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ORIGINAL RESEARCH

Diagnostic efficacy of ultrasound imaging and ct scan in detecting chronic liver diseases (CLD)

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Abstract

Introduction: Accurate diagnostic testing for CLD to identify asymptomatic patients in a high risk population has become more important due to recent advances in management and treatment options that provide better patient outcomes if the diagnosis of fibrosis or cirrhosis can be made before cirrhosis becomes clinically apparent. The purpose of this work was to evaluate the detection and characterization of common liver diseases using CT scan versus ultrasound imaging.

Materials and Methodology: The study population included almost 60 patients (32 males and 28 females) who had fulfilled the inclusion criteria that had been followed in the study. The mean age of the study participants included quantified to be 48 years (16 – 90 years). The major inclusion criteria included those patients who had presented themselves with acute abdominal pain for more than 1 hour and less than 4 days at the emergency ward. Exclusion criteria included those patients who were discharged from the emergency department after getting treated by the physician, patients without any diagnostic imaging, patients under 18 years of age, pregnant women, patients with distinctive abdominal flank pain suspected renal colic were eliminated from the study.

Results: C.T & Ultrasound scan was performed on 60 patients and out of these 60 cases, according to CT findings 11 were malignant (hepatocellular carcinoma), Liver Abscess (5.3%), Fatty liver (27.5%), Haemangioma (8.1%), liver cyst (16.9%), Cirrhosis (13.9%), Others (11.9%) as shown in table – 2 and table - 3. On sonography lesions were diagnosed as 8 were malignant (hepatocellular carcinoma), Liver Abscess (5%), Fatty liver (35%), Haemangioma (6.7%), liver Cyst (15%), Cirrhosis (8.3%), Others (18.3%).

Conclusion: The process of selecting which technique is better purely in a clinician's perspective choice. Further advancements should be aimed in defining a proper diagnostic algorithm for staging specific chronic liver disease (CLD).

Keywords: ultrasound, computed tomography, chronic liver disease, imaging

Introduction

Chronic liver disease (CLD) is a major cause of morbidity and mortality across the globe particularly in majority of the developing nations. CLD is identified to be responsible for 1 million deaths in virtue of certain chronic liver diseases like viral hepatitis and hepatocellular

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carcinoma. Based on the current clinical pictures, there are various opportunities and ways to prevent chronic liver disease thereby improving the public health by enhancing the diagnostic accuracy of assessment of chronic liver disease.[1,2] This CLD might be caused by various reasons that include viruses mainly hepatitis B virus (HBV) or could be hepatitis C virus (HCV) or could be due to excessive alcohol consumption. Other than this there could be other reasons like bad nutrition which ultimately leads to non-alcoholic fatty liver disease (NAFLD) and steatohepatitis (NASH). Sometimes this CLD could be the result of some rare autoimmune hepatitis, primary biliary cholangitis, primary sclerosing cholangitis and wilson's disease.[3]

Accurate diagnostic testing for CLD to identify asymptomatic patients in a high risk population has become more important due to recent advances in management and treatment options that provide better patient outcomes if the diagnosis of fibrosis or cirrhosis can be made before cirrhosis becomes clinically apparent.[4] The standard method for assessing, staging and grading CLD is liver biopsy.[5] The invasiveness of this method and its associated morbidity and mortality has paved the way to the emergence of less invasive methods which include various medical imaging techniques (computed tomography, magnetic resonance imaging and ultrasound), serum markers (both direct and indirect markers of fibrosis) and transient elastography.[4] All of these techniques have the capability to minimise the number of biopsies performed in a high risk population.

Ultrasound can detect the manifestations of CLD such as liver fibrosis and cirrhosis which are relatively characterized by the presence of vascularized fibrotic septa and regenerating nodules.[6] Ultrasound has proved to be an attractive diagnostic tool because it is readily available, inexpensive, well tolerated and is already extensively been administered in the diagnostic work-up of patients with CLD. Most ultrasonography (US) imaging consists of real-time, gray-scale, B-mode display, with the reflected signal amplitude displayed as a variation in brightness.[7] The transducer is most often in contact with a patient's skin (conventional US), although it can be placed in body cavities (endoluminal US) either directly or endoscopically (endoscopic US or endosonography). The purpose of this work was to evaluate the detection and characterization of common liver diseases using CT scan versus ultrasound imaging.

Materials and methodology

After obtaining prior approval from the institutional ethical committee, the study began with the stipulated time period of January 2022 to January 2023. The study population included almost 60 patients (32 males and 28 females) who had fulfilled the inclusion criteria that had been followed in the study. The mean age of the study participants included quantified to be 48 years (16 – 90 years). The major inclusion criteria included those patients who had presented themselves with acute abdominal pain for more than 1 hour and less than 4 days at the emergency ward. Exclusion criteria included those patients who were discharged from the emergency department after getting treated by the physician, patients without any diagnostic imaging, patients under 18 years of age, pregnant women, patients with distinctive abdominal flank pain suspected renal colic were eliminated from the study.

