Comparison of MRCP and ERCP findings: A retrospective secondary data analysis

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Abstract

Objective: To compare the findings of magnetic resonance cholangiopancreatography and endoscopic retrograde cholangiopancreatography in patients presenting with bile duct disorders.

Methodology: The retrospective secondary-data study was conducted at the Gastroenterology Department of Lady Reading Hospital, Peshawar, Pakistan, and comprised data of patients who presented with bile duct disorders from June2019 to May2020. Data was analysed using SPSS 25.

Results: Of the 92 patients, 41(44.6%) were males and 51(55.4%) were females. The overall mean age was 50.12 ± 16.7 years (range: 13-80 years). Out of 28 bile duct calculi cases detected by endoscopic retrograde cholangiopancreatography, 25(89.3%) were detected by magnetic resonance cholangiopancreatography, and, of the 64 without calculi, it was 50(78.1%). Out of 8 bile duct strictures detected by endoscopic retrograde cholangiopancreatography, 3(37.5%) were correctly diagnosed by magnetic resonance cholangiopancreatography, and, of the 84 unaffected patients, were excluded 79(94%). Out of 64 bile duct dilatation cases, magnetic resonance cholangiopancreatography correctly diagnosed 59(92.2%), and, of the 28 unaffected patients, it excluded 27(96.4%).

Conclusion: For bile duct stone and dilation, magnetic resonance cholangiopancreatography was found to have high diagnostic accuracy.

Keywords: Choledocholithiasis, Cholangiopancreatography, MRCP, ERCP. (JPMA 72: 284; 2022)

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Introduction

Biliary tract disorders are a common cause of hospitalisation in gastroenterology units. Obstruction anywhere in the biliary tree leads to obstructive jaundice. Biliary obstruction may be caused by choledocholithiasis, cholangitis, tumours, benign and malignant strictures, trauma, pancreatic head tumours and iatrogenic causes.

Endoscopic retrograde cholangiopancreatography (ERCP) was first reported in 1968.[1] Since then, it has been developed and accepted as a gold standard modality for the evaluation of biliary and pancreatic diseases. However, the procedure requires sedation and exposure to ionizing radiation as well as operator's skill and experience owing to considerable risk of complications (1-7%), such as pancreatitis (3.5%), cholangitis (1%), haemorrhage (1.3%) and perforation (0.1-0.6%) as well as a recognised risk of mortality up to 1%.[2,3] Due to risk of life-threatening complications, ERCP has been reserved for therapeutic purposes. Magnetic resonance cholangiopancreatography(MRCP), being a safe and non-invasive modality, has replaced diagnostic ERCP. Since its development in 1991 the technique has progressively improved. MRCP has the disadvantage that it lacks therapeutic ability whereas ERCP offers both diagnosis and treatment.

The current study was planned to compare the findings of MRCP with ERCP for diagnosing bile duct disorders.

Methods

The retrospective secondary-data study was conducted at the Gastroenterology Department of Lady Reading Hospital (LRH), Peshawar, Pakistan, and comprised data of patients who presented with bile duct disorders from June 2019 to May 2020. The data was retrieved from the institutional medical records system after approval from the institutional ethics review board. Data was retrieved for all patients who underwent ERCP and MRCP. Incomplete data was excluded. ERCP was taken as the gold standard for the diagnosis of biliary disorders, like choledocholithiasis, common bile duct (CBD) dilatation and CBD strictures. Results of MRCP were compared with those of ERCP in terms of sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV). All procedures had been carried out by experienced endoscopists. Data was analysed using SPSS 25.

Results

Of the 92 patients, 41(44.6%) were males and 51(55.4%) were females. The overall mean age was 50.12 ±16.70

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Table-1: Patients' characteristics.

Total number of patients	(N) 92
Female	51(55.4%)
Male	41(44.6%)
Age	31-86 years (Mean ± SD = 50.12 ± 16.70)
Jaundice	
Clinical	60 (65.2%)
Biochemical	80 (91.1%)
Bilirubin < 5mg/dl	31 (33.7%)
Bilirubin > 5mg/dl	52 (56.7%)

Table-2: Magnetic resonance cholangiopancreatography (MRCP) findings.

