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Original Research Paper

Comparative assessment of MRCP with ERCP in Obstructive Jaundice

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ABSTRACT:
Introduction: Evaluation of suspected biliary obstruction typically involves various imaging techniques such as ultrasonography (USG), computed tomography (CT), and invasive cholangiography. In cases where ultrasound and CT fail to visualize intraductal stones adequately, invasive procedures like Endoscopic Retrograde Cholangio-Pancreatography (ERCP) and noninvasive radiation free MRCP become necessary. **Materials and Method**: All patients presenting with signs or symptoms of biliary or pancreatic pathology after initial clinical evaluation by a senior surgeon or physician, or those referred for evaluation of biliary or pancreatic pathologies. **Result**: Study population for obstructive jaundice was between 46-55 years. For gall stone detection, MRCP had specificity and sensitivity of 80% and 100% respectively where as ERCP had 100% each. For bile duct stones MRCP had sensitivity and specificity of 88.24% and 100% respectively and sensitivity and specificity of ERCP was 100% each. In detecting strictures it was observed that MRCP had sensitivity and specificity of 94.74 % and 100% respectively. Sensitivity and specificity of ERCP was 100% each. In detecting choledochal cyst, it was observed that MRCP had both sensitivity and specificity of 100 %. Sensitivity and specificity of ERCP was 100% each.

Keywords: Computed tomography (CT), MRCP (Magnetic Resonance Cholangio C Pancreatography), ERCP (Endoscopic Retrograde Cholangio Pancreatography),USG(Ultrasonography), cholelithiasis, Stricture

INTRODUCTION:

Evaluation of suspected biliary obstruction typically involves various imaging techniques such as ultrasonography (USG), computed tomography (CT), and invasive cholangiography.

A key indicator of biliary obstruction on ultrasound is ductal dilation; however, ultrasound often fails to accurately pinpoint the cause and precise location of obstruction due to its operator dependence and limitations in imaging retroperitoneal structures, especially in the presence of bowel gas or obesity [(1)]

In cases where ultrasound and CT fail to visualize intraductal stones adequately, invasive procedures like Endoscopic Retrograde Cholangio-Pancreatography (ERCP) or Percutaneous Transhepatic Cholangiography (PTC) become necessary.

The limitations of traditional imaging modalities have underscored the necessity for a non-invasive, radiation-free, and operator-independent imaging approach that offers multiplanar visualization capable of identifying both the presence and nature of biliary pathology. Magnetic resonance cholangiopancreatography (MRCP), introduced in 1991 and continuously refined since, has emerged as a viable alternative to ERCP, offering the combined advantages of projectional and cross-sectional imaging [(2).]

MRCP utilizes MR imaging to depict fluid in the biliary and pancreatic ducts as high signal intensity on T2-weighted sequences, making it highly effective for diagnosing various biliary and pancreatic diseases such as choledocholithiasis, congenital anomalies, chronic pancreatitis, post-cholecystectomy complications, and ductal obstruction due to tumors[(3).] Advancements in MR imaging technology have significantly enhanced the spatial and temporal resolution of MRCP, thereby improving its diagnostic accuracy and broadening its clinical utility in hepatobiliary and pancreatic diseases [(4).]

This evolution has positioned MRCP as a preferred diagnostic tool in cases where conventional cholangiography methods may be inadequate or impractical, such as in patients with biliary-enteric anastomoses or suspected pancreaticobiliary diseases [(5).]

Recent innovations in MR imaging, including faster sequences, phased-array coils, parallel imaging techniques, and high-field magnets like 1.5 T, have further optimized MRCP by enabling the acquisition of superior diagnostic images in shorter time frames.

These technological advancements are particularly beneficial in scenarios requiring detailed preoperative planning or postoperative monitoring [6].

In clinical practice, MRCP's role extends beyond mere diagnostic imaging; it also aids in guiding treatment decisions by accurately characterizing the extent and nature of pancreaticobiliary diseases. Notably, in the management of acute biliary pancreatitis, MRCP has proven to be a safe alternative to ERCP, assisting in the selective use of invasive procedures by reliably excluding choledocholithiasis when negative [7].

