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COMPARATIVE ASSESSMENT OF NON-INVASIVE IMAGING MODALITIES AND ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN OBSTRUCTIVE JAUNDICE

Medical Gastroenterology

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ABSTRACT

Introduction: Accurate diagnosis of the cause is crucial in the management of obstructive jaundice. Non-invasive modalities like Ultrasonography (USG) Multidetector computed tomography (MDCT) magnetic resonance cholangiopancreatography (MRCP) and Invasive modality like Endoscopic retrograde cholangiopancreatography (ERCP) play the pivotal roles in the diagnosis. **Aim:** To compare the diagnostic accuracy of USG, MRCP, MDCT with ERCP in Obstructive jaundice. **Materials & Methods**: 76 patients with features suggestive of biliary obstruction were included. At least one imaging modalities were used in each patient. Cause of obstruction was evaluated by each modality. Data and findings of non-invasive modalities were compared with ERCP finding .**Results**: The study included 76 patients (31 females and 45 males). Mean age of presentation was 48 yrs, most in 5th decade. Predominant symptoms were jaundice (85%) and pain abdomen (59%). Most common cause of obstruction was choledocholithiasis (86.8%). Benign and malignant causes were 93.4% and 6.6% respectively. USG, CT and MRCP were able to diagnose accurately the cause of obstruction in 21.4% ,64% and 97.29% of the cases respectively compared to ERCP findings. MRCP had better sensitivity (96.87%) than CT abdomen (73.15%) in the diagnosis of choledocholithiasis. MDCT and MRCP had similar sensitivity and specificity for diagnosis of benign CBD stricture. For malignant causes, CT abdomen had better sensitivity (75%) than MRCP (50%). **Conclusion:** MRCP findings correlated most accurately with high sensitivity with ERCP findings in diagnosis of obstructive jaundice especially in choledocholithiasis patients. Non-invasive modalities may be considered the first-choice option in the diagnostic imaging of obstructive biliary disease in view of high diagnostic accuracy.

KEYWORDS

Obstructive Jaundice, Ultrasonography (USG), Computed tomography (CT) and Magnetic Resonance Cholangiopancreatography (MRCP) and Endoscopic Retrograde Cholangiopancreatography (ERCP), Imaging modalityand Endoscopic Retrograde Cholangiopancreatography (ERCP), Imaging modality and Endoscopic Retrograde Cholangiopancreatography (ERCP), Imaging modality

INTRODUCTION

Obstructive jaundice is one of the most frequent and grave form of hepatobiliary disease. It can lead to problems in diagnosis and management, particularly intrahepatic cholestasis. So, it is necessary to determine pre-operatively the existence, the nature and site of obstruction because an inappropriate diagnostic approach can be dangerous.

Many imaging modalities are available today for the evaluation of patients with suspected biliary obstruction including non-invasive Ultrasonography, Computed Tomography, MRCP and Invasive cholangiography. Ultrasound is used as an initial modality to confirm or exclude duct obstruction, which it does with at least 90% accuracy[1]. USG is operator dependent and has a limitation in patients with obesity and those with large amount of bowel gas.

Computed tomography (CT) is a reliable modality and provides good definition of lesions and facilitates visualization of the entire extent of pancreatic pathology.[2] Recent advances make MDCT often sufficient for evaluating obstructive jaundice. However, it requires the use of I.V. contrast and exposes the patient to ionizing radiation.

The limitations of these modalities have led to the increasing popularity of Magnetic resonance cholangiopancreatography (MRCP). MRCP techniques provides high resolution images of the biliary tree within short duration, while remaining non -invasive without contrast medium injection. However, it is not widely available and is expensive.[3]

ERCP has traditionally been considered the gold standard for imaging the biliary system, particularly if therapeutic intervention is planned ERCP demonstrate the cause of biliary obstruction, and helps in making a diagnosis based on the morphology of the biliary and pancreatic ducts. Because of its attendant risks, and the availability of safer non-invasive Chol angiographic methods with comparable diagnostic abilities, ERCP is evolving into a predominantly therapeutic procedure.[4]

The aim of this study is to compare the diagnostic accuracy of Ultrasonography, MRCP. Computed Tomography with Endoscopic retrograde cholangiopancreatography

MATERIALS AND METHODS

This is a hospital based, prospective observational study conducted over a period of 1 year in the Stanley Medical College and Hospital, Chennai, from 1st Feb 2021 to 31st Jan 2022. 76 subjects were included in the study. Ethical clearance obtained from Ethical committee. All patients of any age, sex, with strong clinical suspicion of biliary obstruction and altered liver function test will be taken as study subject. Patients not willing to give consent to undergo Imaging were excluded from study.