Considering the ultrasonography, the patients are allowed to be placed at supine and left posterior oblique position in order to take longitudinal and transverse views. And when CT is considered, the patient is kept at supine position in order to take axial slices.

Results

Table – 1 showed the age of the study participants included in the study. Majority of the participants belonged to the age group of more than 61 years followed by 41 – 50 years with the percentage of participants of 28%.

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C.T & Ultrasound scan was performed on 60 patients Male(53.3%), Female(46.7%) their age ranged from (16 - 90) years who presented with history of pain symptoms and signs of focal liver lesions(40 with pain, 24 with fever, 24 with tenderness and 12 with Jaundice and the most affected group their age more than 60 years. (Table – 1) Out of these 60 cases, according to CT findings 11 were malignant (hepatocellular carcinoma), Liver Abscess (5.3%), Fatty liver (27.5%), Haemangioma (8.1%), liver cyst (16.9%), Cirrhosis (13.9%), Others (11.9%) as shown in table – 2 and table - 3. On sonography lesions were diagnosed as 8 were malignant (hepatocellular carcinoma), Liver Abscess (5%), Fatty liver(35%), Haemangioma(6.7%), liver Cyst (15%), Cirrhosis (8.3%), Others (18.3%).

Table 1: Age of the study participants

Age group	Percentage
>30 years	16%
31 – 40 years	18%
41 – 50 years	26%
51 – 60 years	10%
>61 years	30%
Total	100%

Table 2: CT findings of liver Lesions

Lesions	Percentage
Liver abscess	5.3%
Hepatocellular carcinoma	16.7%
Fatty liver	27.5%
Hemangioma	8.1%
Liver cyst	16.9%
Liver cirrhosis	13.9%
Others	11.6%
Total	100%

Table 3: Comparison between ultrasound and CT scan findings

Lesions	Ultrasound findings	CT findings
Liver abscess	3	3
Hepatocellular carcinoma	8	11
Fatty liver	21	16
Hemangioma	4	5
Liver cyst	9	10
Liver cirrhosis	5	8
Others	11	7
Total	60	60

Discussion

This study basically included 60 patients Male(53.3%), their age ranged from (16-90)years Ultrasound (US) is an already established accurate technique for improving the true cystic nature of a focal hepatic mass; a simple hepatic cyst will appear as a round or ovoid, sonolucent lesion with posterior acoustic enhancement and will not display the presence of a perceptible wall. Whereas considering the unenhanced CT, a hepatic cyst usually shown as a well-defined, homogeneous and hypodense lesion, with no enhancement of its wall or content after intravenous administration of iodinated contrast material. Various advances like helical CT and multi-detector CT (MDCT) have paved the rapid image acquisition with improved

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spatial resolution and its capability in viewing the liver images in various multiple phases with contrast enhancement in a much more precise manner. Also various advances in images post-processing had allowed the acquisition of the 3D imaging of the hepatic vasculature.

In this research study, particularly out of 60 patients, 7 were correctly diagnosed on sonography. The radiological advancements in liver tumours in last two decades have made some malignant tumors to be operated which were considered inoperable and have completely changed the expectations from radiology. But, accurate staging that is performed by imaging modalities, has critical importance in the selection of patients who can benefit from resection precisely.

Ultrasonography (US) is considered to be a commonly the first imaging modality which are used in the clinical workup of patients with diffuse liver disease. Many factors like the presence of fat, water content, frequency used, focusing, time-gain compensation and gain setting might probably affecting the image. Liver fibrosis and steatosis can have similar appearances and can be present at the same time in a "fatty-fibrotic pattern".[8] However, US is safe, inexpensive, and not only routinely used within hospitals, but is also available in individual doctor's practices and mobile settings. It offers real-time capability without the need for much data processing and analysis. Contrast-enhanced CT using iodinated contrast agents offers a clinical tool for the determination of changes within the liver with high spatial and temporal resolutions comparable to US. The development of helical CT allowed single breathhold scanning and evaluation of the whole hepatic parenchyma without motion artifacts during the hepatic arterial phase and the portal venous phase. Normally hepatic parenchymal enhancement is minimal during hepatic arterial phase, while during the portal venous phase normal hepatic parenchyma enhances markedly.[7-9] Unfortunately, most studies of contrast-enhanced CT involved patients with cirrhosis [7] and it is thus unclear if changes in hepatic enhancement could be used to diagnose mild or moderate hepatic fibrosis.

Conclusion

To conclude, both the ultrasonography as well as computerised tomography has greatly improved in diagnosing the liver lesions. The process of selecting which technique is better purely in a clinician’s perspective choice. Further advancements should be aimed in defining a proper diagnostic algorithm for staging specific chronic liver disease (CLD).

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ISSN: 0975-3583,0976-2833 VOL14, ISSUE 02, 2023

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