ORIGINAL ARTICLE

Determination of the Diagnostic Accuracy of MRCP in Detection of Choledocholithiasis taking per-operative Findings as Gold Standard

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ABSTRACT

Objective: Objective of the study was to determine the diagnostic accuracy of MRCP in detection of Choledocholithiasis taking post-operative findings as gold standard.

Methods: A retrospective cross sectional study was done at the Department of Radiology of Lahore General Hospital, Lahore for six months. After meeting the inclusion criteria, 170 patients were selectedwho had undergone MRCP for diagnosis of Choledocholithiasis and had also been operated for the same complaint.

Results:Age of patients in this study was 35.71±8.53 years. The mean duration of disease was 5.24±2.86 years. The sensitivity, specificity and diagnostic accuracy of MRCP were 83.33%, 93.88%, & 89.41% respectively taking per-operative findings as gold standard.

Conclusion:This study concluded thatMRCP is a non-invasive, operator independent and reliable tool in detection of Choledocholithiasis.

Keywords: Operation, MRCP, Choledocholithiasis, Diagnosis

INTRODUCTION

Choledocholithiasis is the presence of a gallstone within the bile ducts (including common hepatic duct and common bile duct). Choledocholithiasis can result in cholestasis i.e. obstruction or slowing of the bile flow and obstructive jaundice.[1]Choledocholithiasis is the commonest cause of biliary obstruction.[2]

Symptoms of choledocholithiasis include yellow discoloration of skin and sclera (jaundice), clay colored stools, right hypochondrium pain, itching, nausea and vomiting. Secondary biliary cirrhosis can occur if cholestasis is not relieved and hence there is urgency to find causative factor leading to obstructive jaundice.[3]

Ultrasonography is usually the first investigation for evaluation of symptoms related to choledocholithiasis and more than 70% of gallstones are found incidentally on ultrasound and patients are usually asymptomatic. But ultrasound is operator as well as patient dependent.[4]

Regarding diagnosis of choledocholithiasis, intraoperative cholangiography, EUS and MRCP are reported to have comparable results but MRCP has many advantages over other modalities as it is non-invasive technique, no special preparation is needed, no anesthesia is required to perform MRCP and it is a radiation free investigation. Moreover MRCP is also helpful in detecting extra ductal disease.[5]

MATERIAL AND METHOD

A retrospectivecross-sectional study was done at the Department of Diagnostic Radiology, Lahore General Hospital, Lahore for the period of six months (14-2-2019 to 17-8-2019).

The inclusion criteria for the patients in this study was that patients of both gender between theages of 20 to 50 years were considered.Suspected cases of Choledocholithiasis with clinical signs e.g abdominal pain, vomiting and clay colored stool at the time of presentation were selected. Laboratory profile as Alkaline Phosphatase >670U/L, Gamma Glutamyl Trans peptidase >90U/L, Serum Bilirubin >1m g/d were included.

To exclude residual or recurrent disease post-operative patients of Choledocholithiasis were excluded from the study. Similarly, patients having brain aneurysm clips, cochlear implants, cardiac pacemakers and prosthetic heart valves not compatible with MRCP were excluded from the study. Moreover, patients who had history of medication for Choledocholithiasis were not considered for the current study.

A total of 170 cases wereselected for this study. An informed consent had been taken from all the participants. These patients had been advised MRCP with clinical suspicion of Choledocholithiasis. Once report obtained and diagnosis of choledocholithiasis was confirmed then patients were referred to the surgery department. During surgery the presence of Choledocholithiasis was observed using clinical observation intra-operatively. Biasness was considered by taking exclusion criteria for all the variables that may affect the results of this study. The collected data was entered on the designed proforma and statistical analysis of the data was done. All findings were reportedby same observer to minimize bias.

Data was entered and analyzed by SPSS version 21 software for health statistics. Mean and standard deviation was calculated for continuous variables like age. Frequency and percentage were calculated for categorical variables such as gender and presence of Choledocholithiasis. Thena 2×2 contingency table was generated to calculate sensitivity, specificity, PPV and NPV.

