direct cholangiogram as seen by ERCP or percutaneous transhepatic cholangiopancreatography. We intend to evaluate the role of MRCP in determining the etiological spectrum, the level and degree of biliary obstruction in cases of obstructive jaundice.

Purpose of imaging procedure in obstructive jaundice are to identify the level of obstruction, location and length of obstruction, probable cause for obstruction.

MATERIALS & METHODS: -

Outdoor and indoor patients referred to radiodiagnosis Department of Radiology, Pandit Deendayal Upadhyay Government Medical College & Civil hospital, Rajkot, Gujarat, India, for MRCP with clinical and laboratory parameters suggesting obstructive jaundice were included in the study. Patients less than 10 years of age, those with contraindications to MRI and patients with clinico-laboratory evidence of perihepatic/hepatic jaundice were excluded.

MRCP in Obstructive jaundice A total of 50 patients were included after taking an informed consent from each patient. Demographic data, clinical details were recorded and collated along with MRI findings. Descriptive statistics was used to explore MRI findings and findings were correlated with surgical/histopathology/ERCP findings whichever applicable.

The MRI scan was performed with 5 mm thick axial T1W, T2W and STIR, 5 mm thick coronal T1W, T2W and STIR TRUFIS, Thin coronal T2 FS, Thick coronal T2 FS, T2W coronal respiratory trigger sequences, 3-5 mm thick T2 weighted Haste and 3D sequence.

The study protocol was approved by the ethical committee of this institute and all the patients gave written consent to participate. All the patients in the study underwent MRCP. MRCP was performed on Siemens Magnetom Sempra 1.5T/MRI 1.5T GE (2156158-143). All

images were obtained with breath holding and parameters were individualized. Detailed parameters of each sequence are summarized below.

The following Parameters like level of obstruction, Presence of bile duct calculi, Status of common bile duct (CBD), Degree of dilatation of intra hepatic biliary radicles, Gall bladder pathology including size, wall, stones, Dilatation of pancreatic duct, Pancreatic atrophy, calcifications, and pseudocysts, Presence of masses, Invasion of viscera, fascial planes and metastasis, in case of malignant lesions were studied.

Following diagnosis of common bile duct or pancreatic pathology after blood investigations and ultrasonography of abdomen and pelvis, MRCP was done.

Then classification of imaging findings as benign or malignant cause of obstructive jaundice is based on following scale of confidence.

Definitely Benign: Biliary duct dilatation with a visible stone in the duct with no associated mass or stricture.

Probably Benign: Cystic dilatation of bile duct. Pancreatico biliary duct dilatation considered benign (i.e. Sign of chronic pancreatitis).

Inconclusive: Not confidently diagnosed as benign or malignant.

Probably Malignant: Iso - Hypointense mass with indirect signs of tumor such as duct dilatation with ductal cut-off adjacent to the mass or atrophic distal parenchyma or pancreato biliary dilatation considered malignant without sign of a mass or lesion in pancreatic head without duct dilatation.

Definitely Malignant: Mass in the pancreatic head with consistent duct dilatation. Isolated CBD dilatation with an abrupt narrowing located cranial to the level of mass lesion. MRCP was analyzed separately and final diagnosis was established with per operative / ERCP or histopathological correlation.

RESULTS: -

Our study was a hospital based prospective study of 50 patients with clinical, biochemical or radiological suspicion of hepatobiliary pathologies.

Out of 50 patients, 28 patients had icterus (56%). Elevated levels of direct bilirubin were present in 29 out of 50 patients (58%). Increased levels of alkaline phosphatase enzyme were present in 29 out of 50 patients (58%).

Table 1: - Age Group Distribution Of Various Pathologies In Studied Population.

