



RESEARCH ARTICLE

EVALUATION OF ACCURACY OF ULTRASONOGRAPHY IN OBSTRUCTIVE JAUNDICE WITH MAGNETIC RESONANCE CHOLANGIOPANCREATOGRAPHY CORRELATIONM. L. Ravindranath^{*1}, Chandan Manohar²¹Department of Radiology, Medici ti institute of Medical Sciences, Ghanpur Village, Medchal Mandal, R.R District, Andhra Pradesh, India²Shadan Institute of Medical Sciences, Teaching Hospital & Research Centre, Perrancheru, R.R.District, Hyderabad, Andhra Pradesh, India**Received 15 May 2014; Accepted 28 May 2014****ABSTRACT**

Evaluation of a suspected biliary tract disease is a common radiological problem and is traditionally diagnosed by a variety of imaging modalities including Ultrasonography (USG), Computed tomography and Invasive cholangiography and Magnetic Resonance Cholangiopancreatography (MRCP) [1]. In a suspected case of biliary obstruction with clinical and laboratory findings suggestive of obstructive jaundice, the main aim of radiologist is to confirm the presence of obstruction and to identify its location, extent and the probable cause. This was a prospective study conducted in a tertiary care hospital in South India from March 2011 to March 2012. Patients clinically suspected to have obstructive jaundice were interrogated personally and their clinical data was recorded in a proforma. Special emphasis was given to the presence of cholestatic features like pruritus and pale stools in the history. All the patients presented with jaundice. Pruritis at some stage of illness was complained by 42 out of 50 (84%). Pain abdomen and fever suggesting cholangitis were observed in about half of the patients. In all the 50 patients in this study the intrahepatic duct were dilated. The extent to which the site of obstruction can be ascertained from ultrasound examination is variable in the work done by various workers. The figure of 92% in our study the diagnostic accuracy in assessing the site of obstruction compares well with that reported by studies done by other authors. In conclusion diagnostic accuracy of ultrasound and MRCP in a correct assessment of site of obstruction was very high and comparable to each other. But MRCP was better (90%) than ultrasound (80%) in correct predicting the cause of obstruction.

Key words: Ultrasonography, Magnetic Resonance Cholangiopancreatography (MRCP), biliary obstruction, jaundice

INTRODUCTION:

Evaluation of a suspected biliary tract disease is a common radiological problem and traditionally diagnosed by a variety of imaging modalities including Ultrasonography (USG), Computed tomography and Invasive cholangiography and Magnetic Resonance Cholangiopancreatography (MRCP) [1]. In a suspected case of biliary obstruction with clinical and laboratory findings suggestive of obstructive jaundice, the main aim of radiologist is to confirm the presence of obstruction and to identify its location, extent and the probable cause.

In suspected biliary obstruction, USG is being used as the initial screening procedure due to its many advantages like its ready availability, its cost effectiveness and no requirement of contrast material and lack of ionizing radiation. Though it is very useful to visualize the common hepatic duct and proximal common bile duct,

but its major limitation in the visualization of distal common bile duct and pancreas is due to obscuration by overlying bowel gas in 30 – 50 % of cases and obesity can degrade the image quality [2].

MRCP is a non-invasive technique for work-up of patients with suspected biliary obstruction, which has gained popularity because of its excellent diagnostic capabilities in the evaluation of biliary obstruction. In MRCP, the basic principle is that body fluids like bile and pancreatic secretions, have high signal intensity of heavily T3-weighted magnetic resonance sequences with appears white, while the background tissue generate little signal which appears dark. MRCP is usually performed with heavily T2W sequences by using fast spin echo or SSFSE (Single Shot Fast Spin Echo) technique and both a thick collimation (single section) and thin collimation (multisection) technique with a torse phased array coil. The coronal plane is used to provide a cholangiographic

islay and the axial plane is used to evaluate and pancreatic duct and CBD (3). The present study was undertaken to correlate and accuracy of ultrasonography and MRCP in the diagnosis of suspected cases of biliary obstruction.

MATERIAL AND METHODS:

This was a prospective study conducted in a tertiary care hospital in South India from March 2011 to March 2012. Patients clinically suspected to have obstructive jaundice were interrogated personally and their clinical data was recorded in a proforma. Special emphasis was given to the presence of cholestatic features like pruritus and pale stools in the history.

The conventional biochemical liver function tests like total serum bilirubin, serum alkaline phosphatase, serum glutamic pyruvic transaminase (SGPT) levels, serum albumin and globulin were done by the established biochemical techniques. Sonography has now emerged as the investigation of first choice, in the management of suspected cases of obstructive jaundice. The diagnostic accuracy of sonography in detecting intrahepatic biliary dilatation is very high.

Sonographic examination has been done in all patients using GE Logic P5 ultrasound machine, using 3.5 MHz transducer. Images were recorded on single emulsion film. No special preparation was needed apart from fasting overnight. Careful scanning of the entire course &

caliber of the duct system whenever possible helps to trace the extent of the duct dilatation & to localize the level of obstruction. Water was sometimes given to improve visualization.

