Correlation in Size of Right Lobe and Caudate Lobe of Liver in Normal and Chronic Liver Disease Patients' By Using Ultrasonography

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Abstract:

Chronic liver disease in the clinical aspect is a disorder process of the liver. It involves the changes of continuous destruction and regeneration of the liver parenchyma progressing to fibrosis and cirrhosis.

Objective:

To determine the correlation of caudate lobe and right lobe of liver in normal and chronic liver disease patients by using ultrasonography for the diagnosis of chronic liver disease.

Methods:

Total 194 patients were observed out of which 97 were normal and 97 were suffering from chronic liver disease. Two variables were used, size of caudate lobe and right lobe were measured and compared in ratio by using ultrasonography. Study was conducted from March to December 2015.

Results:

The mean value of caudate to right lobe ratio was more than 0.68 in chronic liver disease patients, while the mean value of caudate in right lobe ratio of normal patients was 0.38.

Conclusions:

Caudate to right lobe ratio may be a valuable tool for the diagnosis of chronic liver disease patients.

Keywords:

Chronic liver disease, Ultrasonography, Caudate to right lobe ratio, Normal liver, Liver dysfunction.

Introduction:

Chronic liver disease involves the changes of continuous destruction and regeneration of the liver parenchyma progressing to fibrosis and cirrhosis.[1] The initial signs and symptoms of chronic liver disease are mostly nausea, loss of appetite, fatigue, liver dysfunction, splenomegaly, and gastrophageal varices. The function of liver decrease due to cirrhosis which means that liver working capacity is decreasing day by day possibly for years.[2] The cost of chronic liver disease is extremely high in terms of human suffering, doctor and hospital visits, and early loss of productivity.[3] In the European area in 2013, 29 million people have suffered from a chronic liver disease and more than 30 million Americans suffered from liver disease.[4] The main reasons of chronic liver conditions are liver carcinoma, hepatitis, alcohol liver disease, cirrhosis, autoimmune diseases, cholestatic and drug induce liver diseases. Most appropriate diagnosis for chronic liver disease is at early stage when disease is asymptomatic while the symptoms are mostly appearing at late disease stage. The treatment choices should be done as before the chronic liver disease become irreversible.[5] The size of the liver and its lobes change with the progression of chronic liver disease.[6] The accurate measurement of liver volume has been made possibly due to availability of rapid volumetric scanning. Ultrasound based volumetry has been increasingly utilized in current clinical practice to obtain accurate measurement of liver volumes.[7] Ultrasound technique has the importance for the diagnosis and management of chronic liver disease. Ultrasound technique can also help us in the evaluation and detection of liver parenchymal changes, hepatocellular parenchyma and portal hypertension. The conventional ultrasound has importance to assess liver parenchyma and detection of liver lesion, a number of ultrasound techniques has been developed to find more helpful tool for diagnostic purpose. The thought to conduct this research is to evaluate the validity of ultrasound technique for some current and future value for the diagnosis of chronic liver disease.[8] The ultrasonography can also be used effectively for the grading of hepatic conditions. There is a strong correlation for the grading of liver for inflammation or fibrosis at liver biopsy.[9]

Aktan et al observed an absence of the caudate lobe with 7.41% of the 54 livers studied. Various shapes of the caudate lobe were encountered. 33 specimens showed rectangular shape (91.66%), 2 were triangular (5.55%) and 1 was elongated (2.77%).[10] Out of 90

specimens studied by Joshi et al 58% rectangular, 20% bicornuate, and rest 22% (20 specimens had different shapes, i.e. pear-shaped, quadrate, triangular, elongated, heart-shaped, square and inverted pear-shaped).[11] Sahni et al studied 200 specimens and reported that 189 (94.5%) were rectangular, 9(4.5%) pyriform and 2 (1%) irregular.[12]

The purpose of this research study with correlational review was to make sense of the relationship of right lobe and caudate lobe of liver in regular and chronic liver disorder patients and to get to either this procedure was feasible in the basic considering of ultrasound imaging to find chronic liver disease in a high risk of people.

Methods:

A co-relational study was conducted in Nawaz Sharif Social Security Teaching Hospital, Lahore. Real time Ultrasound machine esaote My Lab 20 working with 3-5 MHz transducer was used for the study. A total of 194 individuals, some of them were diagnosed with chronic liver disease with or without complications, normal healthy volunteers with no chronic liver disease from the same area served as controls. The duration of this study was from March to December 2015. The patient was fasting for 4 hours before the examination to decrease the amount of gasses and fecal masses. The whole liver was measured by caudal cranial technique. The caudate and right lobes were measured by antero-posterior technique and then calculated by caudate/ right lobe ratio. Caudate-right lobe ratio(C/RL) was used as standardized parameter in the assessment of chronic liver disease, especially in the setting of cirrhosis, in which there was a decrease in size of the right lobe with hypertrophy of the caudate lobe. The caudate/right lobe ratios values which showed different liver conditions were used, caudate/Right lobe <0.6 = normal (does not exclude cirrhosis), caudate/Right lobe 0.6-0.65 = borderline, caudate/Right lobe >0.65 = 96% likely to be cirrhotic, caudate/Right lobe >0.73 = 99% likely to be cirrhotic.[13] The individuals with caudate/right lobe ratio less than value 0.6 were consider normal while individual with caudate/right lobe ratio more than 0.6 included in chronic liver disease patients.

