

Diagnostic Accuracy of Magnetic Resonance Cholangiopancreatography in Diagnosis of Obstructive Jaundice

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ABSTRACT

Objective: To compare the diagnostic accuracy of MRCP in diagnosing obstructive jaundice taking endoscopic retrograde cholangiopancreatography (ERCP) as gold standard.

Study Design: Cross sectional survey.

Place and Duration of Study: This study was conducted Radiology and Gastroenterology Departments, Sheikh Zayed Post graduate medical Institute, Lahore for a period of Six months from August 2012 to January 2013.

Patients and Methods: A total of 90 patients having history and clinical suspicion of obstructive jaundice were enrolled in this study. MRCP was obtained in all cases followed by ERCP was performed All this information was recorded on proforma and results were evaluated.

Results: A total of 90 patients were included in the study. 40 (44.4%) were male and 50 (55.6%) were female. The age ranged from 15–80 years. Mean age of patients was 46.66 ± 16.33 years. In our study the sensitivity of MRCP in diagnosing obstructive jaundice was found to be 86.0%, specificity 70%, positive predictive value 96.0% and negative predictive value was found to be 39.0% and diagnostic accuracy was 84.0%.

Conclusion: The outcome of this study was that MRCP is reasonably good in diagnosing obstructive jaundice but is relatively less accurate as compared to ERCP.

Key Words: Obstructive jaundice, Magnetic resonance cholangiopancreatography, Endoscopic retrograde cholangiopancreatography.

INTRODUCTION

The term 'obstructive jaundice' implies the partial or complete obstruction to the flow of bile and its components into the intestinal tract. Cholestasis may occur within the hepatic ductules and ducts (hepatic cholestasis), or there may be a mechanical cause in the extrahepatic biliary system (extrahepatic cholestasis). It is this latter group of conditions that are usually referred to as cases of obstructive jaundice. Causes of jaundice can be classified into pre-hepatic, hepatic or post hepatic. Obstructive jaundice is not a definitive diagnosis and early evaluation to establish the etiology of the cholestasis is crucial to avoid secondary pathological changes (e.g. secondary biliary cirrhosis) if obstruction is not relieved.¹ Distinguishing between biliary tract obstruction and hepatocellular disease by means of history, physical examination, and laboratory studies is often impossible, so primary radiological imaging becomes crucial. Multiple new imaging techniques have been introduced for evaluation of patients with surgical jaundice.²

ERCP is both a diagnostic tool and a therapeutic procedure for certain conditions. It is usually performed following other radiologic studies that are inconclusive (i.e. ultrasound). It is used as a preoperative study to plan a cholecystectomy or postoperative to remove stones that have become lodged in the biliary ducts. Examples of therapeutic treatments with ERCP include

but are not limited to dilating stenosed biliary or pancreatic ducts, removal of biliary or pancreatic duct stones, opening the sphincter of Vater by cutting to increase narrowing (sphincterotomy), taking tissue sample by brushing or biopsy, or placement of a stent to facilitate bile flow.³

MRCP is an available non-invasive magnetic resonance imaging exam that visualizes the entire gallbladder, biliary tree, and the pancreatic duct. It is often performed before an endoscopic retrograde cholangiopancreatogram (ERCP) to determine if therapeutic ERCP is needed. MRCP is a good alternative for those patients who need biliary imaging, but have renal complications or allergy to iodinated contrast media.³ MRCP can demonstrate areas of the hepatic and biliary duct that may not be seen when there is obstruction. MRCP has risen to the level of clinical relevance as a preoperative and pre-ERCP diagnostic tool for evaluation of choledocholithiasis.

Newer techniques such as MRCP give excellent visualization of the bile duct and the cause of obstruction, including stone, tumor and stricture, without the need for IV or oral contrast agents. It is non-invasive, has no radiation hazard, and has short scanning time.^{4,16,17}

Although ERCP is a readily available imaging modality in the diagnosis of obstructive jaundice caused by gall stones or CBD stones but is an invasive procedure. I considered ERCP as the gold standard as it helps in

accurate diagnosis of this common disease. I compared the outcome of MRCP compared to ERCP. The use of MRCP, a non-invasive procedure, may prevent the use of unnecessary invasive procedures.

PATIENTS AND METHODS

Inclusion Criteria: 1. Patients with suspected biliary obstruction on the basis of either / both biochemical (Bilirubin >1.2mg/dl, raised Alk.Phosphatase >160mg/dl) and sonographic (dilated intra/extra hepatic channels) evidence.

2. Patients of both genders with age between 15-80 years.

Exclusion Criteria: 1. Patients with unsuccessful ERCP in whom ERCP scope could not be passed due to non cooperation.