AGE GROUP	NO. OF CASES	PERCENTAGE (%)
Children (0-12yrs)	0	0
Adolescent & young adults (13-30yrs)	6	12%
Adults (31-60yrs)	30	60%
Geriatric patient (>60yrs)	14	28%
Total	50	100%

Table 2: - Various Causes Of Obstructive Jaundice In The Studied Population

PATHOLOGY	NO. OF CASES	PERCENTAGE (%)
PANCREATIC DIVISUM	2	4%
CHOLEDOCHAL CYSTS	4	8%
CHOLELITHISIS AND CHOLEDOCHOLITHIASIS	15	30%
CHOLECYSTITIS	8	16%
PANCREATITIS	5	10%
PANCREATIC PSEUDOCYSTS	4	8%
STRICTURES	3	6%
CA HEAD OF PANCREAS	3	6%
CHOLANGIOCARCINOMA	4	8%
CA GB	1	2%
METASTATIC COMPRESSION	1	2%
TOTAL	50	100%

Table 3: - Biographical Data

FEATURE	NO OF PATIENTS	PERCENTAGE (%)
SEX		
MALE	27	54%
FEMALE	23	46%
HISTORY OF PRESENT ILLNESS		
PAIN IN ABDOMEN	48	96%
YELLOWISH DISCOLORATION OF URINE	27	54%
LUMP IN ABDOMEN	18	36%
MEDICAL PAST HISTORY		
HYPERTENSION	13	26%
DIABETES	9	18%
TUBERCULOSIS	1	2%
NO MEDICAL PAST HISTORY	27	54%
SURGICAL HISTORY		
YES	7	14%
NO	43	86%
ADDICTION		
ALCOHOL	17	34%
NO ADDICTION	33	66%
GENERAL EXAMINATION		
PALLOR	5	10%
ICTERUS	28	56%
DIRECT BILIRUBIN		
ABNORMAL	29	58%
NORMAL	21	42%
ALP		
ABNORMAL	29	58%
NORMAL	21	42%
OBSTRUCTIVE JAUNDICE		
YES	29	58%
NO	21	42%

DISCUSSION: -

Our study aimed to evaluate the role of Magnetic Resonance Cholangiopancreatography (MRCP) in identifying the etiology, level, and degree of biliary obstruction in patients with obstructive jaundice, and to correlate these findings with surgical, histopathology, or ERCP results.

The demographic profile of our study cohort showed a predominance of adults (31-60 years), consistent with the general epidemiology of conditions like gallstones and malignancies that are common causes of obstructive jaundice. The slight male preponderance (54% males vs. 46% females) observed in our study is also notable.

Clinically, abdominal pain was almost universally present (96% of patients), highlighting its importance as a cardinal symptom in obstructive jaundice. The high incidence of icterus (56%) and elevated direct bilirubin (58%) and ALP (58%) levels further confirmed the nature of the condition in the studied population.

Cholelithiasis and choledocholithiasis were the leading causes (30%), aligning with their well-established prevalence in biliary tract pathology. Cholecystitis (16%) and pancreatitis (10%) also contributed significantly to the obstructive picture. The detection of less common but serious conditions such as cholangiocarcinoma (8%), carcinoma head of pancreas (6%), and choledochal cysts (8%) demonstrates the broad diagnostic capability of MRCP.

MRCP has emerged as a crucial non-invasive imaging modality for the evaluation of the biliary and pancreatic ducts, offering advantages over invasive procedures like ERCP and PTC, which carry risks such as pancreatitis, perforation, and bleeding. Our study utilized advanced MRCP techniques including HASTE and 3D sequences, which provide high-quality images comparable to direct cholangiography, thereby aiding in accurate preoperative assessment and therapeutic planning.

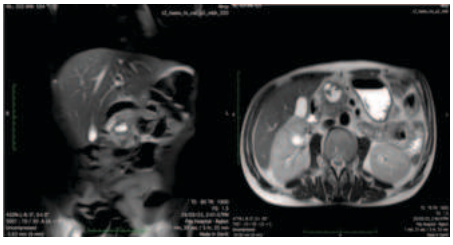
While MRCP is considered the most reliable non-invasive technique, its limitations, such as expense, limited availability, prolonged examination time, and contraindications for patients with metallic implants or claustrophobia, were acknowledged. However, the detailed evaluation possible with MRCP, including the level and extent

of obstruction, presence of calculi, and associated pathologies like masses and pancreatic changes, makes it an invaluable tool. The meticulous imaging protocol employed in our study, encompassing various T1W, T2W, and STIR sequences, ensured a comprehensive assessment of the hepatobiliary system.

