https://doi.org/10.29309/TPMJ/2022.29.03.6697

The Professional Medical Journal
www.theprofesional.com
2022, Volume, 29 Issue, 03

ORIGINAL ARTICLE

Diagnostic accuracy of MRCP in obstructive biliopathy taking ERCP as gold standard. Experience at tertiary care hospital of developing country.

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Article Citation: Nayab S, Jesrani A, Awan RH, Magsi K. Diagnostic accuracy of MRCP in obstructive biliopathy taking ERCP as gold standard. Experience at tertiary care hospital of developing country. Professional Med J 2022; 29(3):285-290. https://doi.org/10.29309/TPMJ/2022.29.03.6697

ABSTRACT… Objective: To determine the accuracy of magnetic-resonance-cholangio-pancreatography (MRCP) in comparison with the endoscopic retrograde-cholangio-pancreatography (ERCP) in the diagnosis of obstructive biliopathy. **Study Design:** Cross Sectional study. **Setting:** Department of Radiology, Liaquat University of Medical and Health Sciences, Jamshoro. **Period:** October 2020 to April 2021. **Material & Methods:** Patients with suspected obstructive biliopathies highlighting need for ERCP were included in this study. MRCP was performed. ERCP was performed by duodeno-videoscope and general electric fluoroscopy. MRCP and ERCP were done which were reviewed by radiologist and were reviewed by radiologist and gastroenterologist and both were to the results of both modalities. Results of obstructive biliopathy from both techniques were compared, according to the pathology found. The sensitivity, specificity, and positive and negative predictive values were calculated. Statistical significance was set at $p<0.05$ with 95% confidence interval. **Results:** MRCP had sensitivity, specificity, positive and negative predictive values of 87%, 80%, 83.3% and 84.2% respectively for obstructive biliopathy (choledocholithiasis). **Conclusion:** MRCP has high diagnostic accuracy for bile duct calculi and is a useful non-invasive technique to diagnose biliary pathologies and avoids unnecessary ERCPs and its complications.

Key words: ERCP, MRCP, Obstructive Biliopathy.

INTRODUCTION

For an optimum management purpose in obstructive pancreaticobiliopathy it is crucial for both the surgeons and endoscopists to diagnose pancreatic and biliary tract pathologies.[1] Among other causes the most prevalent etiology of biliary tract outflow occlusion is bile duct calculi.[2] Instead of being intrusive technique it needs sedation, use of x ray, direct visualization of the common bile or pancreatic duct along with a skilled group of trained and experienced gastroenterologists and staff. Pancreatitis and bile leak, sepsis, bleed and 1% fatality rates are among the most severe ERCP induced complications.[3] For detecting the biliary outflow obstruction MRCP is an efficient option being the non-intrusive and compliant as compared to ERCP.[4] MRCP is basically selective fluid sensitive magnetic resonance imaging (MRI) of hepato-biliary and pancreatic drainage ducts. In evaluation and detection of hepatopancreaticobiliary disorders MRCP is utilized in higher number since 1991 when it came into existence. ERCP has a huge benefit over an MRCP as being used for both therapeutic and diagnostic tool.[5] In the patients with no therapeutic indication unwanted ERCP induced issues like pancreatitis and sepsis can be ignored by using MRCP technique.[6] In unsuccessful cases and non-compliant patients to intrusive procedure MRCP is facilitated as another method of choice. MRCP is also particularly of benefit where ERCP is anticipated technically difficult, hazardous or impossible. It is also considered a useful alternative option for patients with failed attempt for ERCP.[7] Purpose of our study is to stabilize the usage of non-invasive technique like MRCP

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Article received on: 06/07/2021
Accepted for publication: 06/12/2021

and reduce the usage of ERCP until needed for therapeutic purpose as well and hence to reduce the rate of possible complications with ERCP.

MATERIAL & METHODS

A prospective study was conducted at Department of Gastroenterology of Liaquat University of Medical and Health Sciences, Jamshoro. Review of medical record from 20th October 2020 till 19th April 2021 was undertaken. Ethical Review Committee approval was obtained (LUMHS/ REC/-927).