Since the common hepatic duct is not differentiated sonographically from the other segments of extrahepatic duct, proximal 4 cm segment duct extending from the confluence of the right and left bile ducts is referred as the proximal common bile ducts. The upper limit of normal for the diameter of the common bile duct on the sonogram was taken as 8 mm. All the 50 patients were underwent MRCP examinations: The examination was done using MRCP by 1.5 Tesla GE signalHDe MRI machine. We checked the patients for any contraindications. No special preparation was needed. A body coil was used for the examination.

Protocol for MRCP:

Axial T2W RTR, Axial T1, 3D MRCP, Coronal T2 and Axial T2 Thin slices (whenever indicated). The cases were followed up to surgery and the histopathological diagnoses from the pathology department were sort. The ultrasound and MRCP findings were than compared with the surgical and pathological diagnosis.

RESULTS:

50 cases of clinically suspected obstructive jaundice were included in the study. The age and sex distribution of the cases is shown in table 1.

Table 1: Age and sex distribution of cases

Age	Sex		Total
	Male	Female	
11-20	4	-	4
21-31	-	4	4
31-40	2	4	6
41-50	8	4	12
51-60	8	6	14
61-70	8	2	10
Total	30	20	50

Table 2: Distribution of cases according to symptoms

Symptoms	No. of Patients	Percentage
Jaundice	50	100
Pruritus	42	84
Pain abdomen	26	58
Fever	26	58
Anorexia	32	64
Clay stool	30	60

All the 50 patients has jaundice. Conlestatic symptoms in the form of puritus and clay stools was observed in 84% and 60% respectively.

Table 3: Distribution of cases according to signs

Signs	No. of Patients	Percentage
Hepatomegaly	50	100
Ascites	8	16
Splenomegaly	8	16
Lymphadenopathy	2	4
Palpable gall Bladder	10	20

All the patients had hepatomegaly. It is interesting to note that ascites and splenomegaly which normally suggest hepatocellular jaundice were observed in 16% of patients. The ascites seen in these patients responded to diuretic therapy.

Table 4: Serum bilirubin levels

Serum Bilirubin	No. of Patients
upto 2 mg	2
2.1 to 10 mg	30
10 to 20 mg	14
20 to 25 mg	2

Majority of the patients had serum bilirubin levels in the range of 2.1 to 10 mg

Table 5: Serum Glumatic pyruvate Transaminase levels

0-100	101-200	201-400	401-600	>600	Total
-	-	-	-	-	-
12	-	4	-	-	16
2	6	10	2	-	20
4	4	4	2	-	14
18	10	18	4	-	50

None of the patients with obstructive jaundice had normal serum alkaline phosphatase levels. In 16 patients (32%) the serum alkaline phosphatase was between 300 to 720 IU, the levels that can be seen in intrahepatic cholestasis. Majority of patients had serum alkaline phosphatase between 720 to 1500 IU.

Table 6: Comparison of Ultrasound and MRCP

	Ultrasound				MRCP			
	Site	%	Cause	%	Site	%	Cause	%
Indeterminate	2	4	5	10	-	-	2	4
Correct	46	92	40	80	46	95.6	45	90
Incorrect	2	4	5	10	2	4.16	3	6

Table 7: Pathological diagnosis of the cases

Benign	No. of cases	Malignant Lesions	No. of cases
Benign stricture	4	Cacinoma GB	4
Primary sderosing cholangitis	2	Carcinoma pancreas	14
Adhesions	2	Periamullary	4
Chronic pancreatitis	2	Intra abdominal malignancy	4
Stone CBD and GB	14	-	-
Total	24	Total	26

DISCUSSION:

The presenting symptoms have been more or less classical. All the patients presented with jaundice. Pruritis at some stage of illness was complained by 42 out of 50 (84%). Itching accompanying jaundice while not contained to extrahepatic jaundice. It is so often found in association with the latter that its presence should raise a strong suspicion of extrahepatic obstructive jaundice [4]. Pain abdomen and fever suggesting cholangitis were observed in about half of the patients.

The finding of non-tender distended gall bladder was first described by Bardon and pic to obstruction caused by malignancy [4]. Courvoisier’s law or rather hypothesis states that in a jaundice patient if the GB is palpable, malignancy is more likely the cause of obstruction than stones because, in the latter condition GB is not distensible due to recurrent attacks of inflammation. All the 10 out of 50 patients in whom GB was palpable had malignancy. A palpable GB however can be found in association with benign disease in about 20-25% of patient.

In majority of our patients (60%) the serum bilitubin was below ten milligrams. Only 4 patients and levels above 20 mg. It is known that hyperbilirubinemia caused by extrahepatic obstruction ordinarily does not exceed a magnitude of 15-25 of total serum [5]. None of the patients had normal levels of serum alkaline phosphatase. So a consistency normal serum alkaline phosphatase levels makes extrahepatic obstruction unlikely.