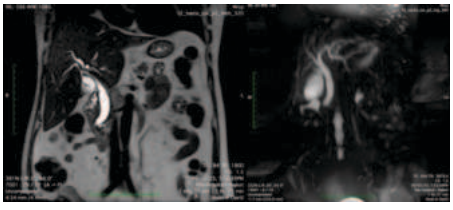
The inherent high contrast resolution, rapidity, multiplanar capability, and virtually artifact-free display of anatomy and pathology make MRCP the imaging modality of choice in many patients with obstructive jaundice. It provides comprehensive information on key parameters, including the level of obstruction, presence of bile duct calculi, status of the common bile duct (CBD), degree of dilatation of intrahepatic biliary radicles, gall bladder pathology (size, wall, stones), dilatation of the pancreatic duct, pancreatic atrophy, calcifications, and pseudocysts, as well as the presence of masses, invasion of viscera, fascial planes, and metastasis in malignant lesions. This detailed evaluation is vital for guiding patient management and surgical intervention, allowing for accurate therapeutic planning. The meticulous imaging protocol employed in our study, encompassing various 5 mm thick axial T1W, T2W, STIR, and coronal sequences, as well as thin and thick coronal T2 FS, T2W coronal respiratory trigger sequences, 35 mm thick T2 weighted Haste, and 3D sequences, ensured a comprehensive assessment of the hepatobiliary system. All scans were performed on Siemens Magnetom Sempra 1.5T/MRI 1.5T GE systems, with individualized parameters and breath-holding techniques to optimize image quality.

Despite some limitations such as higher cost, less widespread availability compared to MDCT, prolonged examination time, and contraindications for patients with pacemakers, ferromagnetic implants, or severe claustrophobia, the benefits of MRCP in terms of its non-invasiveness, detailed anatomical depiction, and avoidance of radiation and contrast agents make it an indispensable tool for the diagnostic workup of obstructive jaundice. Its ability to provide comprehensive information upfront can significantly streamline the diagnostic pathway and facilitate timely and appropriate therapeutic interventions.

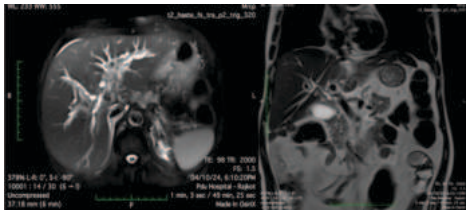
In conclusion, our study reinforces the indispensable role of MRCP in the diagnostic workup of obstructive jaundice. It provides detailed anatomical and pathological information, which is vital for guiding patient management and surgical intervention, often reducing the need for more invasive diagnostic procedures. The correlation of MRCP findings with surgical/histopathology/ERCP findings in future analysis will further solidify its utility in clinical practice.



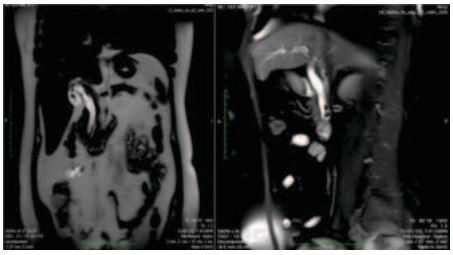
Case 1: - Carcinoma Of Head And Uncinate Process Of Pancreas.



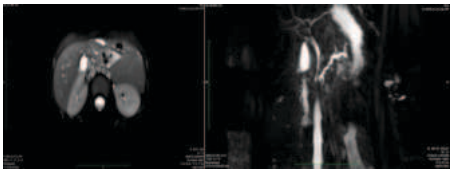
Case 2: - Distal Part Of The CBD (Intrapancreatic) STRICTURE (Malignant)



Case 3: - Cholangitis Of Distal Common Hepatic Duct And Common Bile Duct.



Case 4: - Cholelithiasis And Choledocholithiasis



Case 5: - Pancreatic Divisum - Complete Pancreas Divisum Likely (Type I – classic variant).

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