Aim and Objectives

AIM:

Role of magnetic resonance imaging in cholangiopancreatography for the evaluation of obstructive jaundice.

OBJECTIVES:To evaluate efficacy of MRCP as a diagnostic tool as compared to ERCP in diagnosing obstructive jaundice.

MATERIALS AND METHODS:

Study Design:This was a prospective study carried out in the Department of Radiology of T.N.M.C. and B.Y.L. Nair Charitable Hospital Mumbai.

Inclusion Criteria:

- All patients presenting with signs or symptoms of biliary or pancreatic pathology after initial clinical evaluation by a senior surgeon or physician, or those referred for evaluation of biliary or pancreatic pathologies.

Exclusion Criteria:

- Patients under 18 years old who could not comply with breath-holding commands.
- Hemodynamically unstable patients, unconscious patients, and those on ventilators or other life support.
- Patients with contraindications for MRI, such as those with cardiac pacemakers, recent non-MRI compatible metallic implants, or cochlear implants.

OBSERVATIONS AND RESULTS:

Table no 1: Age distribution amongst study population.

AGE GROUPS (in years)	FREQUENCY	PERCENTAGE (%)
15 to 25 years	3	6
26 to 35 years	1	2
36 to 45 years	10	20
46 to 55 years	16	32
56 to 65 years	11	22
66 to 75 years	7	14
75 to 90 years	2	4
Total	**50**	**100**

The above table shows that, out of the total study population, the majority belonged to the 46 to 55 years age group amounting to 32%.

Table no 2 :Gender distributionamongst study population

SEX	FREQUENCY	PERCENT
Male	26	52
Female	24	48
Total	**50**	**100**

The above table shows that 52% of the study population were males, and 48% were females.

Table no 3: Pathologies detected.

Pathologies detected	FREQUENCY	PERCENT
Choleltihiasis	10	20
Choledocholithiasis	17	34
Strictures	14	28
Choledochal cyst	2	4

Table no 4 : Frequency and percentage of Cholelithiasis.

PARAMETER	FREQUENCY	PERCENTAGE (%)
No gall stones	40	80
ERCP	2	4
ERCP & MRCP	8	16
Total	**50**	**100**

MRCP detected gall stones in 16% of the study population along with ERCP. ERCP alone detected bile duct stones in 4%.

Table no 5: Diagnostic efficacy of MRCP and ERCP for gall stones.

	SENSITIVITY (%)	SPECIFICITY (%)	POSITIVE PREDICTIVE VALUE (%)	NEGATIVE PREDICTIVE VALUE (%)
MRCP	80	100	100	95.2
ERCP	100	100	100	100

In detecting gall stones, it is observed that MRCP has sensitivity and specificity of 80 % and 100% respectively. Sensitivity and specificity of ERCP is 100% each.

Table no 6: Frequency and percentage of bile duct stones.

PARAMETER	FREQUENCY	PERCENTAGE (%)
No bile duct stones	33	66
ERCP	2	4
ERCP & MRCP	15	30
Total	**50**	**100**

MRCP detected bile duct stones in 30% of the study population along with ERCP. ERCP alone detected bile duct stones in 4%.

Table no 7: Diagnostic efficacy of MRCP and ERCP for bile duct stones.

	SENSITIVITY (%)	SPECIFICITY (%)	POSITIVE PREDICTIVE VALUE (%)	NEGATIVE PREDICTIVE VALUE (%)
MRCP	88.24	100	100	94.29
ERCP	100	100	100	100

In detecting bile duct stones, it is observed that MRCP has sensitivity and specificity of 88.24 % and 100% respectively. Sensitivity and specificity of ERCP is 100% each.

Table no 8: Frequency and percentage of strictures.

