ORIGINAL ARTICLE

# COMPARISON OF ULTRASOUND EVALUATION OF PATIENTS OF OBSTRUCTIVE JAUNDICE WITH ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY FINDINGS

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**Background:** Ultrasonography has proven to be quite effective in differentiating hepatocellular from obstructive cause of jaundice in various studies. This study was conducted with the aim to determine the efficacy of ultrasonography and Endoscopic Retrograde Cholangio-Pancreatography (ERCP) in the diagnosis of obstructive reason of jaundice. **Methods:** In this descriptive case series, 200 patients with >15 years age of either gender with cholestatic liver enzymes were included, i.e., those patients who had an ultrasound prior to ERCP at the department of gastroenterology of Patel Hospital, Karachi. Patients known to have liver disease with cholestatic jaundice had imaging other than ultrasound were excluded. The results of ultrasonography and ERCPs were compared in particularly looking for the cause of obstruction. **Results:** Out of total 200 patients, mean age was 41.22±12.46 years with 107 (53.5%) females. Ability of ultrasound in correctly diagnosing obstructive reason for stone CBD was found to be 72.5%, dilated CBD without reason 41.7%, proximal obstruction, 63.15%, distal CBD obstruction 60%, and sludge 66.7%. Overall ability of ultrasound in correctly diagnosing the cause of obstruction was 64.17%. **Conclusion:** Ultrasound is recommended as the initial examination, which provides a guide to choose patients for either a more advanced non-invasive imaging like MRCP or to an invasive procedure like ERCP.

**Keywords:** Obstructive Jaundice; Ultrasound, Endoscopic Retrograde Cholangiopancreatography

**J Ayub Med Coll Abbottabad 2016;28(4):650–2**

## INTRODUCTION

Ultrasound has always been considered the first choice technique in the study of biliary obstructive diseases, due to its accessibility, speed, ease of performance and low cost.[1] Diagnostic sonography has advanced at a breath taking pace.[2] It has proven to be quite effective in differentiating hepatocellular from obstructive cause of jaundice in various studies.[3] New modalities, namely, endoscopic ultrasonography (EUS), magnetic resonance cholangiopancreatography (MRCP), and helical computed-tomographic cholangiography (HCT-C), have been introduced recently for the detection of an obstructive cause of jaundice, and have shown better sensitivity as compared to conventional ultrasound.[4]

The common causes of obstructive jaundice include common bile duct (CBD) stones, pancreatico-biliary cancers and iatrogenic injuries to CBD. ERCP has been considered the gold standard of biliary structure imaging since its introduction in 1970, and is currently maintaining its therapeutic application.[5]

Endoscopic Retrograde Cholangio-Pancreatography currently remains the standard of reference for imaging the bile duct and pancreatic duct.[6] A clear diagnosis prior to ERCP helps the endoscopist to counsel the patients and to be prepared for additional therapeutic procedures like insertion of metallic stents. This study was conducted to determine ultrasonography in the diagnosis of obstructive reason of jaundice with ERCP as the ultimate diagnosis.

## MATERIAL AND METHODS

This descriptive case series was conducted from March 2014 to Feb 2015 at the department of gastroenterology of Patel Hospital in Karachi, Pakistan. A total of 200 patients with cholestatic liver enzymes, who had an ultrasound prior to ERCP, were included in the study through consecutive non-probability sampling.

The inclusion criteria was patients of age more than 15 years of either gender who have cholestatic jaundice and have ultrasonography whereas patients known to have a liver disease and having presented with cholestatic jaundice have imaging other than ultrasound were excluded. Ultrasounds were performed in various centres of Karachi and Interior Sindh, while ERCPs were performed at Patel Hospital Karachi by a single operator which minimized the bias. The results of ultrasonography and ERCPs were compared in particularly looking for the cause of obstruction.