2. Previous history of biliary surgery.

Data Collection Procedure: Ninety cases having history and clinical suspicion of obstructive jaundice fulfilling the inclusion criteria were selected from Department of Gastroenterology, Sheikh Zayed Hospital Lahore. An informed consent was obtained from all of them for subjecting them to two diagnostic techniques and using their information in research. Their demographic information was recorded (e.g. age, sex, etc). Fresh abdominal ultrasound was done in every case. MRCP was obtained in all cases with the following protocol. Patients bore the expenses while non-affording patients were funded from zakat fund. MRCP was performed using body coil using single shot fast spin echo (FSE) pulse sequence in coronal plane and FIESTA sequences without the use of intravenous contrast medium. Then ERCP was performed with following protocol. Pre-medications like 4% xylocaine jelly, Inj. Dormicum 2mg IV, Inj. Buscopan 20mg IV, Inj Pethidine 25mg IV were administered. Flexible scope (Olympus TJF-130) was passed by mouth & the papilla of Vater identified in second part of duodenum. After taking history of previous reaction to contrast, urografin was injected after cannulating the papilla under fluoroscopic control to fill the biliary and pancreatic ducts. All the information of MRCP findings were recorded on a specially designed proforma. While conducting either technique, the results of the other procedure like type of diagnosis were kept unknown to avoid bias.

Statistical Analysis: Data was entered in the SPSS versions 15 and analyzed accordingly. The qualitative variables like sex, MRCP and ERCP findings (intra/extra hepatic biliary dilatation, filling defects, narrowing, extrinsic compression and level of obstruction) were presented as frequency and percentage. The outcomes were compared between the two procedures. Any association observed between the two procedures was tested for sensitivity, specificity, and diagnostic accuracy, predictive value of positive and negative findings.

RESULTS

Ninety patients having history and clinical suspicion of obstructive jaundice fulfilling the inclusion criteria were selected. Both genders were included with sex distribution of 40 (44.4 %) male patients and 50 (55.6 %) female patients (Table 1).

Table No.1: Distribution of cases according to sex group (n=90)

Sex	No. of patients	Percentage
Male	40	44.4
Female	50	55.6
Total	90	100.0

The mean age of the patients in my study was 46.66 ±16.33 years. There were 10 patients having age range of 15-24 years, 18 patients with age range of 25-34 years, 19 patients with age range of 35-44 years, 18 patients with age range of 45-54 years, 11 patients with age range of 55- 64 years, 13 patients with age range of 65-74 years and 1 patient in age range of 75- 80 years (Table 2). The maximum number of patients was in the age range of 35- 44 years.

Table No.2: Distribution of cases according to age group (n=90)

Age (in years)	No. of Patients	Percentage
15-24	10	11.11
25-34	18	20.00
35-44	19	21.11
45-54	18	20.00
55-64	11	12.22
65-74	13	14.44
75-80	1	1.11
Total	90	100.0

Mean±SD=46.66±16.33

Out of total 90 patients MRCP detected obstructive jaundice in 72 (80%) patients but 3 (3.0%) were falsely diagnosed and were found to be normal on ERCP. In rest of 18 (20%) patients MRCP could not detect disease process (Table 3).

Table 3: Outcome of mrctp in diagnosing obstructive jaundice (n=90)

Outcome	No.	Percentage
Diagnosed	69	77.0
Undiagnosed	18	20
Falsely diagnosed	3	3.0
Total	90	100.0

Key: TP=True positive, FP=False positive, FN=False negative, TN=True negative

Out of these 18 (20%) undetected patients, 11 (12.0%) were found to have disease on ERCP and 7 (8.0%) patients were those who were found to be normal both on MRCP and ERCP. So MRCP detected obstructive jaundice in 69 (77.0%) patients out of 90 whereas

ERCP detected the disease in 80 (89.0%) patients. 10(11.0%) patients were found to be normal on ERCP (Table 4).

Table 4: Outcome of ercp in diagnosing obstructive jaundice (n=90)

Outcome	No.	Percentage
Diagnosed	80	89.0
Normal	10	11.0
Total	90	100.0

The two imaging modalities were compared with each others to determine the cause and level of obstruction. On MRCP intra hepatic biliary dilatation was detected in 67 (74.0%) patients, extra hepatic biliary dilatation was detected in 60 (67.0%) patients, filling defect in 18 (20%) patients, narrowing in 41 (46.0%) patients, extrinsic compression in 3 (3.0%) patients and level of obstruction was detected in 72 (80%) patients. ERCP detected intrahepatic biliary dilatation in 71 (79.0%) of patients as compared to 67 (74.0%) patients with MRCP. Extra hepatic biliary dilatation was detected in 71(79.0%) patients with ERCP as compared to 60 (67.0%) patients with MRCP. Filling defect was seen in 28 (31.0%) patients with ERCP as compared to 18 (20%) patients with MRCP. Narrowing was noted in 41 (46.0%) patients as compared 41 (46.0%) patients with MRCP. Extrinsic compression was seen in 4(4.0%) patients with ERCP as compared to 3(3.0%) patients with MRCP. The level of obstruction was detected in 79(88.0%) patients on ERCP as compared to 72 (80%) on MRCP (Table 5).