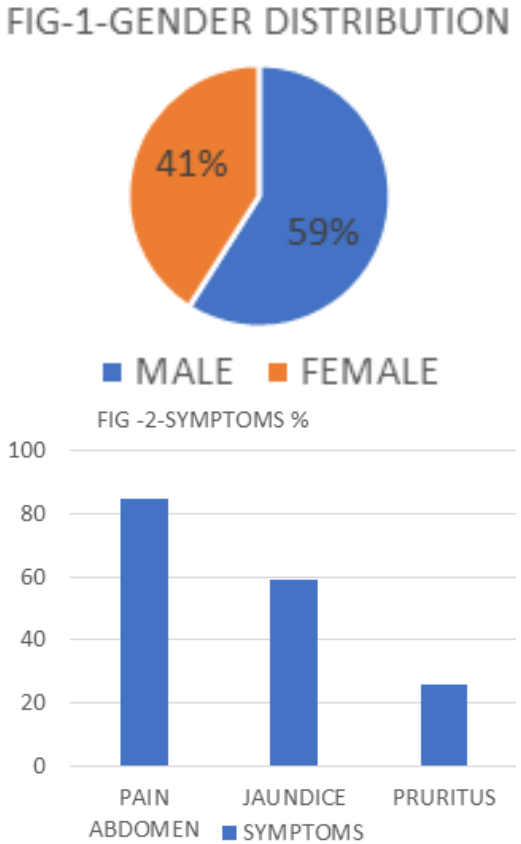
Patients with suspected obstructive jaundice attending the Medical Gastroenterology Department of the hospital during the study period included in the study. The cases randomly selected with clinical suspicion or biochemical abnormalities suggestive of obstructive jaundice. Patients' final selection was as per inclusion and exclusion criteria; after obtaining proper informed and written consent of patient. At least one imaging modalities was used in each patient and comparisons made later based on the findings. The cause of obstruction was evaluated by each modality. Patients were recommended to undergo a period of fasting (at least 6-8 h) prior to upper abdominal imaging of the biliary tree.

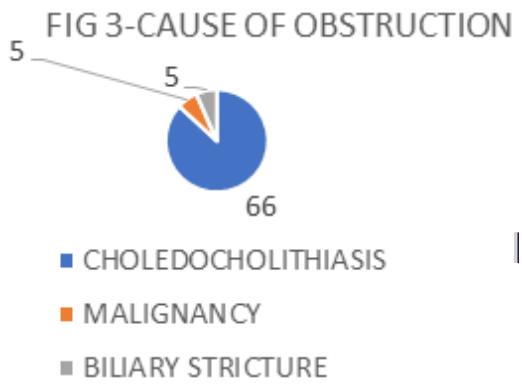
The findings corroborated with the ERCP findings, that was considered the standard of reference of the study. The results so obtained

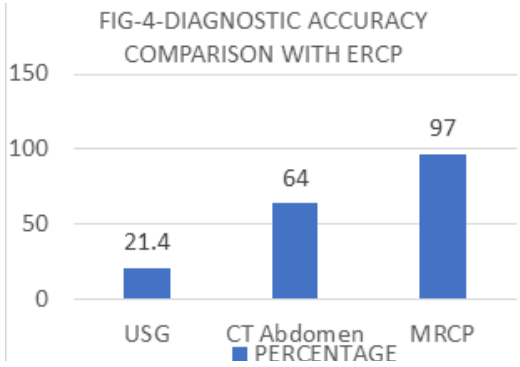
expressed as percentages and variables as required. Microsoft office 2019 and IBM SPSS Statistics 25 used for the data analysis.

