Correlation Between Diameter of Portal Vein and Length of Spleen in Patients with Chronic Liver Disease

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Abstract:

In recent years, Chronic Liver Disease (CLD) had become widespread, alarmingly among adults. Sonography is the main imaging methodology performed in the assessment of people with suspected liver pathologies.

Objective:

To determine the correlation between diameter of portal vein and length of spleen in patients with chronic liver disease.

Methods:

In this Correlational study, 100 Patients with chronic liver disease including both genders were included. Data were collected from Gilani Ultrasound Centre opposite General Hospital Lahore & City color Doppler 4-D Imaging from Peer Khursheed colony road, Multan. During 9 months from 3rd June 2016 to 10th February 2017. The probe 2.5 to 5 MHz curvilinear multiphase probe was used.

Results:

Mean age of 100 patients was 51.04 ± 13.53 years, ranging from 20 to 85 years. The average of portal vein diameter was 14.023 ± 2.86 mm, ranging from 7 to 22 mm, while the mean of splenic length was 14.278 ± 2.93 cm, ranging from 7.6 to 21cm. Significant relation (at 0.01 level) was found between portal vein diameter and splenic length, and between splenic length and patient age. But at 0.05 levels significant relation was found between portal vein diameter and patient age among the patients of chronic liver parenchymal disease.

Conclusions:

Portal vein diameter and splenic length had significant relation in patients of chronic liver parenchymal thickness.

Key words:

Portal vein diameter, spleenic length, chronic liver parenchymal disease, Portal hypertension.

Introduction:

Sonography is the main imaging methodology performed in the assessment of people with suspected liver pathologies. The entrance venous supply for the left flap can be imagined utilizing a sideways, cranially calculated xiphoid see (intermittent subcostal angled projection). The principle and right gateway veins are best found in a sagittal or angled sagittal plane.[1] In normal people, the entry vein breadth does not surpass 13 mm in calm breath, estimated where the entryway vein crosses foremost to the IVC.[2,3] This appraisal is normally led with ultrasound sees along the long pivot of the entry vein. Breath and patient position incredibly influence the extent of the entrance vein and its tributaries; thusly, symptomatic estimations must be institutionalized by inspecting the patient in the recumbent position and in a condition of calm breath .[4]

Portal hypertension is the most common complication and one of the most important causes of mortality in chronic liver disease. Increased resistance to portal blood flow due to liver changes, narrowing of portal veins, splenomegaly and food borne, varicoseal hemorrhage, ascites, hyperpnoea and encephalopathy etc. Increased intracranial vascularization in cirrhosis is mainly found in the liver sinuses.[5] Recent studies have shown that a dynamic component of increased resistance (resulting in active contractions of vascular smooth muscle cells, myofibroblasts and liver spinal cord) is increased, in addition to increased resistance caused by morphological changes in

