"Role Of 3 Tesla Magnetic Resonance Cholangio-Pancreatography In Differentiation Of Benign And Malignant Causes Of Biliary Obstruction".

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Abstract
Background: *Obstructive jaundice is a type of jaundice, due to blockage in flow of bile from liver to intestine. This result in redirection of excess bile and bilirubin into circulation. Differentiation of benign and malignant etiology of biliary obstruction is difficult with imaging alone.* ***Aim*** *of this study is to evaluate the diagnostic accuracy of 3-Tesla MRCP in differentiating benign from malignant biliary obstructive diseases in correlation with surgical, ERCP and HPE findings as gold standard.*

Material and method: *This is a hospital based prospective cross sectional study. Time bound study with 30 samples of suspected cases of obstructive jaundice, 30 patients with clinical and laboratory finding suggestive of biliary obstruction underwent 3 Tesla MRCP. All patients above the age of 18 years with clinical suspicion of biliary obstruction and/ altered LFT and Cases where USG /CT showed features of biliary abnormality were included in study. Patients, who underwent surgical intervention/post ERCP for biliary obstruction or Contraindications for MRI, were excluded from present study.*

Results*: Total of 30 patients with clinical suspicion of biliary obstruction were imaged by 3-Tesla MRCP. Among them 76.7% were benign cases and 23.3% were malignant in nature. Mean age of the included patients was 50.3±14.41 years. There was slightly male preponderance in biliary tract obstruction (Male-16; Female-14). Most common symptom affecting the patients was pain abdomen, vomiting and yellowish discoloration of skin and sclera. Most common cause of benign obstruction in present study was choledocholithiasis (n=10) followed with calculous cholecystitis (n=6). Irregular, asymmetric and long segment narrowing was more common in malignant stricture. Most common cause of benign obstruction in present study was choledocholithiasis (n=10) followed with calculous cholecystitis (n=6). Irregular, asymmetric and long segment narrowing was more common in malignant stricture.*

Conclusion: *MRCP is an accurate, non-invasive means of evaluating biliary obstructive disease. It is the investigation of choice in differentiating benign from malignant biliary obstructive diseases. Benign stricture can be differentiated from a malignant one if it shows regular, symmetric and short segment narrowing. Irregular, asymmetric and long segment narrowing was more commonly found in malignant stricture.*

Keywords: *Biliary Obstruction, MRCP, Benign, Malignant, Choledocholithiasis, HPE.*

I. Introduction

Obstructive jaundice is a type of jaundice, due to blockage in flow of bile from liver to intestine. This result in redirection of excess bile and bilirubin into circulation. Further leading to complications like cholangitis, hepatorenal syndrome and mal-absorption. Differentiation of benign and malignant etiology of biliary obstruction is difficult with imaging alone. Benign is most commonly caused by choledocholilithiasis. Various other causes include post cholecystectomy strictures, inflammatory, strictures due to secondary to pancreatitis and idiopathic causes.[1] Other hand, malignant obstruction is most common due to cholangiocarcinoma. Followed by carcinoma gall bladder, carcinoma head of pancreas, lymph nodes and metastasis.[2,3] Magnetic Resonance Cholangio-Pancreatography (MRCP) is a well established diagnostic tool used in detection of dilated biliary tree and its causes are calculus, masses. However few clinical cases, it is difficult to differentiate the cause for obstruction (inflammatory cause or a stricture due to malignancy).

Aim of this study is to evaluate the diagnostic accuracy of 3-Tesla MRCP in differentiating benign from malignant biliary obstructive diseases in correlation with surgical, ERCP and HPE findings as gold standard.

II. Material and Method:

This is a hospital based prospective cross sectional study. Time bound study with 30 samples of suspected cases of obstructive jaundice, 30 patients with clinical and laboratory finding suggestive of biliary obstruction underwent 3 Tesla MRCP. Protocol for MRCP: Axial T1, Axial T2 FS, T2 Axial, Coronal FIESTA, Axial, Coronal and sagittal T2 SSFSE, Axial diffusion, T1 post contrast and 3D projection images were the sequences studied. The final diagnosis was based on either surgical findings, HPE of resected specimen or ERCP findings. Diagnostic effectivity of MRCP was calculated which included sensitivity, specificity and accuracy. Statistical analysis done by using chi-square test and p value was calculated.

All patients above the age of 18 years with clinical suspicion of biliary obstruction and/ altered LFT and Cases where USG /CT showed features of biliary abnormality were included in study. Patients, who underwent surgical intervention/post ERCP for biliary obstruction or Contraindications for MRI, were excluded from present study.