RESULTS:

The study included 76 patients. Mean age of presentation was 48 yrs. Most of the patients were in the 5th decade of life [Fig. 1]. The youngest patient in this study was 20-year-old, and the oldest patient was 82 year old. Majority of the patients in the present study were males (59.21%), outnumbering females at 40.78%. The male to female ratio was 1.45:1. Predominant symptoms were jaundice (85%) and pain abdomen (59%) [Fig-2]. Most common cause of obstruction was choledocholithiasis (86.8%) followed by benign CBD stricture[5] [Fig-3].The number of benign causes of obstruction was more than the number of malignant causes. Benign and malignant causes were 93.4% and 6.6% respectively[Tab-2]. Carcinoma head of pancreas constituted 60% of the malignant cases, followed by gall bladder carcinoma (40%) cases. USG, CT and MRCP were able to diagnose accurately the cause of obstruction in 21.4% ,64% and 97.29% of the cases respectively compared to ERCP findings[Fig-4]. MRCP had better sensitivity (96.87%) than CT abdomen (73.15%) in the diagnosis of choledocholithiasis[6][Table-3]. MDCT and MRCP had similar (66.6%) sensitivity for diagnosis of benign CBD stricture [Table-4]. For malignant causes, the MDCT had a better number of correct diagnoses compared to MRCP[Table-2]. For malignant causes, CT abdomen had better sensitivity (75%) than MRCP (50%) [Table-5].







Tab-1- Correlation of non-invasive modalities (USG, CT, MRCP) with ERCP

Imaging	Total Patients (n=76)	Correlated With ERCP	Not Correlated With ERCP
USG	28(36.84%)	9/28(32%)	19/28(67.8%)
CT ABDOMEN	25(32.89%)	16/25(64%)	9/25(36%)
MRCP	37(48.68%)	34/37(94.5%)	3/37(5.4%)

Tab-2 - Overall accuracy, of USG, CT, MRCP in comparison to ERCP in benign and malignant etiology of obstructive jaundice.

Imaging-(N=76)	Usg Correlation	CT Abdomen Correlation	MRCP Correlation
CHOLEDOCHOLITHIASIS (n=66)	7	11	31
BENIGN CBD STRICTURE (n=5)	1	2	2
MALIGNANCY (n=5)	1	3	1

Tab 3- Overall sensitivity and specificity of USG, CT, MRCP in comparison to ERCP in CBD calculi.

Imaging In CBD Calculi	Sensitivity For CBD Calculi	Specificity	PPV	NPV
USG	69.5	60	77.7	30
CT	73.15	77.8	75	22.2
MRCP	96.87	95.1	91.17	66.6

Tab- 4 Overall , sensitivity and specificity of USG, CT, MRCP and ERCP in benign CBD stricture

Imaging In Benign CBD Stricture	Sensitivity For Benign CBD Stricture	Specificity	PPV	NPV
USG	33.3	68	11.11	89.77
CT	66.66	36.36	12.5	88.8
MRCP	66.66	5.88	5.88	66.6

Tab-5- Overall sensitivity and specificity of USG, CT, MRCP with ERCP correlation in malignant lesions

Imaging In Malignancy	Sensitivity For Malignancy	Specificity	PPV	NPV
USG	50	30.7	11.11	94.73
CT	75	68.09	18.75	88.8
MRCP	50	50.71	2.94	66.6

DISCUSSION

Obstructive jaundice can be caused by the obstruction of the bile duct with gall stones, strictures, malignancy, etc. Obstructive jaundice is more common amongst females and choledocholithiasis are the commonest benign cause.[7-9]

The most common cause of malignant biliary obstruction is pancreatic adenocarcinoma, followed by cholangiocarcinoma, ampullary neoplasm and extrinsic compression by a metastatic lymphadenopathy in the liver.[10]

Accurate diagnosis of the cause in obstructive jaundice is important for the proper treatment planning. USG has traditionally been used as the initial screening procedure because of its many advantages, which include its ready availability, its cost effectiveness and lack of ionizing radiation[11]. However, although it is well suited to visualize the Common Hepatic Duct (CHD) and proximal CBD, one of its major limitations is assessment of the distal CBD and pancreas, which are often obscured by overlying bowel gas in about 30-50% of the patients. In the present study, USG missed many cases of CBD calculi. USG was able to cause in 21% cases in the study. Other studies have reported

18%-85% in detecting the cause of obstruction[12,13].

In recent years, the improved spatial resolution and contrast sensitivity available with current CT Scanners has increased their capability for evaluating the biliary system.

CT was able to detect the cause in 64% of the cases compared to ERCP findings. Other studies have reported a variation of 63%-94% in detecting the cause of obstruction[14]

MRCP is a rapidly developing non-invasive modality for evaluation of pancreatic-biliary diseases [15]. Complete mapping of the ductal system, non-invasiveness, no requirement of intra-venous contrast and lack of exposure to ionizing radiation are some of its important features. Its inability to offer therapeutic intervention is its only drawback when compared to ERCP.

