Ultrasonography Versus Endoscope Retrograde Cholangio-Pancratography in Diagnosing Obstructive Jaundice

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ABSTRACT Jaundice (icterus) is a yellow discoloration of the skin, mucous membranes, and the whites of the eyes caused by increased amounts of bilirubin in the blood. Jaundice is considered a sign of an underlying disease process. Jaundice is detectable clinically when the serum bilirubin is greater than 50µmol/L (3mg/dL). Aims: the objectives were to assess the accuracy of ultrasound U/S and Endoscope Retrograde Cholangio-Pancratography ERCP , to diagnose site and cause of biliary obstruction. Methodology: Prospective, analytical, study deal with the Comparison between U/S and ERCP to diagnose obstructive jaundice. The study was performed by abdominal U/S and ERCP for thirty patients with signs and symptoms of obstructive jaundice. Results: The study found that obstructive jaundice was the most common in elderly ages especially over 65 years. Females were forming (53.3%) VS (46.7%) males. Abdominal U/S of showed that (77.7%) of the patients had dilated common bile duct CBD but ERCP showed (76.7%). Abdominal U/S showed that (50%) of the patients had stone in CBD and (20%) carcinoma head of pancreas while ERCP showed (36.7%) of the patients with stone and (23.3%) had carcinoma head of pancreas. Accuracy of ERCP in diagnosing obstructive jaundice was (80%) while U/S accuracy was (70%). Conclusion :U/S examinations should be done before ERCP. ERCP procedure is needed for treatment only, however good sterilization and safety considerations must be achieved to avoid the complications.

INTRODUCTION

Jaundice (icterus) is detectable clinically when the serum bilirubin is greater than 50µmol/L (3mg/dL). The usual division of jaundice into prehepatic, hepatocellular and obstructive (cholestatic) is an over simplification as in hepatocellular jaundice there is invariably cholestasis and the clinical problem is whether the cholestasis is intrahepatic or extra hepatic [1].

Jaundice will therefore be considered under the following headings: haemolyticjaundiceincreased bilirubin load for the liver cells, congenital hyperbilirubinaemias defects in conjugation, cholestatic jaundice, including hepatocellular (parenchymal) liver disease and large duct obstruction [1].

The principal role of imaging in the jaundiced patient is the identification and detailed assessment of major bile duct obstruction. The clinical suspicion is based on a variable combination of dark urine, pale stools, pruritus, cholangitis and cholestatic liver function tests. Ultrasound U/S is the preferred initial imaging investigation, but will usually be supplemented with a combination of computed tomography CT, magnetic resonance cholangiopancreatography MRCP, direct cholangiography and, in some centers, endoscopic and/or intraoperativ U/S [2].

U/S has replaced Oral cholecystography OCG for the diagnosis of gallstones and in many centers the oral contrast agents are no longer available. When extracorporeal shockwave lithotripsy was popular OCG was used to prove cystic duct patency, which was necessary for the passage of stone fragments. More recently oral contrast agents have been used for computed tomography CT cholangiography, although most centers use intravenous cholangiography IV biliary contrast agents[2].

Endoscopic retrograde cholangiopancreatography ERCP: ERCP provides direct opacification of bile ducts and pancreatic ducts with success rates of 92–97 per cent. It provides dynamic information during contrast medium introduction and drainage. It allows visual assessment of the duodenum and ampulla of Vater and provides an option for biopsy and brushings, as well as interventional procedures such as sphincterotomy and stone extraction, biliary stenting and biliary stricture dilatation [2].

Complication rates vary depending on the indication for the procedure, the presence of co-existing disease and the experience of the endoscopist, with severe complication rates of 0.9 per cent to 2.3 per cent, and total complication rates of 8.4–11.1 per cent, the most common significant complication being pancreatitis. The main diagnostic pitfall with ERCP is the under filling of ducts above a stricture [2].

The biliary system is one of the main systems in body, any problem in bile duct such as obstruction in Taif University College OF Applied Medical Science - TaIF KSA P O BOX 2425 Post Code 21944 common bile duct may be effect on the liver which formed the largest gland in the body and filter any toxic substance before turn to the blood circulation, may be extend effect the biliary system to the pancreas [3].

