

Diagnostic Yield of Magnetic Resonance Cholangiopancreatography (MRCP) in Intermediate Probability Criteria of Choledocholithiasis According to ASGE Guidelines

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Choledocholithiasis; ASGE; MRCP; ERCP

1. Abstract

1.1. Introduction

ERCP has revolutionised the management of choledocholithiasis (CL) by having both diagnostic and therapeutic impact on the management of CL. Intermediate probability (10-50% likelihood) of CL according to ASGE criteria is defined as the presence of only one strong predictor or any of the moderate predictor. Aim of this study was to evaluate the diagnostic accuracy of MRCP in patients with intermediate probability criteria of choledocholithiasis.

1.2. Methods

This cross-sectional prospective study included all the patients with intermediate probability criteria for CL. Each patient underwent Magnetic resonance cholangiopancreatography (MRCP) prior to ERCP. Results were expressed in terms of mean \pm SD for quantitative data while numbers with percentages were used for qualitative data. Student's t-test was used to analyse continuous variables; while Chi-square test was applied for categorical variables. A p value of ≤ 0.05 was considered statistically significant.

1.3. Results

Ninety-five patients were included in the study with 51(53.7%) being females. Mean age was of 43.8 ± 9.2 years. On MRCP, CBD stone was present in 65 (68.4%) patients. On ERCP, 76(80%) patients were found to have choledocholithiasis. MRCP was significantly associated with detection of CL in the patients with intermediate probability (p-value < 0.001) having the sensitivity of 84.21%, specificity of 94.74 %, negative predictive value of 60 %

and positive predictive value of 98.46% along with a diagnostic accuracy of 86.32%.

1.4. Conclusion:

MRCP proved to have a good diagnostic accuracy in our patients with intermediate probability criteria. However, there is a need of further research work in this regard for the validation of the use of MRCP as a diagnostic modality and also its comparison with EUS in detection of CBD stone in intermediate probability.

2. Introduction

Common bile duct stones are a frequently encountered problem seen in approximately 10–20% of patients with symptomatic cholelithiasis, post cholecystectomy in 7-14% and 18–33% of patients admitted with acute gall stone pancreatitis [1-3]. The timely diagnosis and treatment of choledocholithiasis (CL) is essential in preventing severe complications including cholangitis and pancreatitis [4]. Diagnosis of choledocholithiasis can be established on the basis of clinical features of obstructive jaundice, laboratory findings of cholestasis and imaging [5]. ERCP has revolutionized the therapeutic approach for choledocholithiasis and is currently considered the gold standard modality for both diagnosis and treatment of CBD stone. However, it comes with a limitation of being invasive and has considerable 5-10% risk of complications its invasiveness [6-8]. In view of complications associated with ERCP together with its invasiveness, ERCP has now been substituted by less invasive or noninvasive diagnostic tests, such as endoscopic ultrasonography (EUS) and magnetic resonance cholangiopancreatography (MRCP) [9–11]. There are certain guidelines such as

ASGE which were published in 2010 for predicting CBD stone in patients with high suspicion of CL and also identifying the patients with highest chance of getting benefit from ERCP. The patients were categorized in to three categories on the basis of presence of clinical, ultrasound and biochemical predictors. The patients with one of the following very strong predictors: CBD stone on trans-abdominal ultrasound (US), clinical ascending cholangitis or bilirubin > 4 mg/dL, or those with both of the following strong predictors: dilated CBD on US (> 6 mm with gallbladder in situ) and bilirubin level between 1.8-4.0 mg/ were labelled as high probability of CL (defined as > 50% likelihood). While, the patients with the presence of only one of the strong predictor or any of the moderate predictor (abnormal liver test, age older than 55 years or gallstone pancreatitis) were considered as having intermediate probability of CL (10-50% likelihood) and those with no predictors present were labelled as having low probability of CL (< 10% likelihood) [12].

Lately, retrospective studies have shown the lack of accuracy of the ASGE guidelines for predicting choledocholithiasis [13]. However, little work has been performed in this regard in our country. As validation of this ASGE criteria for CBD stone using MRCP will help us to avoid unnecessary ERCP procedures.

2.1. Aim:

To evaluate the diagnostic accuracy of MRCP in patients with intermediate probability criteria of choledocholithiasis.

2.2. Methodology:

This was a cross-sectional study which was conducted at the Department of Gastroenterology and Hepatology, Sindh Institute of Urology and Transplantation, Karachi from July 2018 to December 2019. All patients of either gender aged greater than 18 years meeting ASGE intermediate criteria i.e. presence of any one of the strong predictor of CBD stone with any of the moderate predictor of CBD stone were included in the study. While, patients with prior history of cholecystectomy, chronic liver disease or ERCP and patients falling in high and low ASGE probability criteria were excluded from the study.

All the patients with intermediate probability of CL were enrolled in this study. Informed consent was taken followed by recording of patients' demographic and clinical information in a predesigned preform.

MRCP was performed in each patient prior to ERCP. An eight-hour fasting was advised to the patient prior to the procedure. All procedures were free of cost as per institutional policy. Then ERCP was performed under general anesthesia using lateral scope (Pentax) in order to delineate biliary anatomy and to retrieve stone.

All the data was entered and analyzed using SPSS Version 20. Continuous variables like age, duration of symptoms etc. were presented as mean \pm (SD) while categorical variables such as gender and CBD stone on MRCP and ERCP were stated as frequency and percentages.

Stratification was done by presence of Stone on MRCP and stone on ERCP. Post stratification chi square test was applied and diagnostic accuracy was calculated. p -value \leq 0.05 will be taken as significant.