In this prospective study inclusion of suspected obstructive biliopathy around eighty four patients with definite indication for ERCP was done. Exclusion of conditions considered as absolute contraindications (cardiac pacemaker, claustrophobia, large patient size, ankylosing spondylitis) to MRCP from the study was done. MRCP was performed, using a torso phased-array coil. Three plane gradient-echo localizing images were obtained and used to plan MRCP sequence. Axial slices were performed using single-shot fast spin-echo (SSFSE) sequences; parameters: 2.1 TE, Field of view 28 - 38 cm, Slice thickness: 7 mm with spacing: 1-2 mm and frequency: 256 kHz. Radial slice acquisitions with high resolution, thick slab using long TE were performed in the region of the biliary and pancreatic ducts. Twelve reconstructed slices with 10-degree spacing were used. To facilitate gallbladder filling duration of 12 hour fasting is acquired for obtaining all the sequences during a single breathe hold method. Under local and general anesthesia ERCP is done by Olympus JF type 230 flexible duodeno-videoscope and general electric fluoroscopy. ERCP is performed by a skilled gastroenterologist in a prone position without any information related to previous MRCP results. ERCP conclusions were blinded with a MRCP images examined by a skilled radiologists. ERCP elucidated by an expert gastroenterologists also blinded with MRCP results. Pathology based assessment was done in the compared results of MRCP and ERCP hepatopancreaticobiliary tract diseases i.e. choledocholithiasis, pancreaticobiliary strictures and dilatation.

The positive, negative predictive values, sensitivity and specificity were used to compare the two imaging techniques. Fisher's 2x2 exact tests were used to compare groups. 95% confidence interval with statistical significance was set at $p<0.05$.

RESULTS

With a mean 45.4 years, ages of patients were ranged from 33 to 68 years. Females were in large number (69%). Mainly (83.7%) i.e. 62 patients had biochemically raised obstructive LFTs profile along with a large number (65.3%) were symptomatically jaundiced. On ERCP examination common bile ducts calculi were the most prevalent pathology. Along with common bile duct calculi and strictures abnormal intra and extrahepatic ductal dilatation was also the most common association found in 62 patients. 8 patients had normal ERCP examination. Variable factors like difficulty in patient intolerance with the procedure, duodenal benign and malignant lesions, markedly edematous papilla and impacted calculus just above the hepatopancreatic ampulla resulted in failed ERCP examination in 12 patients. Common bile ducts calculi were seen in 36 patients on MRCP, in 6 patients involving hepatopancreatic ampulla/ distal CBD and in 30 patients the bile ducts. In 18 patients strictures were detected out of whom 10 were seen in main common bile duct, suspected tumours in the main papilla in 6 cases and pancreatic duct strictures were seen in 2 patients. In 56 patients dilated bile ducts were detected with either an associated calculi or strictures. Normal MRCP was seen in 4 patients. In 6 patients unsuccessful MRCP: 2 were noncompliant cases to procedure and poor visualization of ducts due to gross ascites seen in 4 cases (Table-I).

Out of 32 cases 30 cases were correctly detected on MRCP examination and with ERCP-proven bile duct calculi, and 48 of the 52 patients without calculi in comparison of both studies. In 4 out of the 4 symptomatic patients calculi were correctly detected in the hepatopancreatic ampulla, and on MRCP the negative patients were correctly excluded. 88% and 92% were the specificity, sensitivity for choledocholithiasis respectively. On MRCP 14 out of 18 cases of strictures were

confirmedly detected.62 cases out of 66 negative patients were also excluded. On MRCP 4 false negative cases and 4 false-positive cases were also seen. For detection of strictures 93.9% and 77.7% were the specificity and sensitivity of MRCP respectively. On MRCP 56 out of 62 diseases cases of biliary dilatation were detected and 16 out of 22 negative cases were also excluded by this technique. 14 false-negative and 4 false-positive conclusions were achieved on MRCP. 81.8% and 90.3% were the specificity and sensitivity respectively. 4 false-positive results were detected however the definite diagnosis of affected cases of ampullary neoplastic lesions was also done by this examination. All the affected cases with biliary tract leakage were failed to be detected on MRCP. 83.3%, 84.2%, 80% and 87% were the overall positive, negative predictive values, specificity and sensitivity of MRCP for biliary tract abnormalities respectively. 100% of positive predictive values and sensitivity for pancreatic duct filling defects were concluded. 100% cases of successful ERCP were seen in all of the 6 cases with failed MRCP and in 2 cases the detection of biliary tract calculi and its associated biliary dilatation was successful on MRCP which were unsuccessful on ERCP. Therapeutic managements like impacted biliary calculi removal with or without stent placement, biopsy samples for histological purposes taken in suspected ampullary neoplastic lesions and sphincterotomy were the additional benefits of an ERCP. Figure-1 is showing distal CBD stricture with dilatation of proximal CBD and intrahepatic ducts on MRCP on T2WI coronal sequence and on 3d reconstruction image, which is later confirmed on ERCP. Figure-2 is showing distal CBD stone with mild dilatation of CBD proximal to stone and mild dilatation of intrahepatic ducts on coronal sequence of T2WI (stone pointed with red arrow) which is later confirmed on ERCP and ERCP additionally shows stone at confluence of right and left hepatic ducts (stone pointed with white arrow) as shown in magnification view.

