ORIGINAL ARTICLE

Diagnostic Accuracy of Magnetic Resonance Cholangiopancreatography in Benign and Malignant Lesions in Obstructive Jaundice Patients, Taking Histopathology as Gold Standard

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ABSTRACT

Objectives: To find out the diagnostic accuracy of magnetic resonance cholangiopancreatography in benign and malignant lesions in patients of obstructive jaundice, taking histopathology as gold standard.

Material and methods: This cross sectional study was conducted at Department of Radiology, Bahawal Victoria Hospital, Bahawalpur October 2019 to April 2020. A total of 164 patients with suspected cases of obstructive jaundice and age 25-65 years of either gender were included. Then magnetic resonance cholangiopancreatography (MRCP) was performed in every patient by 1.5 Tesla MR System using a torso phased-array coil. After this, each patient was undergone operation in the concerned ward. Findings of MRCP were compared with the findings of histopathology.

Results: In MRCP positive patients, 78 were true positive (TP) and 13 were false positive (FP). Among 73, MRCP negative patients, 08 were false negative (FN) whereas 65 were True Negative (TN). Overall specificity, sensitivity, NPV, PPV and diagnostic accuracy of magnetic resonance cholangiopancreatography in benign and malignant lesions in patients of obstructive jaundice, taking histopathology as gold standard was 90.70%, 83.33%, 85.71%, 89.04% and 87.20% respectively.

Conclusion: This study concluded that magnetic resonance cholangiopancreatography (MRCP) is the non-invasive modality of choice with diagnostic accuracy in diagnosing in benign and malignant lesions in obstructive jaundice patients.

Keywords: obstructive jaundice, sensitivity, magnetic resonance imaging.

INTRODUCTION

Obstructive jaundice (OJ) is a situation occurred because of blockage in pathway among bile conjugation site in liver and entrance of bile in duodenum by ampulla. In bile duct, blockage may be extrahepatic or intrahepatic.[1] With laboratory and clinical evidence of biliary obstruction cases which suggestive of OJ, radiologist focused on obstruction presence and location identification, extent and possible reason.[1,2] Extrahepatic obstruction is commonly caused by pancreaticobiliary malignancies and Choledocholithiasis.[3] Diagnostic measure like ultrasound of abdomen, CT abdomen, endoscopic retrograde cholangiopancreatography (ERCP) and magnetic resonance cholangiopancreatography (MRCP) are required for the management of OJ.[4,5]

MRCP is non-invasive and very important modality for the investigation of OJ cases.[6] In 1991, MRCP was introduced for evaluation of pancreatic and biliary duct obstruction. In early phases, for the evaluation of OJ, MRCP was considered as second level modality. Now a days, MRCP is widely used for the diagnosis of OJ.[6,7]

The objective of the study was to find out the diagnostic accuracy of magnetic resonance cholangiopancreatography in benign and malignant lesions in patients of obstructive jaundice, taking histopathology as gold standard.

Operational definitions:

Cases of obstructive jaundice: All patients who were presented with obstructive jaundice on laboratory analysis (serum bilirubin >2 mg/dl, alkaline phosphatase > 140 IU/ L) of any duration was taken as positive.

Magnetic resonance cholangiopancreatography findings of benign lesions: Presence of hypointense, well circumscribed area in common bile duct on MRCP was taken as positive.

Magnetic resonance cholangiopancreatography findings of malignant lesions: presence of filling defects within the biliary tree and dilatation of the common channel was taken as positive.

Histopathology findings: presence of all these i.e. glandular, acinar structures, intracytoplasmic mucin, cuboidal or low columnar cells was deemed as positive.

MATERIAL AND METHODS

This was a cross sectional study conducted at Department of Radiology, Bahawal Victoria Hospital, Bahawalpur October 2019 to April 2020. A total of 164 patients with suspected cases of obstructive jaundice (as per-operational definition), duration of disease ≥48 hours, having age 25-65 years either male or female were included in this study.

Pregnant females, post-operative cases of choledocholithiasis, heart patients, cases which are not fit for MRCP, patients with any coagulation disorder i.e. hemophilia, ITP (INR >1.5), chronic liver disease patients and chronic renal failure patients were excluded from the study.

Study was approved by institutional ethical review committee. Informed written consent was taken from each patient. Then magnetic resonance cholangiopancreatography (MRCP) was performed in every patient by 1.5 Tesla MR System using a torso phased-array coil. All MRCP films were looked for benign or malignant lesions as per-operational definition. After this, each patient was undergone operation in the concerned ward. MRCP findings were compared with histopathology findings. This all data (age, gender, duration of symptoms, benign or malignant lesion on MRCP and operation) was recorded on a specially designed proforma.

Data was analyzed by using SPSS 20.0. Mean and standard deviation were calculated for age and duration of disease. Gender and benign or malignant lesion on MRCP and operation were presented as frequency and percentage. 2x2 table was plotted to calculated sensitivity, specificity, PPV, NPV and diagnostic accuracy.

