



ORIGINAL ARTICLE

Comparison of diagnostic usefulness of magnetic resonance cholangiopancreatography (MRCP) with endoscopic retrograde cholangiopancreatography (ERCP) in evaluation of patients with obstructive jaundice.

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ABSTRACT... Objective: To determine the diagnostic accuracy of Magnetic Resonance Cholangiopancreatography in diagnosis of obstructive jaundice taking Endoscopic Retrograde Cholangiopancreatography as gold standard. **Study Design:** Cross-sectional study. **Setting:** Department of Radiology, Aziz Fatima Medical and Dental Hospital, Faisalabad. **Period:** 1st October 2022 to 31st March 2023. **Material & Methods:** A total number of 108 patients reported at the OPD with the obstructive jaundice confirmed with liver function tests and having indication for conducting ERCP was included in this study. MRCP was done by radiologist with a torso phased-array coil. Sequence of MRCP was planned with use of 3 plane gradient-echo localizing images. By using Single-shot fast spine echo axial slices were taken. ERCP was carried out by gastroenterologist under local or general anesthesia. Assessment was done on the basis of pathology and results were compared between the two techniques where results of ERCP were taken as reference. The primary outcomes were sensitivity, specificity and negative & positive predictive values for obstructive jaundice. **Results:** In this study age range was 18 to 50 years with mean age of 40.805 ± 5.98 years and mean duration of complain was 7.259 ± 1.72 months. Female gender was dominant in this study (50.9%) followed by male (49.1%). MRCP diagnosed 58(53.7%) patients while ERCP diagnosed 55(50.9%) patients with obstructive jaundice. MRCP has shown sensitivity of 85.46%, specificity 79.24% and diagnostic accuracy by 82%, PPV 81% and NPV 84% in diagnosis of obstructive jaundice ($p < 0.000$). **Conclusion:** The non-invasive technique of MRCP provides a good and reliable diagnostic option in patients with obstructive jaundice which is comparable with invasive technique of ERCP.

Key words: ERCP, MRCP, Obstructive Jaundice.

INTRODUCTION

A complete or partial blockage of bile drainage into the duodenum leads to raised levels of serum bilirubin causing the obstructive jaundice. It is important to find the cause of this blockage to relieve it as the symptoms may worsen if not timely treated.¹ The cause of obstructive jaundice may be intra hepatic or extra hepatic and major symptoms include yellowish coloration of the skin, darkening the urine color, itching and fatigue. The liver function tests reveal the biochemical changes and the laboratory investigation shows a $>40 \mu\text{mol/l}$ concentration of serum bilirubin. There are also increased levels of alkaline phosphatase up to 5 times and

a moderate increase in transaminases levels.^{2,3} Accurate diagnosis of obstructive jaundice is vital for the gastroenterologists to advise the proper management. Although the most common cause is bile duct calculi, the other causes includes bile duct traumas and tumors.⁴

Besides the X-rays, visualization of pancreatic and common bile ducts is also required by gastroenterologist for accurate diagnostic purposes. Endoscopic retrograde cholangiopancreatography (ERCP) is a procedure used where endoscopy is combined with fluoroscopy for diagnosing the pathologies at the levels of pancreatic and biliary ducts.

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Besides the diagnosis the procedure is also useful to treat the cause of obstructive jaundice like removal of gall stones, sphincterotomy and stenting. It also useful in taking tissue biopsies where required. Expert gastroenterologist and radiologist along with a trained team is needed for the ERCP and procedure is done under sedation or general anesthesia.^{5,6} Despite its usefulness, the procedure of ERCP is however related to some unwanted complication which includes sepsis, bleeding, bile leakage, pancreatitis and even a reported rate of mortality up to 1%.⁷

A procedure called magnetic resonance cholangiopancreatography (MRCP) introduced in 1991 is now under frequent use for diagnostic purposes in the pathologies related to pancreatic duct and hepatobiliary diseases. MRCP is a noninvasive, fluid sensitive method that helps to locate the obstruction in the outflow of pancreaticobiliary fluids.^{8,9}

While making analysis between the two diagnostic options, it is considered that both are comparable in diagnosis of pancreatic and biliary duct pathologies.