The current study mainly aimed to assess the accuracy of U/S and ERCP in determining biliary obstruction.

METHODOLOGY

Prospective, analytical, study deal with the U/S and ERCP procedures for diagnosing obstructive jaundice.

The target population of this study were consecutive patients

presented to our department. U/S reported obstructive jaundice and suggested ERCP for further confirmation.

Sample frame was comprised of thirty random cases confirmed signs and symptoms of obstructive jaundice, were scanned by U/S and ERCP. Selection of participation was done through simple random sampling.

Data collection sheet which was designed to include all variables like , Gall bladder abnormality, measurement of the diameter of common bile duct , causes and site of obstructive jaundiceto satisfy the study.

For U/S each patient was scanned with an universal ultrasound scanning protocols. A Shimadzu SDU-350 XL ultrasound machine with multi-frequency curvilinear probe (3.5-5 MHz) and a KIAXIN with two probes curvilinear multifrequency (2 MHz-5 MHz) and linear high frequency 6.5 MHz probe. High frequency probe 6.5 MHz was used to evaluate the gall bladder, common bile duct diameter measurements, cause of obstructive jaundice and other superficial structure.

A Shimadzu SDU-350 X1 curvilinear probe was used for other abdominal organs. Proper setting of the overall gain (system) gain and time gain or depth gain compensation (TGC/ DGC) was adjusted to optimally visualize each organ.

For ERCP examination preparation was performed , asked the patients to fast8 hours before ERCP. Patients post medical history was recorded before the exam.

Patients was asked to temporarily stop taking medications that affect blood clotting or interact with sedatives, which are usually given during ERCP to help patients relax and stay comfortable.

For ERCP a Toshiba fluoroscopic unit (Input of max 150 KVP ;Output of max 500 mA) was used. Each patient lied supine on an x-ray table while an endoscope was inserted down the esophagus, through the stomach, and into the duodenum. Video was transmitted from a small camera attached to the endoscope to a computer screen. Air was pumped through the endoscope to inflate the stomach and duodenum, making them easier to be examined. When the duodenal papilla was located, a catheter was slid through the endoscope and guided through the papillary opening. Once the catheter was inside the papilla, the contrast media was injected into the ducts allowing the ducts to be seen on the monitor. X- Rays were then taken to locate for narrowed areas or blockages.

Ethical consideration, viability and reliability
Special consideration was given to the right to confidentiality and anonymity of all survey participants. Anonymity was achieved by using numbers for each survey participant that will provide link between the information collected and the participants. In addition confidentiality was ensured by making the collected data accessible only to the researchers.

Justice and human dignity was observed by treating selected participants equally when offering them an opportunity to participate in the survey. The participants are free to decide whether to participate or not. The participant was given informed consent that will be signed after explanation of the purpose, possible outcomes of the survey and conditions applying to their participation. Permission to conduct the survey was obtained from the hospitals directors as well as the superintendent radiographer in the surveyed –x-ray departments.

To ensure combined validity and reliability the results of the study was verified by an independent consultant radiologist who has expertise in performing U/S procedures and interpreting U/S images.

RESULTS
30 jaundiced patients with biliary system disorders were in-

vestigated by ERCP and U/S and the results in the following tables and figures.
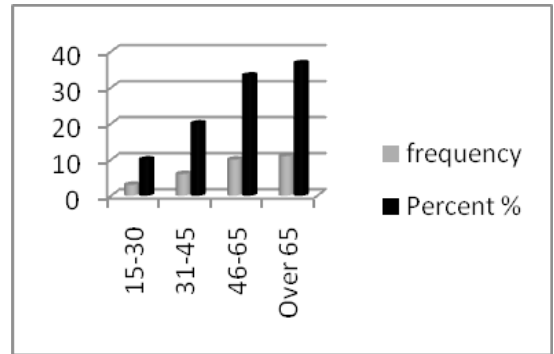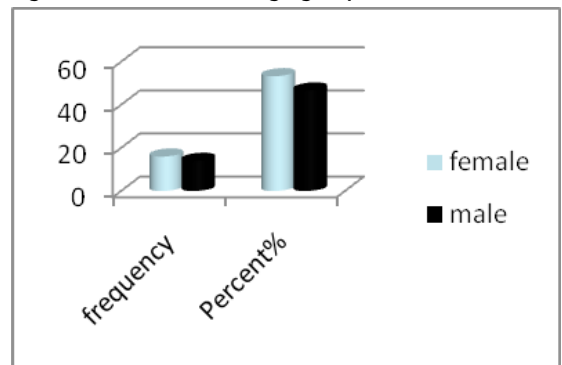