Table 5: Comparison between MRCP and ERCP findings (n=90)

Findings	MRCP finding		ERCP finding	
	No.	%age	No.	%age
Intra hepatic biliary dilataion	67	74.0	71	79.0
Extra hepatic biliary dilatation	60	67.0	71	79.0
Filling defect	18	20	28	31.0
Narrowing	41	46.0	41	46.0
Extrinsic compression	3	3.0	4	4.0
Level of obstruction	72	80	79	88.0

The final outcome of this study was that MRCP diagnosed obstructive jaundice and its causes in 69(77.0%) patients as compared to 80 (89.0%) patients diagnosed by ERCP.

Taking ERCP as the gold standard, the sensitivity of MRCP in diagnosing obstructive jaundice was found to be 86.0%, specificity 70%, positive predictive value 96.0% and negative predictive value was 39.0%. The diagnostic accuracy was found to be 84.0% (Table 6).

Table 6: Percentage validity of the diagnosis of obstructive jaundice from MRCP (n=90)

Validity	Obstructive jaundice
Accuracy	84.0%
Sensitivity	86.0%
Specificity	70.0%
Negative predictive value	39.0%
Positive predictive value	96.0%

DISCUSSION

In our study the mean age of the patients was 46.66 ± 16.33 years, which was comparable to mean age of 49.50 years in study conducted by Siddique K. et al. In other study by Soto J A. mean age of the patients was 53 years.^{5,6,18}

Among our patients 44.4% were males and 55.6% females. The percentage of male and female patients in study conducted by Hurter D. was 61.5 % females and 38.5 % males which is almost same. In another study conducted by Bjornsson E. it was 53.52% for females and 46.47% for males which was also close to percentages in our study.^{7,8}

In our study the sensitivity of MRCP for diagnosis of choledocholithiasis was 61.0 % which was comparable to sensitivity of 57.1% in a study conducted by Zidi et al. In another study by Moon J H. et al the sensitivity of MRCP for diagnosis of choledocholithiasis was 80%. The specificity of MRCP in diagnosis of choledocholithiasis in our study was 98.0 % in comparison with specificity of 100% in study by Zidi et al which is almost same. In the study by Soto J A. the specificity of MRCP for choledocholithiasis was 100%.^{9, 10, 11}

MRCP detected stricture with a sensitivity of 78.0% in our study as compared to sensitivity of 81% in study by Park M S. The specificity for diagnosis of strictures was 93.0%. and was comparable to specificity of 96.6% for diagnosis of strictures in the study conducted by Hurter D. which are almost the same.^{12,13}

Out of total 90 patients, MRCP detected obstructive jaundice in 80% patients out of which 3.0% were falsely diagnosed and were found to be normal on ERCP. Rest of 20% patients was not diagnosed by MRCP. There were many causes for this. The main potential problems with MRCP are image artifacts and difficulty in patient compliance because of claustrophobia. Image artifacts can be seen as bright signals arising from stationary fluid within the adjacent duodenum, duodenal diverticulae and ascites, can be caused by metallic clips following cholecystectomy or from severely narrowed ducts, such as occurs in primary sclerosing cholangitis . Out of 20% undetected patients by MRCP 56.0% were those who were found to have obstructive jaundice on ERCP.

ERCP diagnosed obstructive jaundice in 89.0% patients and 11.0% were found to be normal.

Keeping ERCP as gold standard the sensitivity of MRCP was 86.0%, specificity was 70% and diagnostic accuracy was found to be 84.0%. The positive predictive value and negative predictive value were 96.0% and 39.0% respectively. The sensitivity and specificity of MRCP was 97.98% and 84.4% respectively as reported by Shanmugam et al. Vaishali reported diagnostic accuracy for detection of level and cause of obstruction as 96.3% and 89.65%.^{14,15}

The outcome of this study was that MRCP is reasonably good in diagnosing obstructive jaundice but relatively less accurate in determining the extent of disease as compared to ERCP.

CONCLUSION

It is concluded from this study that although ERCP is the gold standard in diagnosing obstructive jaundice, MRCP is comparatively inexpensive and non invasive imaging modality that is reasonably good and relatively comparable with the ERCP in diagnosing obstructive jaundice. MRCP can help avoid invasive diagnostic ERCP in some patients where intervention is not required. However ERCP has a documented advantage as minimal invasive procedure to avoid major surgery.

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