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Original Article

Characterization of Solid Liver Masses on Ultrasound in Adults

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ABSTRACT

Liver carcinoma is the fifth leading cancer globally and the third top cause of mortality in 2012, there were 14 million new cases and 8.2 million fatalities. **Objective:** To accurately define solid liver masses in adults based on clinical presentation and ultrasound findings in order to obtain a definitive diagnosis in adults**. Methods:** It was a retrospective study consisting of total 128 individuals with untreated liver lesions examined on ultrasound (Toshiba Xario 100) at a private tertiary care hospital in Gujrat. From January 2021 to January 2022, 65 males and 63 females, ages ranging from 30 to 70 years. A convenient sampling technique was used to collect data by fully informed consent from patients to access. Data was entered and analyzed on SPSS version 22. **Results:** The current study included 128 patients aged ranging from 30–70 years, being examined using ultrasound for solid liver masses. The gender frequency was 65(50.8%) males and 63(49.2%) females. Ultrasound diagnosis interprets as 62(48.4%) Hepatocellular-carcinoma, 38(29.7%) hemangioma, 11(8.6%) FNH, 3(2.3%) metastasis, and 13(10.2%) cholangiocarcinoma. Moreover, ultrasound findings regarding liver masses diagnosed includes 99(38.7%) single masses, 29(11.3%) multiple masses, 47(18.4%) normal liver parenchyma and 81(31.6%) coarse liver. The common clinical complaints associated with solid hepatic lesions were right upper quadrant pain 80(35.4%), splenomegaly 69(30.5%) and 77(34.1%) hepatomegaly. **Conclusions:** It is concluded that the right upper quadrant pain, hepatomegaly has a correlation to solid liver masses and a weak relation to splenomegaly irrespective to age and gender. The most common solid liver mass was Hepatocellular carcinoma (HCC). Ultrasound is a noteworthy imaging modality to diagnose solid hepatic masses.

INTRODUCTION

To image deep and superficial organs of the body, a high-frequency (> 20 kHz) sound known as ultrasound is used. Ultrasound is non-ionizing with zero effect on tissues and is safe for imaging. It requires a medium such as liquid or solid to be transmitted. Like other organs, the liver is most frequently imaged in abdominal scans where the liver appears to be multi-echoic [1]. Furthermore, fluid-filled structures with well-defined edges, such as gallbladders, appear anechoic, and there may be a shadow below due to the absence of signal produced by any stone or dense structure. Different liver masses have different appearances on ultrasound images, different sizes, different thicknesses, and different echogenicity [2]. They may appear hypoechoic, isoechoic, or hyperechoic with either necrotic or fluid-filled centers and irregular margins or well-defined boundaries, respectively [3]. Hemangioma might be hard to distinguish from a localized metastasis, abscess or hydatid cyst as it is visualized as a hyperechoic lesion with a discrete boundary, whereas hepatoma is visualized as a single localized lesion with the same echogenicity till its edges [4,5] A lack of clinical indications may indicate it to be a hemangioma. To make an accurate diagnosis, a color doppler Ultrasound, CT, MRI is necessary [6]. Because of the widespread use of imaging techniques, liver masses are now more common [7]. A large proportion is discovered by chance in an asymptomatic individual [8,9]. Oral contraceptives and anabolic steroids may be associated with hepatic adenoma [10]. Angiosarcoma is associated with alcohol usage and occupational exposure [11]. Primary sclerosing cholangitis, liver fluke, Caroli's

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disease, and choledochal cysts are all correlated to cholangiocarcinoma [12]. A thorough medical history and physical examination are essential for the proper assessment and treatment of solid liver tumors [9]. Access for symptoms of liver soreness, clinical manifestations of chronic liver disease, or generalized deterioration (fever, weight loss) [13]. Increased levels of alkaline phosphatase, lactate dehydrogenase (LDH), albumin, prothrombin time, and oxidative stress are non-specific markers of chronic hepatitis, cirrhosis, or an infiltrative process [14]. Hepatitis B, C, or liver cirrhosis in the past may indicate the presence of hepatocellular carcinoma (HCC) [15]. A history of abnormal cell growth or chemotherapy raises the possibility of spreading liver disease. Hemangioma (4%), focal nodular hyperplasia (0.4%), and hepatic adenomas are among the benign liver lesions that affect more than 20% of the general population (0.004 percent) [16]. Multiple tumors in a liver generally mean cancer (most commonly caused by colon, stomach, lung, or prostate adenocarcinoma, although they might also be cysts or hemangiomas [17]. Internationally, cancer has become one of the major causes of illness and mortality. In 2012, there were 14 million new cases and 8.2 million fatalities, an estimated 746,000 deaths [18]. Liver carcinoma is the fifth leading cancer globally and the third top cause of mortality [19,20]. Liver cancer accounted for 2.2 percent of new cancer cases and 4.2 percent of all cancer deaths in the United States (US) in 2015, according to the Surveillance, Epidemiology, and End Results Program (SEER) [21]. Though metastatic cancers are the most common type of liver carcinoma, HCC alone accounts for around 80% of liver cancers [22]. Liver solid masses are extremely common in the general population and are associated with increased morbidity and mortality. This study will support early detection and treatment of the disease while creating awareness among the population for early cure. This study will also suggest that ultrasound is the best modality to visualize lesions in detail.