Figure 1: Distribution of age groups

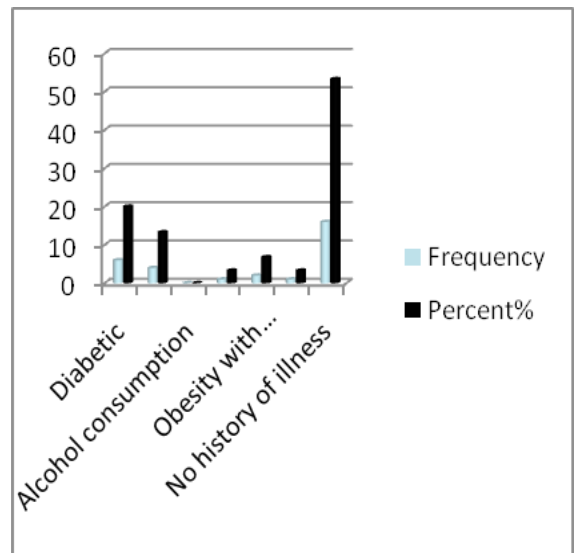Figure 2 : Distribution a patient's gender.

Figure 3: Distribution of patients according illness history
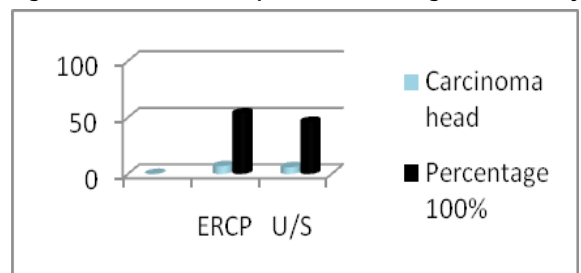

Figure 4: Distribution of diagnosis carcinoma head of pancreas by ERCP and U/S out of 13 patients.
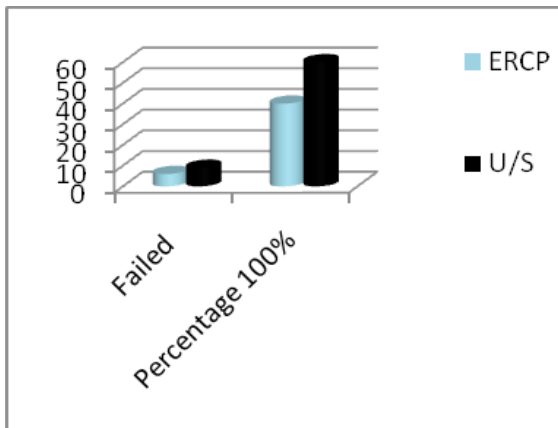
Figure 5: Distribution of ERCP and U/S failed to diagnosis obstructive jaundice out of 15 patients
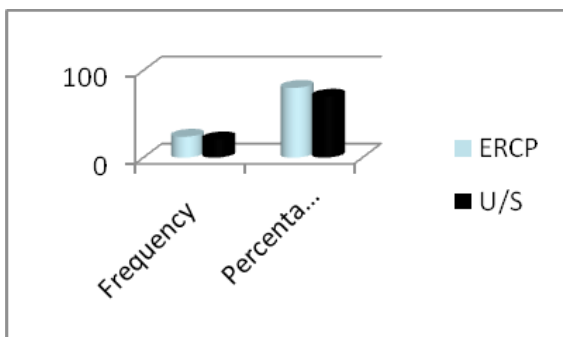

Figure 6:Efficiency of U/S compared with ERCP to detect causes of obstructive jaundice out of 30 patients.