chronic liver disease. Portal hypertension causes systemic portal clusters to form at the site of splenomegaly and at different locations. Portal system and systemic circulation are connected to different points. Gastro-oesophageal guarantees create from associations between short gastric and coronary veins and the oesophageal, azygos, and intercostal veins; the outcome is the development of esophageal and gastric varices. Securities create in territories where anatomic associations exist between the entry venous and foundational flow. These are vascular channels that are practically shut in ordinary conditions yet progress toward becoming widened in entryway hypertension as an outcome of expanded intravascular weight and blood stream. These gastro-oesophageal varices are in charge of the principle entanglements of entrance hypertension and enormous upper GI dying. Portal vein breadth is typically expanded in cirrhosis of liver with entrance hypertension, and spleen is additionally broadened in measure. Spleen estimation was estimated ultrasonographically by putting the patient in prone position, utilizing 2 - 5 MHz curvilinear transducer in the coronal plane of segment posteriorly in one of the lower left intercostal spaces. [6, 7] The patient was analyzed in different degrees of motivation to amplify the window to the spleen. The plane of segment was then cleared posteriorly and anteriorly to see the whole volume of spleen. The normal grown-up spleen estimates 12 cm long. The spleen parenchyma is to a great degree homogeneous and it has a uniform mid-to-low echogenicity. At the point when the spleen develops, it very well may be more echogenic. Splenomegaly regularly goes with entrance hypertension and is a critical finding. A most extreme cephalo-caudal estimation surpassing 13 cm demonstrates amplification with a high level of unwavering quality.[8, 9]Spleen is the main organ of the lymphatic system. It is found on the left side of the abdomen between the 9th and 12th ribs. The main function of the protein is to produce lymphocytes and plasma cells that are used in preventing the immune system and the cells. About half of the body's body is stored in the body. These cells can easily be converted into molecular cells and cells and help repair the wound. In addition, cavity skeletons and other unwanted materials, such as cellular debris and microbiology, such as bacteria, viruses and fungi. In addition, it monitors red blood cells by eliminating abnormalities, or too old, to function properly. It also acts as a repository for many blood components, such as platelets and white blood cells. In the absence of a chromosomal, the body's chin may be more susceptible to bacterial and bacterial infections, and some respiratory response also decreases. When normal functions of the body are disrupted by diseases such as cancer, anemia, malaria, tuberculosis, hepatitis, hepatitis, hepatitis, hepatitis, and kidney disease, it grows to become clumsy and begins to catch up and keep many blood cells and platelets. As a result, plaque and blood cells in the bloodstream begin to fall sharply. As a result, the gums grow and, as it grows, trap in blood cells and plaques. Eventually, sprout sprouts begin to capture and destroy normal blood cells along with abnormalities.[10, 11] These glandular cells and plasma block the electrons and disrupt their normal function. Symptoms of waist enlargement are severe pain in the abdomen and back. Sometimes the pain grows on the left shoulder. This happens when parts of the trap begin to bleed and die due to insufficient blood supply. Atomic gland begins to press the stomach to feel full after eating little food or even not eating anything. In addition, as excess blood and plasma cells are removed from the bloodstream, body immune system responses start to decrease, the symptoms of anemia appear, and normal blood clots decrease.[12, 13]

The purpose of this study was to determine the Correlation between diameter of portal vein and length of spleen in patients with chronic liver disease. So, that after identification of risk factors preventive measures could be applied to reduce this disease.

Methods:

It was a Correlational study to find the correlation between diameter of portal vein and length of spleen in patients with chronic liver disease. 100 patients of both genders were selected. Data were collected from Gilani Ultrasound Centre opposite General Hospital, Lahore & City color Doppler 4-D Imaging Peer Khursheed colony road, Multan. During 9 months from 3rd June 2016 to 10th February 2017. The inclusion criteria was patients with chronic liver disease having hepatitis, diffuse liver disease etc of different age groups. Patients who refused to participate in research project were excluded. Correlation between diameter of portal vein and splenic length in chronic liver disease patients was recorded using a curve barrier using a 2.5 to 5 MHz capacitor multiphase probe. For data analysis, qualitative variable were shown in the form of bar charts and Mean ± standard deviation (Mean±SD) were used for quantitative variable. A correlation between diameter of portal vein and length of spleen in patients with chronic liver disease was analyzed on SPSS version 21.0.

Results:

The mean age was 51.04 ± 13.53 years, ranging from 20 to 85 years. Male and female participants were 58 (58%) and 42 (42%) respectively. According to Table 1, the average of portal vein diameter was 14.023 ± 2.86mm, ranging from 7 to 22mm, while the mean of splenic length was 14.278 ± 2.93 cm, ranging from 7.6 to 21cm.

Gender	Number	Parameters	Age in years	PV Diameter (mm)	Length of Spleen (cm)
Male	58	Mean ± Std. Deviation	51.43±14.55	14.155 ± 2.74	14.36 ± 3.025
		Range	20 to 81	7.0 to 20.0	8.4 to 21.0
Female	42	Mean ± Std. Deviation	50.5±12.132	13.84 ± 3.046	14.164 ± 2.83
		Range	27 to 85	7.6 to 22.0	7.6 to 20.1
Total	100	Mean ± Std. Deviation	51.04±13.53	14.023 ± 2.86	14.278 ± 2.93
		Range	20 to 85	7 to 22	7.6 to 21

Table 1: Portal Vein Diameter and spleen length in different age groups

According to Table 2, all participants were categorized in aged groups, 6 (6%) individuals were from less than 30 years age group, 11 (11%) to 30-39, 23 (23%) to 40-49, 27 (27%) to 50-59, (23%) to 60-69, 6 (6%) to 70-79, and4 (4%) were for more than 80 years age group.