METHODS

A retrospective study consisting of total 128 individuals with untreated liver lesions were examined through ultrasound (Toshiba Xario 100 color Doppler (C5-2 convex probe) with a frequency of 3.0 to 5.0 MHZ in real-time) at a private hospital in Gujrat was conducted. The data was collected from January 2021 to January 2022, 65 males and 63 females were involved in the study. The age ranges from 30 to 70 years. A convenient sampling technique was used to collect data with fully informed consent from patients. Patients were examined in the supine or lateral position to count and record the number, location, morphology, boundary, size, internal echo, and the existence of an acoustic halo at the tumor's margin. To calculate the tumor's blood flow resistance, a color Doppler blood flow imaging technique was used to examine the blood supply in the tumors. Tumor boundaries, echogenicity, and blood flow inside the tumor were all thoroughly examined in accordance with US diagnostic criteria.

RESULTS

The current study included 128 patients who were examined using ultrasound for solid liver masses. Table 1 shows the total number of patients, with the youngest and eldest patient ages mentioned as 30–70 years, respectively.

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
Age of Patients	128	30.00	70.00	49.6797	12.44701

Table 1: Descriptive statistics of age

Table 2 shows the gender frequency, including 65(50.8%) males and 63(49.2%) females, with no significant effect on the occurrence of solid liver masses.

Valid	Frequency	Percent	Valid Percent	Cumulative Percent	
	Female	63	49.2	49.2	49.2
	Male	65	50.8	50.8	100.0
	Total	128	100.0	100.0	

Table 2: Gender frequency

Table 3 shows the ultrasound diagnosis, including 62(48.4%) hepatocellular-carcinoma, 38(29.7%) hemangioma, 11(8.6%) FNH and 13(10.2%) cholangiocarcinoma and some cases 3(2.3%) of metastasis.

	Frequency	Percent	Valid P%	Cumulative %	
Valid	HCC(hepatocellular carcinoma)	62	48.4	48.4	48.4
	Hemangioma	38	29.7	29.7	78.1
	Focal nodular hyperplasia	11	8.6	8.6	86.7
	Metastases	3	2.3	2.3	89.1
	Cholangiocarcinoma	13	10.2	10.2	99.2
	Hepatic adenoma	1	.8	.8	100.0
	Total	128	100.0	100.0	

Table 3: Ultrasound diagnosis of patients

Table 4 shows the ultrasound findings regarding liver masses diagnosed, including 99(38.7%) single masses, 29(11.3%) multiple masses, 47(18.4%) normal liver parenchyma, and 81(31.6%) coarse liver.

	Frequency	Percent	Valid %	Cumulative %	
Valid	Single mass	99	38.7	38.7	38.7
	Multiple mass	29	11.3	11.3	50.0
	Normal liver parenchyma	47	18.4	18.4	68.4
	Coarse liver parenchyma	81	31.6	31.6	100.0
	Total	256	100.0	100.0	

Table 4: Ultrasound findings regarding liver masses

Table 5 shows the clinical complaints associated with solid

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hepatic lesions such as 80 (35.4%) right upper quadrant pains, 69(30.5%) splenomegaly, and 77(34.1%) hepatomegaly.

	Frequency	Percent	Valid %	Cumulative %	
Valid	Splenomegaly	69	30.5	30.5	30.5
	Right upper quadrant pain	80	35.4	35.4	65.9
	Hepatomegaly	77	34.1	34.1	100.0
	Total	226	100.0	100.0	

Table 5: Clinical findings of patients with liver masses

DISCUSSION

Ultrasound examination of the right upper quadrant pain in relation to the liver is very important for the early detection of any benign or metastatic liver lesions. The goal of the current study was to characterize solid liver masses in adults in relation to their clinical presentation and ultrasound findings in order to make a definite diagnosis in adults. All individuals included were diagnosed with solid liver masses. The study included 128 patients with solid liver masses, including HCC, hemangioma, focal nodular hyperplasia, metastasis, and cholangiocarcinoma. Ultrasound showed significant diagnosis and characterization. The study showed that HCC is more commonly found in adults irrespective of gender and age, as there were 65(50.8%) males and 63(49.2%) females aged 30 to 70 years. The current study demonstrates that solid liver masses have no correlation with age and gender and have an approximately equal distribution of liver masses. Whereas the current study has shown a significant correlation between the right upper quadrant pain among patients, 80(35.4%), 77(34.1%) had hepatomegaly, and 69(30.5%) had splenomegaly. This study proclaims to have very high accuracy in the diagnosis of HCC, hemangioma, metastasis, focal nodular hyperplasia, and cholangiocarcinoma. The same statement was concluded by the results of a previous study conducted by Abdelnasser Abdelatti et al. in 2020 which showed the highest incidence of hepatocellular-carcinoma as a liver mass in adults, followed by hemangioma and other liver masses [23]. The previous findings were 38(29.7%) hemangioma, 11(8.6%) FNH, 3(2.3%) metastasis, and 13 (10.2%) cholangiocarcinoma, which was almost similar to the current findings in having a most frequent occurrence of HCC in adults. Another study by Jia Hu in 2020 supports the nearly same frequency of liver masses diagnosed in adults, in relation to his area of data collection [24]. Jia Hu's study shows 32 (34%) HCC, 55 (58%) hemangioma, 29 (30%) metastasis, and 22 (23%) intrahepatic cholangial-cellular carcinomas, which have nearly the same findings as to the current study. Both studies have concluded the use of ultrasound for accurate diagnosis of liver masses with approximately the same frequency of results and accuracy rate for different liver masses.

CONCLUSION

It is concluded that the right upper quadrant pain is associated with hepatomegaly, solid liver masses, and a weak relationship to splenomegaly. All adults, including females and males, are equally prone to developing liver masses at any age of adulthood. The most common solid liver mass was Hepatocellular carcinoma (HCC) and ultrasound is highly accurate in the diagnosis of HCC, hemangioma, focal nodular hyperplasia, and cholangiocarcinoma.

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