Although in majority the alkaline phosphatase was 720-1440 IU/L range. 16 out of 50 (32%) had only mild elevation of serum alkaline phosphatase levels in the range of 300-72 IU/l, the levels that are often seen with

intrahepatic cholestasis. In 22 out of 50 patients the SGPT was elevated more than twice the normal. It is known that interpretation of laboratory tests are indices of extrahepatic obstruction jaundice is subject to limitations and even pit falls cannot be relied upon entirely [6].

The ability to accurately distinguish obstructive jaundice from non-obstructive jaundice had made sonography the accepted screening procedure in jaundice patients [7, 8]. In all the 50 patients in this study the intrahepatic duct were dilated. The site of obstruction could be determined with certainty in all but 4 patients in this study . The extent to which the site of obstruction can be ascertained from ultrasound examination is variable in the work done by various workers.

The figure of 92% in our study the diagnostic accuracy in assessing the site of obstruction compares well with that reported by studies done by [5, 9], the site of obstruction could be determined (by ultrasonography) in only 27% of the total sample. In a study done by Kammona [10] they showed that USG correctly identified the level of obstruction in 92.8%.

The cause of obstruction was indeterminate in 5 patients and incorrectly diagnosed in 5 patients and correct assessment regarding the cause of obstruction could be made in 80% patients in this study. Again by applying stringent criteria Honickman and other workers [9], could achieve only 23% success in defining the cause of obstruction in their patients. In nearly 75% of their patients the site of obstruction was indefinite. On other hand Koenigsberg and other co-workers [11] achieved 81% success in defining the cause of obstruction. Thus wide variations in determining the cause exists.

Table 8: Diagnosing level of obstruction by USG [11-13].

	Accuracy in diagnosing level of obstruction	Accuracy in diagnosing cause of obstruction
Koenigsberg et all (1979)	94 %	81 %
Verma SR et all (2011)	92.60 %	85.30 %
Pandit SP, Panthi M (2011)	94 %	83 %
Present study	92 %	80 %

Thus it is apparent from our study that although diagnostic accuracy of site of obstruction by ultrasonographic examination is quite high (92%) the accuracy in determining the cause of obstruction falls to only 80%. In our study, MRCP was correct in defining the level of obstruction in all cases. Out of the 50 cases the site of obstruction could be delineated correctly in 46 cases (95%). Regarding the cause of obstruction it could be correctly assessed in 45 cases (90%).

CONCLUSION:

Diagnostic accuracy of ultrasound and MRCP in a correct assessment of site of obstruction was very high and comparable to each other. But MRCP was better (90%) than ultrasound (80%) in correct predicting the cause of obstruction.

ACKNOWLEDGEMENTS:

We authors would like to thank the participants of the study.

Conflict of interest: None

REFERENCES:

1. Magnuson TH, Bender JS, Duncan MD, et al. Utility of Magnetic Resonance Cholangiography in the evaluation of biliary obstruction. *J Am Coll Surg* 1999;189:63-72.
2. Upadhyaya V, Upadhyaya DN, Ansari MA, Shukla VK, Comparative Assessment of Imaging Modalities In Biliary Obstruction. *Ind J Radio Imag* 2006;16(4):577-82.
3. James E Pearls. Advanced MRI-From Head to Toe. 2002; 3:211-46.
4. Berk JE, Cohen M. Extrahepatic obstructive jaundice. In:BOCKUS HL, eds. *Gastroenterology*. Vol.3:3rd ed. Philadelphia:W. B. Saunders;1976;238-46.
5. Atkinson M, Nordin BE, Sherlock S. Malabsorption and bone disease in prolonged obstructive jaundice. *Q J Med* 1956;25(99):299-312.
6. Knill Jones R.P, Stern R. B, Grimes D.H, et al. Use of sequential Bayesian model in diagnosis of jaundice by computer. *British Medical Journal*, 1973;1:530-3.
7. Lapis JL, Orlando RC, Mittelstaedt CA, Staab EV. Ultrasonography in the diagnosis of obstructive jaundice. *Ann Intern Med* 1978;89:61-3
8. Taylor KJ, Rosenfield AT, Spiro HM. Diagnostic accuracy of gray scale ultrasonography for the jaundiced patient. A report of 275 cases. *Arch Intern Med* 1979;139:60-3.
9. Honickman SP, Mueller PR, Wittenberg J et al. Ultrasound in obstructive jaundice: prospective evaluation of site and cause. *Radiology* 1983;147:511-5.
10. Kammona A, The accuracy rate of ultrasonography versus percutaneous transhepatic cholangiography in determining the level and cause of obstructive jaundice. A study submitted to the Iraqi commission for medical specializations in Radio-diagnosis. Baghdad, 1995.
11. Koenigsberg M., Wiener S. N., Walzer A. The accuracy of sonography in differential diagnosis of obstructive jaundice. A comparison with cholangiography. *Radiology* 1979,133: 157-65.
12. 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).
13. Pandit SP, Panthi M. Ultra-Sonographic Prediction of The Causes & Level of Obstruction in the Diagnosis of Obstructive Jaundice. *Postgraduate Medical journal of NAMS* 2011;11(2):8-10.