	Frequency	Percentage
Dilated Biliary System	60	65.2
Choledocholithiasis	39	42.4
Choledocholithiasis with dilatation	36	39.1
Choledocholithiasis without dilatation	03	3.3
Stricture	08	8.7
Total	92	100

Table-3: Endoscopic retrograde cholangiopancreatography (ERCP) findings.

	Frequency	Percentage
Dilated Biliary System	64	69.6
Choledocholithiasis	28	30.4
Choledocholithiasis with dilatation	37	29.3
Choledocholithiasis without dilatation	01	1.1
Stricture	08	8.7
Total	92	100

years (range:13-80 years). Of the total, 60(65.2%) patients were clinically jaundiced, while 83(90.2%) were biochemically jaundiced (Table-1).

Using MRCP, 39(42.4%) patients were found to have choledocholithiasis, 8(8.7%) had strictures and 60(65.2%) had bile duct dilation (Table-2).

Using ERCP, 28(30.4%) patients were found to have choledocholithiasis, 8(6.7%) had strictures and 64(69.6%) had bile duct dilation (Table-3).

Out of 28 ERCP-proven bile duct calculi, MRCP correctly diagnosed 25(89.3%), and, of the 64 without calculi, it detected 50(78.1%). Patients who had false-positive (FP) result for calculi on MRCP were 14(21.9%), while false-negative (FN) were 3(10.7%).

The sensitivity and specificity of MRCP for bile duct calculi were 89.3% and 78.1% respectively, while PPV was 64.1% and NPV was 94.3%.

Out of 8 ERCP-proven bile duct strictures, MRCP correctly diagnosed 3(37.5%), and, of the 84 unaffected patients, it excluded 79(94%). The sensitivity and specificity of MRCP for bile duct strictures were 37.5% and 94%, respectively, with PPV 37.5% and NPV 94%.

Out of 64 ERCP-proven bile duct dilatation cases, MRCP correctly diagnosed 59(92.2%), and, of the 28 unaffected patients, it excluded 27(96.4%). Sensitivity, specificity, PPV and NPV for dilation were 92.2%, 96.4%, 98.3% and 84.4%, respectively.

Discussion

In order to evaluate disease of the bilio-pancreatic region, ERCP is the gold standard. It has accuracy of around 90-100% in detecting intra-hepatic and extra-hepatic biliary duct dilation, site, size, and numbers of bile duct strictures and stones.[4] However, ERCP is associated with serious complications, including haemorrhage, infection, gut and duct perforation, pancreatitis and depression of the cardiopulmonary system.[5] Complications for ERCP, such as bleeding, infection, pancreatitis and biliary leaks, have been reported to be as high as 1-7%. Possible reduction in ERCP practice has been reported by some studies after the introduction of MRCP[6] which has several advantages. It provides information regarding gall bladder stones and cholecystitis, stone size, mass in gallbladder, thickness of gallbladder wall, common bile duct stone and its size. It can provide information regarding malignant and benign strictures. Its evolving role is to reduce or avoid the need for diagnostic ERCP because it has the ability to produce comparable highly accurate cholangiographic images like the ERCP.[7]

Several international studies have evaluated sensitivity, specificity, PPV and NPV of MRCP as 85-97%, 75-98%, 83-89% and 82-98% respectively, for hepatobiliary system.[6]

A literature review reported MRCP sensitivity 88.9%, specificity 100%, PPV 100% and NPV 99.2% for diagnosing biliary stone.[8] A study reported sensitivity, specificity, PPV and NPV to be 87%, 80%, 83.3% and 84.2% respectively.[9] Another study reported MRCP sensitivity, specificity, PPV and NPV of 85%, 93%, 87% and 96% respectively.[10] In the current study, the sensitivity, specificity, PPV and NPV for MRCP were 89.3%, 78.1%, 64% and 94.3%, respectively, for choledocholithiasis which correlates well with earlier results.

A study reported sensitivity and specificity of MRCP for the detection of bile duct stricture as 89% and 92% respectively.[11] In another study, sensitivity was 86% and specificity was 94% for bile ducts strictures.[12] One study reported sensitivity and specificity of 83.3% and 97.6% respectively.[13] In the current study, sensitivity, specificity, PPV and NPV was 37.5%, 94%, 37.5% and 94%

respectively. Compared to international data, the sensitivity was substantially low in the current study, which may be due to small number of patient (8.7%) who definitely had strictures. Another possible explanation for this may be the different MRCP protocols used for the detection of biliary disease.