ERCP has additional therapeutic benefits as well besides its diagnostic advantages.¹⁰ However, MRCP has the advantage of actual visualization of the biliary tract and finding the site of blockage. A major advantage of MRCP is in shape of being noninvasive and has shown patient's acceptability due to safety and less discomfort for the patients. MRCP offers diagnostic option where patients are not compliant to ERCP. MRCP also provides a superior option for patients where any therapeutic requirement is not present and diagnostics can be, therefore performed without the possibility of complications related to ERCP.¹¹

The study is therefore planned to compare the effectiveness of MRCP and ERCP in diagnosis of pancreatic and hepatobiliary tract pathologies. The results of the study will help to decide that weather the noninvasive technique of MRCP can be used prior to ERCP. This will help to avoid the reported complications with ERCP and to improve the patients compliance related to diagnosis of

obstructive jaundice.

MATERIAL & METHODS

The study was conducted at the department Radiology, Aziz Fatima Medical and Dental Hospital, Faisalabad over a period of 6 months from 1st of October 2022 to 31st of March 2023 after approval from ethical committee (IEC/210-23).

The study design was cross-sectional. By using sensitivity and specificity calculator for sample size calculations using sensitivity = 86%, specificity = 70%¹², prevalence = 54.1%¹³, confidence Interval = 95%, precision for sensitivity 9%, for specificity = 9% Sample size = 108

A total number of 108 patients reported at the OPD with the obstructive jaundice were confirmed with liver function tests and having indication for conducting ERCP was included in this study. Exclusion criteria were set as patients having contraindication for the procedure of MRCP like claustrophobia, cardiac pacemaker etc.

MRCP was done with a torso phased-array coil. Sequence of MRCP was planned with use of 3 plane gradient-echo localizing images. By using Single –shot fast spine echo axial slices were taken with parameters description: 2.1 TE, slice spacing 1-2mm and thickness 7mm, field of view 28-38cm and frequency 26 kHz.

Use of 12 reconstructed slices was made with 10-degree spacing. To promote gallbladder filling a 12-hour fasting time was obtained to get the sequences during a single breath hold. All the data of MRCP was assessed by radiologist.

ERCP was carried out by gastroenterologist under local or general anesthesia. The gastroenterologist was blinded of MRCP results. Similarly the radiologist was unaware of the ERCP results.

Diseases related to hepatopancreaticobiliary tract including choledocholithiasis, dilatations and pancreatic biliary strictures were assessed on the basis of pathology. Results were compared

between the two techniques where results of ERCP were taken as reference.

The primary outcomes were sensitivity, specificity and negative and positive predictive values. Fisher's exact 2×2 tests were applied with 95% confidence interval while taking p-value < 0.05 as statistically significant.

RESULTS

In this study age range was 18 to 50 years with mean age of 40.805 ± 5.98 years and mean duration of complain was 7.259 ± 1.72 months as shown in Table-I.

Demographics		Mean \pm SD
1	Age (years)	40.805 ± 5.98
2	Duration of complain (months)	7.259 ± 1.72

Table-I. Mean \pm SD of patient's age and duration of complain n=108

Frequency and percentage of patients according to gender are shown in Table-II.

Gender	No. of Patients (%)
Male	53 (49.1%)
Female	55 (50.9%)
Total	108 (100%)

Table-II. Frequency and percentage of patients according to gender n=108

MRCP diagnosed 58(53.7%) patients while ERCP diagnosed 55(50.9%) patients with obstructive jaundice as shown in Table-III.

Obstructive Jaundice	MRCP	ERCP
Positive	58(53.7%)	55(50.9%)
Negative	50(46.3%)	53(49.1%)
Total	108 (100%)	108 (100%)

Table-III. Overall results of MRCP and ERCP in diagnosis of obstructive jaundice n=108

MRCP has shown sensitivity of 85.46%, specificity 79.24% and diagnostic accuracy by 82%, PPV 81% and NPV 84% in diagnosis of obstructive jaundice ($p < 0.000$) as shown in Table-IV.