Results:

The correlation between caudate and right lobe of liver in normal and chronic liver disease patients was found to be significant with the chi-square statistics 0.995 (p=0.000). The magnitude of chi-square indicates moderate and negative relation among the sizes of right and caudate lobe of liver in normal and chronic liver disease patients. The mean value of the co-relational ratio of caudate to right lobe in 97 normal patients was 0.38 and in 97 chronic liver disease patients the mean value of the ratio in caudate to right lobe was 0.68. Mean size of right lobe was 14.25 as well as caudate lobe was 5.49cm with caudate to right lobe ratio mean value was 0.384 in normal patients, while the mean size of right lobe was 10.669 and caudate lobe was 7.26 with caudate to right lobe ratio mean value was 0.684 in chronic liver disease patients (table1).

Chronic liver disease		Right lobe size(cm)	Age (year)	Caudate lobe size (cm)	Caudate to right lobe ratio
ABSENT	Mean	14.2526	45.9263	5.4920	.3846
	N	97	97	97	97
	Std. Deviation	1.21058	15.24219	.73886	.05415
	Minimum	10.80	20.00	4.10	.26
	Maximum	17.50	82.00	8.94	.63
	Std. Error of Mean	.12420	1.56382	.07580	.00556
PRESENT	Mean	10.6697	64.0707	7.2624	.6843
	N	97	97	97	97
	Std. Deviation	.71805	8.43009	.61672	.09662
	Minimum	9.20	35.00	6.20	.52
	Maximum	13.00	86.00	8.80	.95
	Std. Error of Mean	.07217	.84726	.06198	.00971
Total	Mean	12.4242	55.1856	6.3955	.5375
	N	194	194	194	194
	Std. Deviation	2.04944	15.22939	1.11639	.16951
	Minimum	9.20	20.00	4.10	.26
	Maximum	17.50	86.00	8.94	.95
	Std. Error of Mean	.14714	1.09341	.08015	.01217

Table 1: Correlation in size of right lobe to caudate lobe of liver in normal and chronic liver disease patients in total 194 people

The correlation between caudate to right lobe of liver in normal and chronic liver disease patients was found to be significant as r= -0.436 (P-value=0.000).

		Right Lobe Size (cm)	Caudate Lobe Size (cm)
Right Lobe Size (cm)	Pearson Correlation	1	-.436**
	Sig. (2-tailed)		.000
	N	100	100
Caudate Lobe Size (cm)	Pearson Correlation	-.436**	1
	Sig. (2-tailed)	.000	
	N	100	100

Table 2: The correlation between caudate to right lobe of liver in normal and chronic liver disease

Total 194 patients were examined, where 94 were not having chronic liver disease. Caudate to right lobe ratio was between 0.26-0.60 and 20 patients of chronic liver disease found in this range. Only 01 individual was diagnosed healthy within caudate to right lobe ratio was between 0.61-0.95, other 79 patients having chronic liver disease lie within this range (Table 3).

		CLD		Total
		NIL	PRESENT	
Caudate and Right Lobe Ratio	0.26---0.60	94	20	114
	0.61---0.95	1	79	80
Total		95	99	194

Table 3: Caudate and Right Lobe Ratio

The association between caudate to right lobe ratio and chronic liver disease status was significant as the fisher extract test 124.055 with P-value 0.000< 0.050. This suggests that there was a chance of chronic liver disease in those having caudate to right lobe ratio between 0.61-0.95 (Table 4).

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	124.055[a]	1	.000		
Continuity Correction[b]	120.827	1	.000		
Likelihood Ratio	152.223	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	194				

Table 4: The association between caudate to right lobe ratio and chronic liver disease

Discussion:

The data was collected from 194 patients and investigation was carry out in Nawaz Sharif social security Hospital radiological department. This study was aimed to find correlation of right lobe and caudate lobe size of liver in normal and chronic liver disease patients. When examined, the patient by ultrasound, it was found that the size of right lobe gradually decrease while the size of caudate lobe increased with progression of the chronic liver disease. The results of the study were compared with another study conducted on modification of right and caudate lobe in cirrhosis by Hitomi Awaya, from the Department of Radiology, Thomas Jefferson University Hospital, to determine whether a change in caudate–right lobe ratio(c/rl-ratio) was more reliable tool for diagnosing cirrhosis and find its clinical grading than the previously described C/RT with use of the main portal vein to set the lateral boundary (C/RT-measurment). Inter observer agreement was statistically confirmed.[13] Another study was conducted and results showed that findings of liver parenchymal change and right lobe/caudate lobe sizes was an accurate method for diagnosing the subset of asymptomatic patients with severe liver fibrosis or cirrhosis, which indicates a worse prognosis.[14]

Conclusions:

In this study correlation was done between right lobe and caudate lobe of liver in normal and chronic liver disease patients by ultrasound technique. In chronic liver disease a clear relation of usually that increase in size of caudate lobe and progressively decrease in size of right lobe was observed.

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