Pathology		ERCP (n 84)	MRCP (n 84)	Significance
Choledochoithiasis	Total	32	36	
	CBD	28	30	P-value<0.05
	Ampulla/ Terminal CBD	4	6	P-value<0.05
Strictures	Total	18	18	
	CBD	12	10	P-value<0.05
	Pancreatic	4	2	P-value<0.05
	Papilla	2	6	P-value<0.16
Dilated CBD		62	56	P-value<0.05
Normal		8	4	
Failed Procedure		12	6	

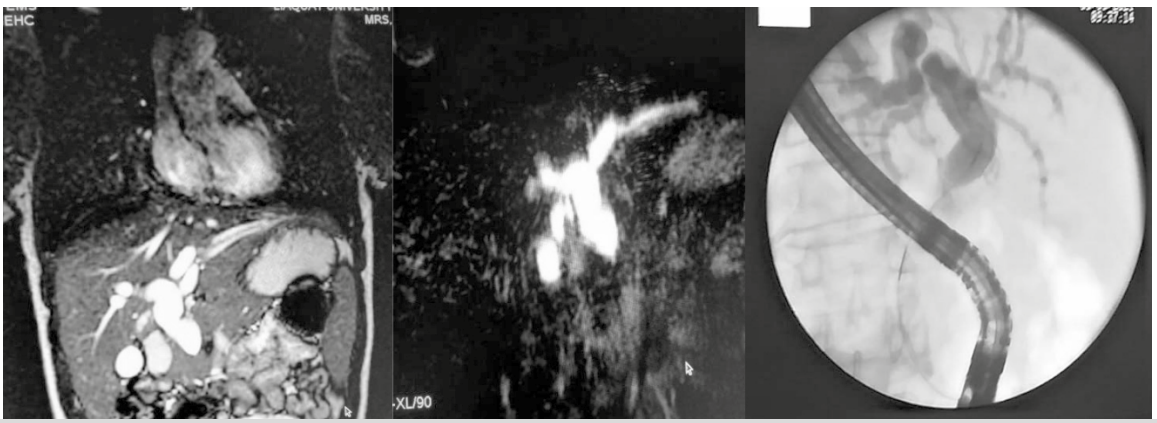

Figure-1. Distal CBD stricture on MRCP and ERCP.

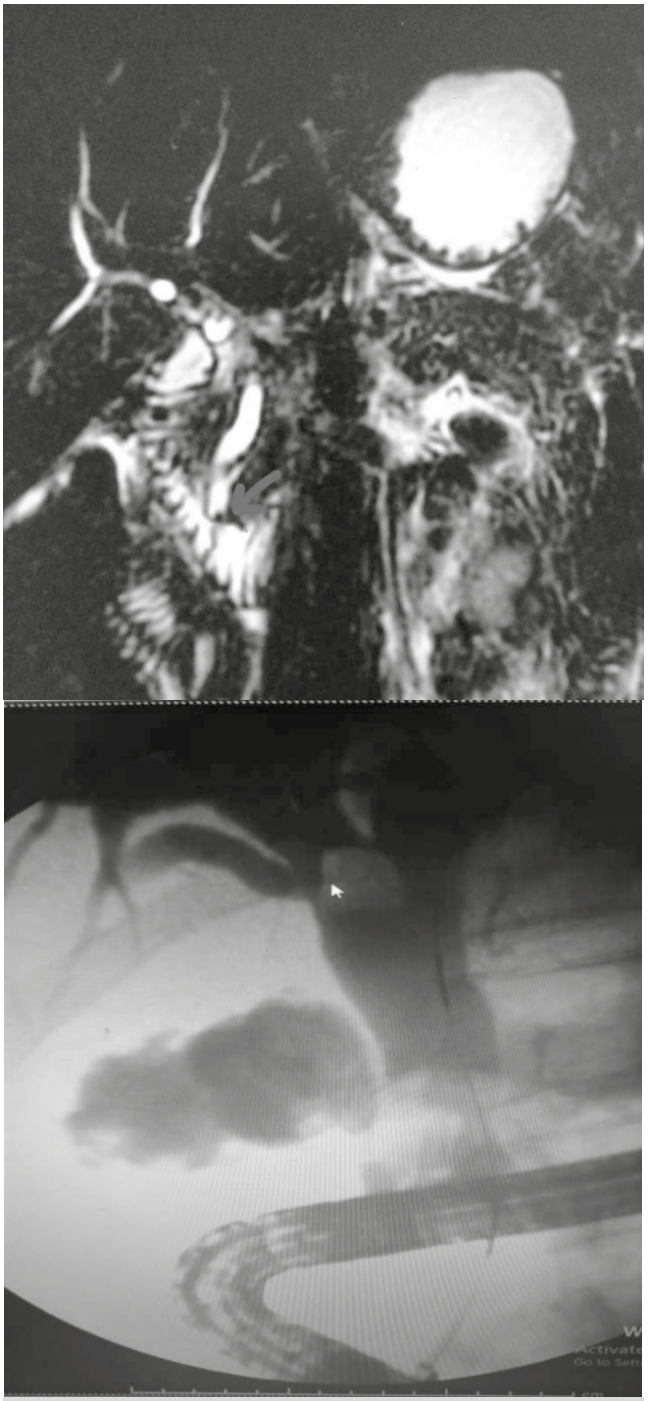

Figure-2. Stones in biliary system on MRCP and ERCP.