Table 1: Distribution of U/S findings concerning gall bladder.

Gall bladder	Frequency	Percent %
Normal gall bladder	6	20
Thick wall	3	10
Thick wall with stone	9	30
Neoplasm	3	10
Sludge	5	16.7
Multiple stone , distended and removal GB	4	13.3
Total	30	100

Table 2: Distribution of ultrasound findings concerning common bile duct.

Common bile duct	Frequency	Percent %
Normal	7	23.3
Dilated	23	77.7
Total	30	100

Table 3: Distribution of ultrasound findings concerning causes of obstructive jaundice.

Causes of obstructive observed	Frequency	Percent %
Common bile duct stone	15	50
Common bile duct mass	0	0
Carcinoma head of pancreas	6	20
Ultrasound failed	9	30
Total	30	100

Table 4: Distribution of ERCP findings concerning CBD diameter.

Common bile duct	Frequency	Percent %
Normal	1	3.3
Dilated	23	76.7
Failed	6	20
Total	30	100

Table 5: Distribution of ERCP findings concerning causes of obstructive jaundice.

causes of obstructive observed	Frequency	Percent %
Normal	1	3.3
Common bile duct stone	11	36.7
Common bile duct mass	0	0
Carcinoma head of pancreas	7	23.3
Stricture	5	16.7
ERCP failed	6	20
Total	30	100

Table 6: Distribution for diagnosis of biliary system stone by ERCP and U/S out of 26 patients.

Techniques	Biliary stone	Percentage 100%
ERCP	11	42.3
U/S	15	57.7
Total	26	100

DISCUSSION

30 obstructive jaundiced patients were investigated by U/S and ERCP. It's well known that U/S scan procedure is easy, comfortable, non invasive procedure and without patients or staff hazard. While ERCP procedure is invasive, performed in the painful risky considerable conditions and with radiation hazard.

The study found that obstructive jaundice is most common in elderly ages especially over 65 years there were 11 out of 30 cases (36.7%) this might due to "elevation of the bilirubin level in this stage of life than normal which (>50umol/L)"(1),, and this results was not match the recent results reported by Zhong ; et al 2012 [4] that revealed from their sample youth group of patients with Jaundice and viral hepatitis is the most common, accounting for 31.94%, much higher than the middle age group of 9.23% and 4.26% of the elderly group.

16 cases out of thirty were females forming an incidence (53.3%) and 14 were males (46.7%). Increased incidence of female patients in this study due to excess of cholesterol in the body, multiple pregnancies, obesity and rapid weight loss, this results approach the results of Zhong ; et al 2012 [4] who mentioned that In the 352 cases of jaundice, male to female ratio is 1.88:1.. Also these results are basically the same as Xudong ; et al [5] and Qiu ; et al [6].

The ultrasound scan sensitivity in detecting the calculus cholecystitisthat associated with obstructive jaundice was commonest and was 9 out of 30 patients (30%) compared with other abnormality of gall bladder, but ERCP failed to diagnosis any abnormality in the gall bladder. This results is not comparable with the study performed by Rahim Khan et al 1995 [7], that detected the ultrasound accuracy in calculi , and reported that the positive predictivevalue for the site and etiology of obstruction by ultrasonography was 94% and 86% respectively

The dilated common bile duct was commonest finding that concerned with obstructive jaundice which was 23 out of 30 (77.7%), compared with ERCP which was 23 cases (76.7%), due to accumulation of bile in common bile duct. These find-

ings to somewhat agree with the findings of Karki ; et al 2013 [8], they reported that " Ultrasound was found to have very high accuracy in detecting biliary tract dilatation with sensitivity of 94.8% and specificity of 100%. However the detection of CBD stricture by U/SG was not statically significant as compared to ERCP '