MRCP was able to detect the cause in 97.29% cases. Other studies[16,17] have also reported very good results with ability to detect the level ranging from 85% to 100% . In this study MRCP had the best results in cause of biliary obstruction. With its excellent diagnostic capabilities, it has certainly carved a niche for itself in the non-invasive evaluation of the patient with obstructive jaundice.

ERCP was performed in the most of the cases where needed therapeutic intervention ,but in some malignant cases it was not possible to perform ERCP in all cases as it was difficult to cannulate the Ampulla of Vater either because of localized oedema or because of the external compression caused by the tumour.[18]

In our study, ultrasound was found to have sensitivity: 69.5%, specificity: 60%, PPV: 77.7% and diagnostic accuracy of 21.4% for choledocholithiasis in correlation to ERCP findings[19] [Tab 3].In contrast to our study, Pandit et al[20].in their study found accuracy of ultrasound in detection of benign stricture was 31% but results are comparable to a study done by Lomas et al.[21]who compared MRCP and ERCP in 78 patients with obstruction and reported a sensitivity and specificity of 86.4% and 82.4% respectively for benign stenosis. CECT correctly detected choledocholithiasis with sensitivity: 73.15%, specificity:77.8 %, PPV: 91.17% and the diagnostic accuracy of 64% for CBD calculi. MRCP correctly detected choledocholithiasis with sensitivity: 96.87%, specificity: 95.1%, PPV: 91.17% and the diagnostic accuracy of 97.29%. . Pasanen et al.[22] found that the sensitivity of ultrasound for choledocholithiasis varies widely from 20% to 80% in concordance to our study. Ferrari et al.[23] in their study showed USG the diagnostic accuracy of 80.15%, with a sensitivity of 71.08% and a specificity of 95.83% were more as compared with our study. Ferrari et al.[24] have found that MRCP has a diagnostic accuracy of 93.89%, sensitivity of 93.97% and specificity of 93.75% in the diagnosis of choledocholithiasis. Other authors like Mendler et al.[25] have also found decreasing sensitivity of MRCP in detecting stones according to the stone size: 67-100% for stones >10 mm size, 89-94% for stones measuring 6-10 mm, and 33-71% for bile duct stones.

There were few limitations of the study. Sample size was small which might not be representative to the whole population.

CONCLUSION:

MRCP findings correlated most accurately with high sensitivity with ERCP findings in diagnosis of obstructive jaundice especially in choledocholithiasis patients. Non-invasive modalities may be considered the first-choice option in the diagnostic imaging of obstructive biliary disease in view of high diagnostic accuracy

REFERENCES:

1. Knowlton JQ, Taylor AJ, Reichelderfer M, Stang J. Imaging of biliary tract inflammation: An update. AJR Am J Roentgenol 2008;190:984-92
2. Joshi, A., Rajpal, K., Kakadiya, K. et al. Role of CT and MRCP in Evaluation of Biliary Tract Obstruction. Curr Radiol Rep 2, 72 (2014). https://doi.org/10.1007/s40134-014-0072-x
3. Attri A, Galhotra RD, Ahluwalia A, Saggar K. Obstructive jaundice: Its etiological spectrum and radiological evaluation by magnetic resonance cholangiopancreatography. Med J DY Patil Univ [serial online] 2016 [cited 2022 May 31];9:443-: https://www.mjdrdypu.org/text.asp?2016/9/4/443/186049
4. Khurram M, Durrani AA, Hasan Z, Butt Au, Ashfaq S. Endoscopic retrograde cholangiopancreatographic evaluation of patients with obstructive jaundice. J Coll Physicians Surg Pak. 2003 Jun;13(6):325-8. PMID: 12814529.
5. Arki S, Joshi KS, Regmi S, Gurung RB, Malla B. Role of ultrasound as compared with ERCP in patient with obstructive jaundice. Kathmandu Univ Med J. 2013;11(43):237–240. doi:10.3126/kumj.v11i3.12512.
6. Arjun Raju P, Divyashree, Surabhi Mehrotra. Role of MRI-MRCP in Evaluation of Obstructive Jaundice .journal of medical science and clinical research volume 10 issue 05 doi: https://dx.doi.org/10.18535/jmscr/v5i3.08
7. Upadhyaya V, Upadhyaya DN, Ansari MA, Shukla VK. Comparative assessment of imaging modalities in biliary obstruction. Indian J Radiol Imaging 2006;16:577-82.
8. AhmetogluA, Kosucu P, Kul S, Dinç H, SariA, Arslan M, et al. MDCT cholangiography with volume rendering for the assessment of patients with biliary obstruction. AJR Am J Roentgenol 2004;183:1327-32.
9. IshimaruK, IshimaruH, MatsuokaY, AshizawaK, KoshiishiT, FujimotoT, et al. Multidetector-row CT in patients with suspected obstructive jaundice: Comparison with non-contrast MRI with MR cholangiopancreatography.Acta Med Nagasaki 2005;50:147-54.
10. Briggs M, Peterson CD. Investigation and management of obstructive jaundice: Surgery. 2007;25(20): 74-80. https://doi.org/10.1016/j.mpsur.2007.01.005
11. Hanif H, Khan SA, Muneer S, Adil SO. Diagnostic accuracy of ultrasound in evaluation of obstructive jaundice with MRCP as gold standard. Pak J Med Sci. 2020 May-Jun;36(4):652-656. doi: 10.12669/pjms.36.4.1665. PMID: 32494250; PMCID: PMC7260912
12. Zagoni T, Benko Z, Telegdy L, Antony A, Keleti G, Peter Z. Diagnostic value of abdominal ultasonography and endoscopic retrograde cholangiopamcreatography in obstructive jaundice. Orv Hetil 1995; 136 (28): 1483-6
13. Kumar M, Prashad R, Kumar A, Sharma R, Acharya SK, Chattopadhyay TK. Relative merits of ultrasonography, computed tomography and cholangiography in patients of surgical obstructive jaundice. Hepatogastroenterology 1998; 45(24): 2027-32
14. Mathew RP, Moorkath A, Basti RS, Suresh HB. Value and Accuracy of Multidetector Computed Tomography in Obstructive Jaundice. Pol J Radiol. 2016 Jun 28;81:303-9. doi: 10.12659/PJR.896680. PMID: 27429673; PMCID: PMC4928501.
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;139:54757.
16. Singh A, Mann HS, Thukral CL, Singh NR. Diagnostic Accuracy of MRCP as Compared to Ultrasound/CT in Patients with Obstructive Jaundice. J Clin Diagn Res. 2014 Mar;8(3):103-7. doi: 10.7860/JCDR/2014/8149.4120. Epub 2014 Mar 15. PMID: 24783094; PMCID: PMC4003596
17. Verma SR, Sahai SB, Gupta PK, Munshi A, Verma SC & Goyal P. Obstructive Jaundice-Aetiological Spectrum, Clinical, Biochemical And Radiological Evaluation At A Tertiary Care Teaching Hospital. The Internet Journal of Tropical Medicine. 2011;7(2).
18. Adamek HE, Breer H, Karschkes T, Albert J, Riemann JF. Magnetic resonance imaging in gastroenterology: Time to say good-bye to all that endoscopy? Endoscopy 2000; 32(5): 406-10
19. Acalovschi M. Cholangiocarcinoma: risk factors, diagnosis and management. Rom J Intern Med 2004; 42:41-58
20. Rahman, M. M., Sharif, M. S. B., Rahman, A., Khan, M. R., & Mandal, M. A. (2017). Success and Limitations of ERCP in the Management of Obstructive Jaundice. KYAMC Journal, 8(1), 38–42. https://doi.org/10.3329/kyamcj.v8i1.33872
21. Pandit SP, Panthi M. Ultrasonographic prediction of the causes & level of obstruction in diagnosis of obstructive jaundice. PMJN 2013;11:8-10.
22. Lomas DJ, Bearcroft PW, Gimson AE. MR cholangiopancreatography: Prospective comparison of a breath-hold 2D projection technique with diagnostic ERCP. Eur Radiol 1999;9:1411-7.
23. Pasanen PA, Partanen K, Pikkarainen P, Alhava E, Pirinen A, Janatuinen E. Diagnostic accuracy of ultrasound, computed tomography, and endoscopic retrograde cholangiopancreatography in the detection of obstructive jaundice. Scand J Gastroenterol 1991;26:1157-64
24. Ferrari FS, Fantozzi F, Tasciotti L, Vigni F, Scotto F, Frasci P. US, MRCP, CCT and ERCP: A comparative study in 131 patients with suspected biliary obstruction. Med Sci Monit 2005;11:MT8-18.
25. Mendler MH, Bouillet P, Sautereau D, Chaumerliac P, Cessot F, Le Sidaner A, et al. Value of MR cholangiography in the diagnosis of obstructive diseases of the biliary tree: a study of 58 cases. Am J Gastroenterol 1998;93:248290.