		Surgical findings	
		Malignant	benign
MRCP Findings	Malignant	True Positive (a)	False Positive (b)
	Benign	False Negative (c)	True negative (d)

"Sensitivity: a / a+c x 100"
"Specificity: d / b+d x 100"
"Positive predictive value: a / a+b x 100"
"Negative predictive value: d / c+d x 100"
"Diagnostic accuracy: a+d / a+b+c+d x 100"

RESULTS

Mean age was 45.68 ± 8.88 years with age range 25-65 years and mean duration of symptoms was 6.70 ± 2.07 days. Age group 25-45 years was consisted on 76 (46.34%) patients while age group

46-65 years consisted on 88 (53.66%) patients. (Table 1) Male patients were 73 (44.51%) and female patients were 91 (55.49%). (Fig. 1) Two groups of duration of symptoms were created i.e. ≤7 days group and >7 days group. Total 104 (63.41%) patients belonged to ≤7 days group while 60 (36.55%) patients belonged to >7 days group. (Table 2) Malignant lesions were noted 91 (55.49%) patients by using MRCP. Histopathology findings confirmed malignant lesions in 86 (52.44%) cases. In MRCP positive cases, true positive (TP) cases were 78 while false positive (FP) cases were 13. Among 73, MRCP negative cases, 08 cases were false negative (FN) while 65 cases were True Negative (TN). (Table 3). Overall sensitivity was 90.70%, specificity 83.33%, positive predictive value (PPV) 85.71%, negative predictive value (NPV) 89.04% and diagnostic accuracy of MRCP was 87.20%.

Table 1: Stratification of patients according to age

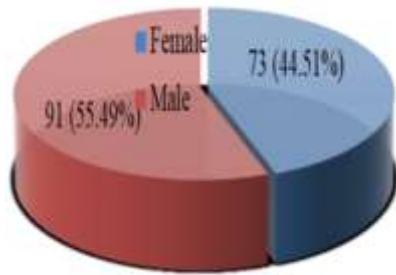| Age (years)	N	%
25-45	76	46.34
46-65	88	53.66
Total	164	100.0

Fig. 1: Gender distribution

Table 2: Stratification of patients according duration of symptoms.

Duration of symptoms (days)	N	%
≤7	104	63.41
>7	60	36.55
Total	164	100.0

Table 3: Diagnostic accuracy of MRCP in benign and malignant lesions in obstructive jaundice patients, taking histopathology as gold standard.

	Positive result on histopathology	Negative result on histopathology
Positive on MRCP	78 (TP)	13 (FP)
Negative on MRCP	08 (FN)	65 (TN)

"TP=True positive, FP=False positive, FN=False negative, TN=True negative"
"Sensitivity: 90.70%"
"Specificity: 83.33%"
"Positive Predictive Value (PPV): 85.71%"
"Negative Predictive Value (NPV): 89.04%"
"Diagnostic Accuracy: 87.20%"

DISCUSSION

The objective of present study was to find out the diagnostic accuracy of MRCP in benign and malignant lesions in patients of obstructive jaundice, taking histopathology as gold standard. All the patients were subjected to MRCP and then histopathology. MRCP supported the diagnosis of malignant lesions in 91 (55.49%) patients. Malignant lesions were confirmed in 86 (52.44%) cases on histopathology.

In MRCP positive cases, true positive (TP) cases were 78 while false positive (FP) cases were 13. Among 73, MRCP negative cases, 08 cases were false negative (FN) while 65 cases were True Negative (TN). (Table 3). Overall sensitivity was 90.70%, specificity 83.33%, PPV 85.71%, NPV 89.04% and diagnostic accuracy of MRCP was 87.20%. In a study, the prevalence of malignant lesions was found to be 42.0%. The accuracy was 92%, sensitivity 93.7%, and specificity of MRCP was

91.2%.[8] In another study, sensitivity of MRCP was 92.95%, specificity 86.02%, positive predictive value 91.77% and NPV was 87.91%.[9]

One study has shown the sensitivity as 94.6%, specificity 93.8%, PPV 85.7%, NPV 94.4%.[10] In another study by Al-Obaidi et al[11] sensitivity and specificity was 100% and 98.5% respectively while accuracy was 98.7%. In study of Verma et al[12] MRCP sensitivity was 92.3% while specificity was 86% for detecting the benign etiology of obstruction. In study of Ferrari FS et al[13] MRCP sensitivity was 90%, specificity 94% while diagnostic accuracy was 93.13%. You MW et al reported sensitivity and specificity of MRCP as 77.3% and 88.9% for diagnosis of choledocholithiasis.[14] Kim HK et al in his study has found the sensitivity and specificity as 100.0% and 30.0% respectively.[15] In another study, diagnostic accuracy of MRCP for choledocholithiasis was 97%, sensitivity 95.2%, specificity was 97.5%, PPV 90.9% NPV was 98.7%.[16] In another study, diagnostic accuracy of MRCP was 90.36%, sensitivity as 92.95%, specificity as 86.02%, PPV was 91.77% and NPV was 87.91%.[17] One study has shown the sensitivity and specificity as found 100.0%[18] while another study has shown sensitivity of MRCP in identifying choledocholithiasis as 91.66% and specificity as 90.46%.[19] In another study, MRCP had sensitivity as 87% and specificity as 80%.[20]

Another study[21] reported accuracy of MRCP as 89.65%, sensitivity and specificity as 94.4% and 81.1% respectively.

In a comparative study by Upadhyaya et al[22] diagnostic accuracy of MRCP was 87.5% for the assessment of biliary diseases. Similar diagnostic accuracy 89.65%) of MRCP was reported by Vaishali et al.[23]

Sensitivity and specificity of MRCP reported by Aube et al[24] was 90.5% and 87.5%.

Griffin N et al[25] reported accuracy of MRCP as 93%, sensitivity as 84%, specificity as 96%, PPV as 91% and NPV as 92%.

CONCLUSION

This study concluded that magnetic resonance cholangiopancreatography (MRCP) is the non-invasive modality of choice with diagnostic accuracy in diagnosing in benign and malignant lesions in obstructive jaundice patients.

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