## RESULTS

Mean age of the patients was 41.22±12.46 years (Range: 17–84 years) with 107 (53.5%) females. Out of total 200 patients, obstructive jaundice was observed in 187 (93.5%) patients (Figure-1). Out of these 187 (93.5%) patients, ultrasound showed stones

of common bile duct (CBD) in 109 (58.28%) patients, dilated common bile duct without any cause in 36 (19.25%) patients, proximal obstruction in 19 (10.16%) patients, distal CBD obstruction in 20 (10.76%) patients, and 3 (1.60%) patients were reported as sludge with CBD dilatation.

Among 109 patients with CBD, during ERCP, CBD stones were confirmed in 79 (72.47%) patients whereas in 13 (11.92%) patients CBD was found dilated but there were no stone, while 5 (4.60%) patients had dilated CBD and debris. In 10 (9.17%) patients, a stricture was found in CBD rather than a stone. Only 1 patient (0.92%) was found to have normal CBD, while in another 1 case (0.92%) Ascarias worm was found lying in the CBD.

Among 36 patients with dilated CBD, on ERCP, 15 (41.67%) patients had CBD stones while in 07 (19.45%) patients the CBD was found dilated without any obvious reason and 6 (16.67%) patients had ampullary growth, another 6 (16.67%) patients had strictures while 1 (2.77%) patient had a normal CBD and another 1 patient (2.77%) had only sludge.

Out of 187 cases, 3 patients were reported to have sludge in common bile duct on ultrasound. On ERCP, 2 out of 3 patients had similar finding while 1 had only dilated CBD but no sludge was present.

In total of 187 cases, proximal obstruction was reported in 19 patients on ultrasound. Out of these 19 patients 12 patients had proximal obstruction likely because of carcinoma of gall bladder. In comparison of this ultrasound finding, we found that those 12 patients who were reported as proximal obstruction likely because of carcinoma of gall bladder had similar findings on ERCP, while 4 (21.05%) of these patients had proximal stricture likely due to Cholangiocarcinoma, while 1 patient (5.26%) had a stone impacted in proximal CBD. Two patients (10.52%) had a total cut off at the level of cystic duct suggestive of post cholecystectomy complication.

Distal obstruction was reported in 20 patients on ultrasound and 12 of these patients were reported to have a pancreatic mass which proved to have a distal stricture on ERCP (66.67%). Ampullary or periampullary growth was suggested in 6 patients (33.33%) on ultrasound out of whom on ERCP 4 (22.22%) had an abnormal looking ampulla while 2 patients (11.11%) had diffuse involvement of duodenal wall. Accuracy of ultrasound correctly diagnosing obstructive reason for stone CBD was found to be 72.5%, dilated CBD without reason 41.7%, proximal obstruction, 63.15%, distal CBD obstruction 60% and sludge 66.7%. Overall accuracy of ultrasound was found to be 64.17%. (Table-1)

ERCP findings of 13 patients reported normal in ultrasound is shown in figure-2.