Classification of imaging findings as benign or malignant cause of obstructive jaundice was based on following scale of confidence:
Definitely benign: Biliary duct dilatation with a visible stone in the duct.
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.
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.

Statistical analysis:
Data analysis was done using rates, ratios and percentages of different diagnosis. Diagnostic affectivity was calculated for MRCP which included sensitivity, specificity and accuracy by comparing with surgical, histopathological or ERCP findings. Statistical analysis was done by using chi-square test and p-value was calculated.

III. Results:

Total of 30 patients with clinical suspicion of biliary obstruction were imaged by 3-Tesla MRCP. Among them 76.7% were benign cases and 23.3% were malignant in nature. Mean age of the included patients was 50.3 ± 14.41 years. There was slightly male preponderance in biliary tract obstruction (Male-16; Female-14). Most common symptom affecting the patients was pain abdomen, vomiting and yellowish discoloration of skin and sclera.

Table 1: Distribution of benign and malignant biliary obstruction.		
MRCP	Frequency	Percentage
Benign	23	76.7
Malignant	7	23.3

Most common cause of benign obstruction in present study was choledocholithiasis (n=10) followed with calculous cholecystitis (n=6). Irregular, asymmetric and long segment narrowing was more common in malignant stricture. (Table 3)

Table 2: Comparison of MRCP findings to HPR findings.				
Comparison of MRCP report HPR		Gold standard HPR		Total
		Benign (n)	Malignant (n)	
MRCP	Benign (n)	20	03	23
		True negative	False negative	
	Malignant (n)	02	04	06
		False Positive	True positive	
	Total	22	07	Total (n)
	Measures	Specificity 90.9 %	Sensitivity 57.4 %	29
Chi-square test value 7.4729 (d.f1); p value 0.006				

The correlative result of MRCP and HPR reports are; Sensitivity of MRCP scan 57.4%; Specificity of MRCP scan. 90.9%; Positive Predictive value 66.6%; Negative Predictive value 86.9%; True positives – 4 (Both MRCP and HPR findings coinciding); True negative – 20 (Both MRCP and HPR findings coinciding). (Table 2)

Table 3: Final diagnosis of MRCP		
	Frequency	Percentage
Calculous Cholecystitis	6	20.0
Choledocholithiasis	10	33.3
Chronic Calcific Pancreatitis/Chronic Pancreatitis/ walled of necrosis of pancreas	5	16.7
Acute pancreatitis	3	10.0
Cholangiocarcinoma	5	16.7
Benign stricture of CBD	4	13.3
Cholelithiasis	1	3.3
Cholangitic abscess	1	3.3
GB Carcinoma	1	3.3
Choledochal Cyst	1	3.3
GB Perforation	1	3.3
Hepatolithiasis	1	3.3

IV. Discussion:

Diagnosing patients with suspected biliary or pancreatic pathologies in their early stage is most important in the patient care and management. Knowledge of the advantages and disadvantages of each technique are needed to determine the appropriate work up of patients with these pathologies. With the introduction of MR Cholangio-Pancreatography in addition with conventional MRI in diagnosing biliary and pancreatic ductal pathologies, invasive procedure like ERCP can be avoided solely for the purpose of diagnosis.

The most common symptoms we found in patients with biliary obstruction were right upper quadrant pain and yellowish discoloration of skin and sclera. Loss of appetite and weight loss were more common symptoms found in patients with malignant pathologies similar to Saluja et al.[4] Majority (n=23) were benign lesion, and malignant in just 7 patients. Similar pattern was found in various other studies in past.[2] Sensitivity of MRCP to detect malignant cases was 57.4% and specificity to rule out malignancy was 90.9 %. The PPV was 66.6% and NPV of MRCP was 86.9%. [2,4,5] Irregular margins of the stricture were more commonly found in malignant strictures. Asymmetrical dilatation of biliary radicals was more commonly associated with malignant strictures. Smooth margin of strictures and symmetrical dilatation of biliary radicals were more commonly seen in benign strictures. Saluja et al., suggested in their study that malignant strictures were irregular with an asymmetric dilatation because of the nature of involvement of the bile duct by the malignant tumour.[1,4,6]

V. Conclusion:

MRCP is an accurate, non-invasive means of evaluating biliary obstructive disease. It is the investigation of choice in differentiating benign from malignant biliary obstructive diseases. Benign stricture can be differentiated from a malignant one if it shows regular, symmetric and short segment narrowing. Irregular, asymmetric and long segment narrowing was more commonly found in malignant stricture.

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