DISCUSSION

The main aim of this prospective cohort study was to compare the diagnostic accuracy of relatively non-intrusive MRCP vs. much intrusive ERCP as a main study of choice for hepatopancreaticobiliary pathologies. For imaging the pancreaticobiliary tract abnormalities other than an ERCP, MRCP is regarded as a substitutional nonintrusive, compliant and non-interventional study.[8] There are undoubtly beneficial and accurate results are achieved by MRCP in comparison to diagnostic or therapeutic ERCP.[9] An ERCP is carried out in very few well developed health institutions throughout the world apart being a study of choice due to limited expertise in its performance and management of its associated complications.[10] for detecting hepatic and biliary tract diseases. MRCP is considered as a first investigation of choice due to its magnificent benefits over ERCP.[11] Diagnostic outcomes of an MRCP is same to ERCP in vast hepatopancreatic biliary tree but there is markedly increased ERCP induces complications like bowel perforation or hemorrhage, pancreatitis and sepsis and pancreatic duct cannulation.[12] By an MRI and MR angiography an MRCP provides an extraordinary usefulness of pancreatico-biliary tract anatomical details and knowledge than an ERCP.[13] Other hazards like sedation, radiation exposure and contrast mediums are not utilized in an MRCP.[14] Less time is needed to perform and complete this technique if proper fasting is achieved by patient. Uncooperative patients due to claustrophobic nature and imaging associated artifacts are the major drawback of this modality. Static fluid within and adjacent to duodenum and ascitic fluid results in imaging artifacts as bright signals. Metallic cholecystectomy surgical clips can also results in signal drop out artifact.[15,16] Small filling defects like parasitic infestation, blood clot, tumour can be misdiagnosed and confused with small biliary calculi of <4 mm are although readily seen but easily confused on MRCP.[17] Intrabiliary air bubbles, flow imaging artifacts and false ampullary stones are among the mimickers of common bile ducts stones.[18]

By preventing an ERCP associated harmful effects an MRCP has major detecting ability to replace as evident by all above mentioned comparison between an MRCP and ERCP. Overall the specificity of 75 - 98%, sensitivity of 85 - 97%, negative predictive values of 82 -98% and positive predictive values of 83 - 89% is evaluated in several international studies suggesting the diagnostic accuracy of MRCP.[19,20] The values for detection of malignant lesions is lower than biliary tract calculi

by an MRCP than an ERCP apart MRCP being a mainstay diagnostic technique.[20] For detection of pancreaticobiliary tract outflow obstruction 97% and 95% are the specificity and sensitivity of an MRCP respectively but for malignant lesions (88%) the sensitivity is higher than for biliary calculi (92%) according to a systematic observation0.[21] 82% and 94% respectively are the complete depicting values of hepatopancreatic biliary tract of an ERCP and MRCP ($p>0.05$) in a recent prospective cohort study.[22] Comparison of MRCP with ERCP proved that detecting accuracy of MRCP is comparable with that of ERCP according to Park et al study in differentiating an extra-hepatopancreatic biliary tree malignant lesion such as cholangio-carcinoma from benign etiology of strictures.[23] 90.0% and 80.0% are the sensitivities respectively in suspected biliary-pancreatitis of ERCP and MRCP for evaluating and detecting choledocholithiasis according to Moon et al study.[24] Abnormal dilatation of biliary tract results in reduced sensitivity of MRCP in diagnosing the choledocholithiasis.[25]

CONCLUSION

A vast number of hepatopancreaticobiliary tract pathologies (stricture, neoplastic lesions and obstructions) can be detected by MRCP due to its remarkable diagnostic efficacy then an ERCP and by avoiding possible unwanted and harmful complications.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Seema Nayab	Contributed and conception and interpretation of data and gives its expert for manuscript designing.	
2	Ameet Jesrani	Drafting of the article and shares expert reserach opinion and experience in finalizing the manuscript.	
3	Riaz Hussain Awan	Contribution to conception and designing, acquisition and review of data.	
4	Kosar Magsi	Revision and corresponding author data collection and analysis.	