Age Groups	Frequency
< 30	6
30 - 39	11
40 - 49	23
50 - 59	27
60 - 69	23
70 - 79	6
80+	4
Total	100

Table 2: Categorization of patients according to age group

According to Table 3, there was no significant correlation between age portal vein diameter and length of spleen. Significant relation (at 0.01 level) was found between portal vein diameter and splenic length, and patient age. But at 0.05 level significant relation was found between portal vein diameter and patient age among the patients of chronic liver parenchymal disease.

		PV Diameter (mm)	Length of Spleen (cm)
Age	Pearson Correlation(r)	.067	-.121
	Sig. (2-tailed)	.509[a]	.232[a]
	N	100	100
PV Diameter (mm)	Pearson Correlation(r)		.003
	Sig. (2-tailed)		.978[a]
	N	100	100

Table 3: Correlation of portal vein diameter with length of spleen (cm) and age

a: non-significant correlation was found at $p < 0.05$

Discussion:

In chronic liver disease the diameter of portal vein increases in cirrhotic liver disease and length of spleen also increases in portal hypertension. Chronic liver parenchymal disease can be diagnosed by hepatic structural or functional variation. As liver is a large gland that's why functional variation is relatively a late process and most often blood tests show normal

results. When the alteration occurs in blood test (liver function tests) that demonstrate late and established destruction to the hepatic parenchyma.[14] If both splenic length and portal vein diameter increases in response to chronic hepatic parenchymal disease, then there should be a significant correlation between them.[15, 16] Current study was therefore intended to correlate splenic length with portal vein diameter in chronic liver parenchymal disease. For this purpose, hundred patients of chronic liver parenchymal disease were enrolled comprising 58% male and 42% female.

Many previous studies were conducted to determine the clinical use of Doppler ultrasound inter and the intra-observer agreement in the evaluation assessment of the portal and hepatic vessels along with measurement of spleen size in the diagnosis of chronic liver disease and cirrhosis. If both splenic length and portal vein diameter increases in response to chronic hepatic parenchymal disease, then there should be a significant correlation between them. Present study was there for intended to correlate splenic length with portal vein diameter in chronic liver parenchymal disease. For this purpose, hundred patients of chronic liver parenchymal disease were enrolled comprising 58% male and 42% female. A study was aimed to determine the clinical use of Doppler ultrasound inter and the intra-observer agreement in the evaluation assessment of the portal and hepatic vessels along with measurement of spleen size in the diagnosis of chronic liver disease and cirrhosis. For the purpose 49 controls and 45 cases of chronic liver disease were examined by to experienced sonologists. A strong correlation was found between the chronic liver parenchymal disease and splenic length with p-value 0.009. [17-19] A strong correlation was found between the chronic liver parenchymal disease and splenic length. Similarly, portal vein diameter has significant correlation with chronic liver disease.

The results of the current study also correlate with the previous researches. In current study the range of patient's age was from 20-85 years. The mean splenic length was 14.278$\pm$2.93cm and average diameter of portal vein was 14.023$\pm$2.86 mm but normal spleen length is 14 cm. [20] There was statistically significant relation among liver parenchymal disease, portal vein diameter and splenic length. A study was conducted for the evaluation of usefulness of ultrasound in the diagnosis of liver diseases. For this purpose, 113 patients having no signs and symptom of chronic liver disease were recruited. Multivariate analysis revealed the combined assessment of hepatic echotexture, portal vein diameter and spleen size are the accurate approaches to sonographic staging of liver cirrhosis, with sensitivity, specificity, and accuracy of 80%, 92% and 89% respectively. The aggregated effect of the assessment of hepatic echotexture, spleen length, and portal vein diameter provides accurate diagnosis.[21] In current study splenic size was of prime importance in the diagnosis of chronic liver disease and portal vein is secondary in the priority order. But both of them are very useful in the diagnosis of chronic liver parenchymal disease, even if the disease is not yet symptomatic.

Conclusions:

Portal vein diameter and splenic length has significant relation with each other in patients of chronic liver parenchymal sickness.

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