3. Results

Ninety-five patients were included in the study with 51 (53.7%) female patients while males were 44 (46.3%). The mean age of 43.8 ± 9.2 years. The total bilirubin was of 2.28 ± 0.97 (mg/dl). Serum Alkaline phosphatase on admission was of 486 ± 336 U/L). The Aspartate Transaminase (AST) on admission was of 39 ± 33 (U/L). The Alanine transaminase (ALT) on admission was of 105 ± 217 (U/L). The GGT on admission was of 319 ± 296.7 (U/L) and serum amylase of 197 ± 478 (IU) (Table 1).

Biliary pancreatitis was noticed in 16 (16.8%) patients. On MRCP, the stone was noted in 65(68.4%) patients while on ERCP, the stone was found to be present in 76(80%) patients. Sixty-four out of 95 patients had stone both on MRCP and ERCP while there was only one patient who had stone on MRCP but no stone on ERCP. There were 18 patients, who neither have stone on MRCP nor on ERCP (Table 2, 3).

Post stratification, chi square test was applied showing the sensitivity, specificity, PPV and Negative predictive value was 84.21%, 94.74%, 98.46% and 60% respectively for MRCP in predicting choledocholithiasis in intermediate probability along with a diagnostic accuracy of 86.32% (Table 4).

Table 1: Laboratory parameters on admission of Study population (n = 95)

Variables	Mean \pm Std. deviation
Age	43.8 \pm 9.2
Total bilirubin(mg/dl)	2.2 \pm 0.97
Direct bilirubin(mg/dl)	1.01 \pm 0.63
Alkaline phosphate(U/L)	486 \pm 386
Aspartate Transaminase(AST)	
(U/L)	108 \pm 192
Alanine Transaminase(ALT)	
(U/L)	105 \pm 217
Gamma Glutamyl Transferase(GGT)	
(U/L)	319 \pm 297
S.amylase levels(IU)	197 \pm 478

Table 2: Frequency of Categorical variables of the patients enrolled in the study.

Symptoms	Present n(%)	Absent n (%)
Dilated CBD	74(77.9)	21(22.1)
Gallstone Pancreatitis	16(16.8)	79(83.2)
Stone on MRCP	65(68.4)	30(31.6)
Stone on ERCP	76(80)	19(20)

Table 3: Chi square test showing association of stone on MRCP with stone on ERCP

Stone on MRCP		Stone on ERCP (n-95)	p-value	
		Present (n-76) n (%)	Absent (n-19) n (%)	≤0.001
	Present	64(84.2)	1(5.3%)	
	Absent	12(85.8)	18(94.7%)	

Table 4: Showing sensitivity, Specificity, Positive predictive value, Negative predictive value and diagnostic accuracy of MRCP in predicting choledocholithiasis

Statistic	Value
Sensitivity	84.21%
Specificity	94.74%
Positive Predictive value(PPV)	98.46%
Negative Predictive value(NPV)	60%
Diagnostic Accuracy	86.32%

4. Discussion

There is a lack of accuracy which has been shown by previous studies for the prediction of suspected choledocholithiasis (CL). In addition, there are certain non-invasive scores which have been proposed lately as non-invasive predictors of CBD stone. One of these scores was proposed by Khan RTY et al., [14] is the AGT score with an excellent sensitivity, specificity and diagnostic accuracy but it lacks validation. Currently, EUS is emerging as an excellent asset for biliary imaging. [12, 13]. But the lack of wide spread availability of EUS in a resource limited country makes MRCP an excellent option for diagnosing CBD stones. Ali et al., [15] has previously compared the two diagnostic modalities with EUS showing better sensitivity (90% vs 85% for MRCP), MRCP showing better specificity (78% vs 46% for EUS) and similar diagnostic accuracy between the two modalities (82% for EUS and 84% for MRCP). In our study, MRCP performed well in prediction of CL in our population with intermediate probability with sensitivity of 84.21 % and specificity of 94.72% and diagnostic accuracy of 86.32%. But, this performance of MRCP was lower as compared to EUS which had a sensitivity and specificity of 96.3% and 100% respectively along

with diagnostic accuracy of 97.6% [16]. This is due to the fact that smaller stones of size less than 5mm can easily be missed by MRCP while EUS has shown to be highly sensitive and decreasing stone size does not diminishes its accuracy [17].

In patients with biliary pancreatitis, MRCP has been a safer alternative for Endoscopic Retrograde Cholangiopancreatography (ERCP) considering the low morbidity associated with former. Considering high cost and morbidity associated with ERCP, its use as a diagnostic modality should be curtailed. In the past, the studies have shown the decreased incidence of CL in patients with biliary pancreatitis (36.2%) versus those without pancreatitis (65.9%) [18]. In this study, sixteen (16.8%) out of 95 patients had gall stone pancreatitis likely due to obstruction of CBD by small stones(<5mm).

In our study, 65(68.4%) patients had CBD stone on MRCP while on ERCP, it was found to be present in 76(80%) patients with a good sensitivity, an excellent specificity and PPV along with a good diagnostic accuracy of 86 % further confirming an essential role of MRCP in patients falling in intermediate probability criteria. The certain limitations of our study included small sample size that can be improved by conducting studies in future comprising a large number of patients with intermediate likelihood of CBD stone and the nature of study been single centred study which can also be improved in future by doing a multicentre study which will help us in reaching a consensus regarding the preferable diagnostic approach in patients with intermediate probability criteria and avoiding unnecessary ERCP in our patients.

5. Conclusion

MRCP proved to have a good diagnostic accuracy in our patients with intermediate probability criteria. However, there is a need of further research work on a large scale in this regard for the validation of the use of MRCP as a diagnostic modality and also its head to head comparison with EUS in detection of CBD stone in intermediate probability.

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