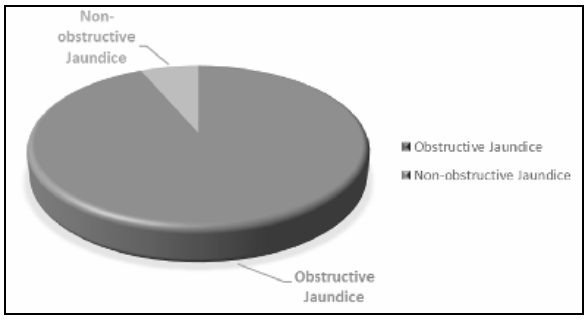


**Figure-1: Reason of cholestatic jaundice**

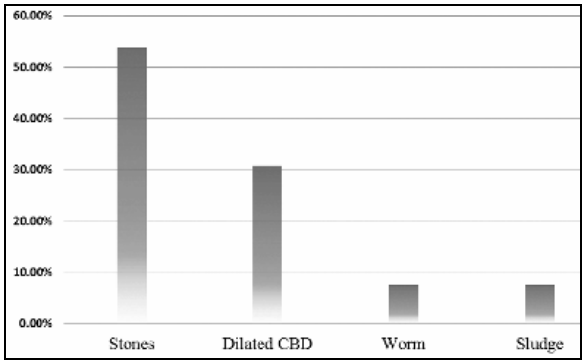


**Figure-2: ERCP findings of 13 patients reported as Normal on U/S**

**Table-1: Accuracy of ultrasound for obstructive reason of jaundice (n=200)**

| Obstructive Reasons | on U/S | Confirmed on ERCP | Accuracy |
|---|---|---|---|
| Stones CBD | 109 | 79 | 72.50% |
| Dilated CBD without reason | 36 | 15 | 41.70% |
| Proximal Obstruction | 19 | 12 | 63.15% |
| Distal CBD obstruction | 20 | 12 | 60% |
| Sludge | 3 | 2 | 66.70% |
| Overall accuracy | 187 | 120 | 64.17% |

n: number, U/S: Ultrasound, ERCP: Endoscopic Retrograde Cholangiopancreatography

## DISCUSSION

The findings of this study showed higher efficacy of ultrasound in suggesting an obstruction in biliary tract with ability to diagnose 93.50% which is close to a study done in Iraq showing such figures as 91.25%.[7] A study has revealed up to 97% sensitivity of ultrasound in differentiating obstructive jaundice from jaundice secondary to hepatocellular pathology.[1]

In this study, the level of biliary obstruction was divided in proximal CBD and distal CBD. Obstruction was reported in 39 patients on ultrasound. Out of these, 19 had proximal CBD obstruction and 20 had distal CBD. In comparison to ERCP, level of obstruction was correctly defined in 100% of patients while in a study published in Nepal it was close to 90%.[9] On ultrasound, actual cause of obstruction, i.e., tumours was suggested in 30 cases, 12 had carcinoma of gall bladder, 12 had

pancreatic mass and 6 had ampullary or periampullary growth. When these ultrasound results were compared to ERCP findings, the sensitivity of ultrasound in predicting a malignant obstruction was 57.67% with a positive predictive value of 100%. In a study, the sensitivity and accuracy of ultrasound in identification of malignant biliary obstruction was 97%, and 91% respectively.[9]

In 2 patients, however, the wall of duodenum was invaded by a tumour making the correct diagnosis difficult. A stricture in the proximal CBD at or above the level of cystic duct insertion was deemed to be compatible with either a CA Gall Bladder or a Cholangiocarcinoma. Brushing was not done due to poor yield and expense. Other possibility was post cholecystectomy stricture i.e. iatrogenic. This was proposed if the history was compatible. Only 2 patients had complete cut off in proximal CBD; these patients were post cholecystectomy and were referred by surgeons for evaluation of jaundice and biliary leaks. In this study, 13 patients with obstructive jaundice who were reported to have normal ultrasound have biliary tract obstruction on ERCP. In total of 200 patients, only 02 patients have found worm in CBD on ERCP which was totally missed by ultrasound. In short, ultrasonography has shown high accuracy in identifying the level and cause of biliary obstruction. In particular, considering the risks of invasive procedures and the cost, availability and patient's friendly nature, ultrasonography is recommended as the first choice of investigation in suspected biliary obstruction followed by other imaging modalities as and when required.[9] However, more prospective, multicentre, analytical studies are recommended to further evaluate the efficacy of ultrasonography in patients with obstructive jaundice at national level.

## CONCLUSION

Although, ultrasound provides good information about the presence and level of biliary obstruction, it does not suggest the possible cause in many cases. So, ultrasound is recommended as the initial examination (screening modality), which provides a guide to choose patients for either a more advanced non-invasive imaging like MRCP or to an invasive procedure like ERCP. It accurately demarcates the level of obstruction and therefore influences clinician's diagnosis and management plan.

## AUTHORS' CONTRIBUTION

All authors contributed equally in the preparation of manuscript.

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| *Received: 27 July, 2016* | *Revised: 1st November, 2016* | *Accepted: 6 November, 2016* |
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