Ultrasound scan sensitivity in detecting biliary stones was (57, 7%), 15 patients out of 26. Sensitivity for ERCP was (42.3%), and this record explains the increased sensitivity of U/S over ERCP because some stones were too small in size or largest to prevent entering ERCP guide wire. Also the stenosis in the site of the papilla, which makes it difficult to cannulate. This study agrees with records of Rigauts et al, (1992) [9] in their study about Comparison of ultrasound and ERCP in detection of the causes of obstructive biliary disease. They found that out of 120 patients the ultrasound correctly defined the cause of obstruction in 71% of the patients with ductal stones compared with ERCP. In addition to that it also match the findings of Kiani et al [10] in their recent study 2012 , as they revealed that Choledocholithiasis was the commonest causes (twenty patients i.e., 66.6%) followed by various malignancies.

ERCP most sensitive to detect biliary tumors, there were 7 out of 13 patients with biliary tumors (53.8%) diagnosed by ERCP, and U/S diagnosed 6 (46.2%). This record explains the sensitivity of ERCP over U/S. this findings agrees with Rigauts and his team (1992) [9] in their study about comparison of ultrasound and ERCP in the detection of the cause of obstructive biliary disease. They revealed that out of 120 patients the ERCP correctly defined the cause of obstructive in (90%) of patients with ductal tumors compared with U/S. also this findings comparable with the original study of Karki et al 2013 [8], as they concluded that ERCP was to be the much sensitive in detecting CBD stricture as compared to U/SG which was similar to the study performed by Upadhyaya and his colleagues [11] 2006. In addition to that , ERCP with advanced technology and well trained staff may be more sensitive than this findings as the findings mainly depend on the technology and experience of the staff.

Efficiency of ultrasound to detect causes of obstructive jaundice was 21 cases out of 30 (70%) and ERCP was 24 (80%). This record explains that the ERCP more accurate than U/S to detect causes of obstructive jaundice. This study agrees with Pasanen ; et al (1992) [12], in study about ultrasonography, CT, and ERCP in the diagnosis of choledochal Stones. they found that out of 187 patients the sensitivity of U/S in detection of obstructive jaundice was (22.5%) and ERCP was (87%). Also this match the findings of Satish ; et al 2013 [13] as they concluded that ultrasound even with high resolution equipment and tissue harmonic imaging technique waslimited by many factor such asobese patients who were poor ultrasound candidates, as well as too bowel gases which caused

obscuration of distal CBD. Besides, smaller lesions beyond the resolving power of ultrasound were missed . And these would allowed ERCP more accurate than trans-abdominal ultrasound to the following factors : ERCP used in biopsy guidance as a helpful means of confirming the diagnosis moreover drainage and removal of duct stones more than U/S , and it is accurate in visualization of biliary ducts , in addition it is gives more information about causes of obstructive jaundice which would not achieve during U/S.

In addition to that U/S scanning is individual dependence , therefore it require experience and new advanced machines has a wide range to covering the diagnosis of the biliary system diseases and has the ability to differentiate between them , while ERCP procedure is effective in the bile ducts .

CONCLUSION

ERCP is superior than U/S in the evaluation of the biliary system abnormality, it has high diagnostic accuracy, sensitive and efficient, it's better than U/S in covering the diagnosis of biliary system disorders, (with 60% accuracy), and adding to advantage of each, U/S guided needle puncture for biopsy and bacteriology is the most helpful means of confirming the diagnosis. Also ultrasound examination usually performed before ERCP, ERCP is often indicated when both clinical and ultrasound finding indicate abnormalities in the biliary system or the pancreas.

Obstructive jaundice has different etiological spectrum in males; While malignant causes predominate compared to females who have more of benign disease.Benign causes are seen at a comparatively younger age group compared to malignant causes.

RECOMMENDATIONS

U/S examinations should be done before ERCP. ERCP procedure is needed for treatment only, however good sterilization and safety considerations must be achieved to avoid the complications.Some cases missed diagnosed by U/S, so ERCP should be done to ensure the final diagnosis. More studies on this field of diagnosis were required, and the training of the staff is the principal key.

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