PARAMETER	FREQUENCY	PERCENTAGE (%)
No strictures	36	72
ERCP	2	4
ERCP & MRCP	12	24
Total	**50**	**100**

MRCP detected strictures in 24% of the study population along with ERCP. ERCP alone detected bile duct stones in 4%.

Table no 9: Diagnostic efficacy of MRCP and ERCP for strictures.

	SENSITIVITY (%)	SPECIFICITY (%)	POSITIVE PREDICTIVE VALUE (%)	NEGATIVE PREDICTIVE VALUE (%)
MRCP	85.71	100	100	94.74
ERCP	100	100	100	100

In detecting strictures it was observed that MRCP has sensitivity and specificity of 94.74 % and 100% respectively. Sensitivity and specificity of ERCP was 100% each.

Table no 10: Frequency and percentage of choledochal cyst.

PARAMETER	FREQUENCY	PERCENTAGE (%)
No choledochal cyst	48	96
ERCP	0	0
ERCP & MRCP	2	4
Total	**50**	**100**

MRCP detected choledochal cyst in 4% of the study population along with ERCP.

Table no 11: Diagnostic efficacy of MRCP and ERCP for choledochal cyst.

	SENSITIVITY (%)	SPECIFICITY (%)	POSITIVE PREDICTIVE VALUE (%)	NEGATIVE PREDICTIVE VALUE (%)
MRCP	100	100	100	100
ERCP	100	100	100	100

In detecting choledochal cyst, it was observed that MRCP has sensitivity and specificity of 100 % and 100% respectively. Sensitivity and specificity of ERCP was 100% each.

DISCUSSION:

The total of 50 patient who were clinically diagnosed or suspected of having pancreaticobiliary pathology were included in the present study after institutional ethical committee approval of which 26 were males and 24 were females and majority were in the age group of 46 to 55 years. In our study the sensitivity of MRCP was found to be 88.24 % for choledocholithiasis, 100% for CBD malignancy and 85.71% for CBD stricture which was comparable to the accuracy of MRCP evaluated by various authors.

In our study MRCP showed sensitivity and specificity 100 % for CBD tumors which was higher than the study conducted by Pamos S et al where the sensitivity and specificity was 100 and 83.3% respectively.

In our study, for stricture detection MRCP showed sensitivity of 94.74% and specificity of100%, while ERCP had 100% specificity and sensitivity where as Singh et al. (2018) reported MRCP to have a sensitivity of 93% and specificity of 98% for detecting strictures.

In the current study, the sensitivity and specificity of MRCP in detecting gall stones were 80% and 100%, respectively, whereas for ERCP, both sensitivity and specificity were 100%. Gupta et al. (2018) reported that MRCP had a sensitivity and specificity of 82% and 98%, respectively.

The sensitivity and specificity of MRCP and ERCP in detecting choledochal cysts were both 100%. Which is similar to study done by Sharma et al. (2018).

CONCLUSION:

We conclude that MRCP has high diagnostic accuracy and is equivalent to ERCP in diagnosing (IHBR-intra hepatic biliary radical- and CBD-common bile duct) abnormalities like IHBR strictures and CBD tumors.

In cases of CBD strictures, CBD stones and ampullary stones, MRCP is comparable to ERCP. For lower biliary tract abnormalitites like ampullary stricture and pancreatic ductal abnormalitites MRCP was found to have lower sensitivity. Ancillary findings like intrahepatic biliary radical dilatation and gall stone disease are well demonstrated on MRCP. MRCP as the method of choice for the diagnostic imaging of biliary and ERCP is reserved for therapeutic intervention in this setting as the commoner pathologies (stones ,strictures and malignancies in upper biliary tract) can be easily identified with high specificity with MRCP.

RECOMMENDATIONS:

We would propose that all cases of obstructive jaundice should undergo MRCP so that ERCP can be used only for therapeutic purpose.

MRCP should be performed in cases of CBD (when the clinical data and USG abdomen are inconclusive) to RULE OUT presence of stones, strictures and malignancies to avoid complications of diagnostic ERCP.

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