The sensitivity to biliary dilatation was 87-100% and specificity 91-100% in a recent systemic review.[14] A meta-analysis reported that MRCP had 95% sensitivity and 97% specificity for the detection of biliary dilatation.[15] For dilation of biliary tract, the results of the current study were 92.2%, 96.4%, 98.3% and 84.4% for sensitivity, specificity, PPV and NPV, respectively. These results are similar to that of international data cited above.

Conclusion

Diagnostic accuracy of MRCP for bile duct calculi and bile duct dilation was high. The results for biliary strictures were not conclusive due to small number of patients.

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Conflict of Interest: None.

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References

1. McCune WS, Shorb PE, Moscovitz H. Endoscopic cannulation of the ampulla of vater: a preliminary report. Ann Surg 1968;167: 752-6.
2. Al-Jiffry BO, Elfateh A, Chundrigar T, Othman B, AlMalki O, Rayza F, et al. Non-invasive assessment of choledocholithiasis in patients with gallstones and abnormal liver function. World J Gastroenterol 2013; 19: 5877-82.
3. ASGE Standards of Practice Committee; Anderson MA, Fisher L, Jain R, Evans JA, Appalaneni V, Ben-Menachem T, et al. Complications of ERCP. Gastrointest Endosc 2012; 75: 467-73.
4. Alam A, Rudra G, Shuaib IL, Dhiraj S, Pradeep V, Sunil P. Billary Obstruction: Evaluation with direct cholangiography. Internet J Radiol 2006; 5: 2.
5. Gerhards MF, Vos P, Van Gulik TM, Rauws EA, Bosma A, Gouma DJ. Incidence of benign lesions in patients resected for suspicious hilar obstruction. Br J Surg 2001; 88: 48-51
6. Gondal M, Ch SM, Ahmad I, Hussain T, Awan S, Fatima K. Accuracy of MRCP in Comparison with ERCP for Diagnosing Hepato-Pancreatico-Biliary Pathologies. JRMC 2018; 22: 88-91.
7. Sonawane S, Bagale S, Patil S. MRCP–A Problem Solving Diagnostic Tool in Pancreaticobiliary Pathologies. Int.J.Contemp.Med.Surg.Radiol. 2018; 3: 144-8.
8. Hekimoglu K, Ustundag Y, Dusak A, Erdem Z, Karademir B, Aydemir S, et al. MRCP vs ERCP in the evaluation of biliary pathologies. review of current literature. J Dig Dis 2008; 9: 162-9.
9. Hurter D, De Vries C, Potgieter P, Barry R, Botha F, Joubert G. Accuracy of MRCP compared to ERCP in the diagnosis of bile duct disorders. SA J Radiol 2008; 12: 14-22.
10. Vila JJ, Borda F, Jimenez FJ, Borobio E, Elizalde I, Arin AJPRA. Influence of Endosonography in the Evaluation of Idiopathic Acute Pancreatitis 2007; 31.[not found]
11. Adamek H, Albert J, Weitz M, Breer H, Schilling D, Riemann J. A prospective evaluation of magnetic resonance cholangiopancreatography in patients with suspected bile duct obstruction. Gut 1998;43:680-3.
12. Nandalur KR, Hussain HK, Weadock WJ, Wamsteker EJ, Johnson TD, Khan AS, et al. Possible biliary disease: diagnostic performance of high-spatial-resolution isotropic 3D T2-weighted MRCP. Radiology 2008; 249: 883-90.
13. Munir K, Bari V, Yaqoob J, Khan DB, Usman MU. The role of magnetic resonance cholangiopancreatography (MRCP) in obstructive jaundice. J Pak Med Assoc 2004; 54: 128-32.
14. David V, Reinhold C, Hochman M, Chuttani R, McKee J, Waxman I, et al. Pitfalls in the interpretation of MR cholangiopancreatography. AJR Am J Roentgenol 1998; 170: 1055-9.
15. Romagnuolo J, Bardou M, Rahme E, Joseph L, Reinhold C, Barkun AN. Magnetic resonance cholangiopancreatography: a meta-analysis of test performance in suspected biliary disease. Ann Intern Med 2003; 139: 547-57.