MRCP	Results
Sensitivity	85.46%
Specificity	79.24%
Diagnostic accuracy	82%
Positive predictive Value	81%
Negative predictive Value	84%

Table-IV. MRCP sensitivity, specificity and predictive values n=108

Comparison of MRCP versus ERCP for diagnosis of obstructive jaundice is given in Table-V.

MRCP	ERCP		Total
	Positive	Negative	
Positive	47 (TP)	11 (FP)	58
Negative	8 (FN)	42 (TN)	50
Total	55	53	108

Table-V. Comparison of MRCP versus ERCP for diagnosis of obstructive jaundice n=108

TP=True positive, FP = False positive
FN=False negative, TN=True negative

DISCUSSION

The use of ERCP is common for diagnostic purposes in cases of obstructive jaundice despite of requiring hospital admissions and putting burden of high costs for the patients. ERCP also needs to be done in relatively developed health care set ups because of requiring the expertise and facilities required for management of possible complications.¹⁴

Over the last decade, MRCP has become popular method for diagnosis of abnormalities like biliary blockage. The scans obtained through MRCP provide clear projection of the blockages. MRCP unlike ERCP is not dependent of team of operators and no need to administer the intravenous contrasts. Rahayu et al described MRCP as providing useful information regarding the anatomy and pathology of pancreato-biliary tract. The ERCP being an invasive procedure will then necessary only in selective cases.¹⁵ MRCP also exposes the patients to lesser radiation than ERCP and is done without sedation. Some limitations mentioned in different studies for MRCP includes those patients who have claustrophobia and having fluid in the duodenum or the ascetic fluid as they may produce bright signals.¹⁶ It is also reported that tumors, blood clots and parasitic infections are also sometimes misdiagnosed by radiologist and are reported as calculi of $< 4\text{mm}$ size.¹⁷ Tso DK et al, in their study mentioned that abnormal dilation of CBD in patients with choledocholithiasis results in decreased sensitivity for MRCP hence they preferred ERCP in this type of patients.¹⁸

Ali et al performed MRCP for assessing the

pancreatobiliary outflow obstruction and reported sensitivity and specificity as 97% and 95% respectively. They reported the sensitivity of MRCP for malignant lesions as 92%.¹⁹

Jagtap N et al studied MRCP and ERCP for their sensitivity for choledocholithiasis detection and shared the results as 80% and 90% respectively.²⁰

Hanif et al compared MRCP and ERCP for their sensitivity in pathologies of hepatopancreato biliary tract and reported it as 91% and 82% respectively with a p-value of >0.05.²¹

Hence most of the studies done with MRCP in this segment have mentioned sensitivity between 85 to 98% while specificity between 75 to 96%. The +ve predictive value are mentioned between 75 to 90% and -ve predictive values between 80 to 97%.^{22,23,24}

The results of our study are in line with the studies mentioned above. In our study age range was 18 to 50 years with mean age of 40.805 ± 5.98 years and mean duration of complain was 7.259 ± 1.72 months. Female gender was dominant in this study (50.9%) followed by male (49.1%). MRCP diagnosed 58(53.7%) patients while ERCP diagnosed 55(50.9%) patients with obstructive jaundice. MRCP has shown sensitivity of 85.46%, specificity 79.24% and diagnostic accuracy by 82%, PPV 81% and NPV 84% in diagnosis of obstructive jaundice ($p < 0.000$). The results therefore show that MRCP provides a good diagnostic technique for evaluation of patients with obstructive jaundice.

The limitations of our study includes the small sample size hence a study on large scale will be helpful to suggest more clear guidelines for the diagnosis of obstructive jaundice.

CONCLUSION

The non-invasive technique of MRCP provides a good and reliable diagnostic option in patients with obstructive jaundice which is comparable with invasive technique of ERCP. Hence it is suggestive to use MRCP and ERCP only in cases where necessary to avoid the unwanted

complications related to the technique.



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