RESULTS

In our study, atotal of170 patients were enrolled. The mean age of the patients was 35.71±8.53 years. Male

patients were 47(27.65%) while 123(72.35%) patients were females.Mean BMI of the patients was 28.79±5.33 kg/m^2.The mean duration of disease was 5.24±2.86 years (Table 1).

In this study, MRCP detected positive choledocholithiasis among 66(38.8%) patients and per operation diagnosed positive choledocholithiasis among 72(42.35%) patients (Table 1).

Results of the study showed that the sensitivity, specificity, PPV, NPV and diagnostic accuracy of MRCP was 83.33%, 93.88%, 90.91%, 88.46% & 89.41% respectively taking operation as gold standard as shown inTable 2.

Table1. Patient Characteristics.

Age	35.71±8.53
Male Gender	47 (27.65%)
Female Gender	123 (72.35%)
BMI (Kg/m^2)	28.79±5.33
Duration of Disease (Years)	5.24±2.86
Detection of Choledocholithiasis Using MRCP	
Yes	66 (38.8%)
No	104 (61.2%)
Detection of Choledocholithiasis During Operation	
Yes	72 (42.35%)
No	98 (57.65%)

Table 2.Validity of MRCP for detection of choledocholithiasis

		Operation Finding		Total
		Positive	Negative	
MRCP	Positive	60	6	66
		90.9%	9.1%	100.0%
	Negative	12	92	104
		11.5%	88.5%	100.0%
Total		72	98	170
		42.4%	57.6%	100.0%
Sensitivity	83.33%			
Specificity	93.88%			
PPV	90.91%			
NPV	88.46%			
Diagnostic Accuracy	89.41%			

DISCUSSION

Choledocholithiasis, a condition depicted as presence of stone in common bile duct is a relatively prevalent condition and may present as jaundice, biliary colic and abnormal liver function tests or in some cases the patient may remain completely asymptomatic. The management requires diagnostic measures such as abdominal ultrasound, Computed Tomography (CT) abdomen, magnetic resonance cholangiopancreatography (MRCP) and endoscopic retrograde cholangiopancreatography (ERCP).Treatment is mostly surgical but can be conservative in cases where surgery is contraindicated.[6-8]

In our study, the sensitivity, specificity and diagnostic accuracy of MRCP for detection of choledocholithiasis was 83.33%, 93.88%, and 89.41% respectively taking operation finding as gold standard. The MRCP diagnostic accuracy, sensitivity and specificity in our studywere comparable to those reported in the literature byHuassein et al.[9], Boraschi et al.[10]and Varghese et al.[11] where sensitivity, specificity and diagnostic accuracy respectively ranged between 81–100%, 84–100% and 90– 96%.

One study by Rashid et al.[12]demonstrated that the sensitivity of MRCP in diagnosis of choledocholithiasis was 95.2%, specificity 97.5%, positive predictive value 90.9%, negative predictive value 98.7% and diagnostic accuracy was found to be 97%.

A study by A Guarise et al.[13] documented thatin suspected patients of choledocholithiasis MRCP is accurate sufficiently to replace ERCP. The results are dependent upon size of the calculi. Excluding the calculi less than 6 mm in diameter the study concluded the sensitivity, specificity and accuracy were 100%, 99% and 99%, respectively. Similarly, Kaltenthaler et al.[14] reported sensitivity and specificity for choledocholithiasis as 93% and 94% respectively.

Another study by Myung-Won You et al.[15]showed superior results of MRCP in diagnosis of choledocholithiasis with dependable inter-observer agreement. As there is no radiation risk associated with MRCP and no contrast media required, MRCP could be a better and appropriate first line modality in the diagnosis of choledocholithiasis with patients suffering from cholecystitis.

CONCLUSION

MRCP can be considered as the most reliable, non invasive, operater and patient independent tool in large repertoire of available methods for detection of Choledocholithiasis.

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