



Study of Portal Vein Diameter and Spleen Size by Ultrasonography and their association with Gastro-oesophageal Varices

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Abstract

Aim and objectives: The present study was done to assess the correlation of portal vein diameter and spleen size with oesophageal varices in patients with cirrhosis of liver and to assess the ability of ultrasound to predict the presence of oesophageal varices.

Materials and method: This was observational cross-sectional study done among patients admitted in the department of General medicine. All patients >18 years presenting to General medicine department diagnosed with chronic liver disease based on clinical, biochemical and ultrasonographic findings.

Results: A total of 50 adult patients of cirrhosis of liver were included in the study, out of which 40 (80.0%) were male and 10 (20.0%) were female of ages between 22-71 years, (mean 47.89 ± 10.60 years). The mean Portal vein diameter and Spleen size were significantly more among subjects with varices. Ascites and splenomegaly was significantly more among subjects with varices compared to without varices.

Conclusion: Ultrasonography has enormous potential for identifying instances of cirrhosis with portal hypertension, assessing varices, and managing patients over the long term. To quantify the severity of oesophageal varices and establish a threshold at which preventing oesophageal variceal bleeding is necessary, more research is required.

Keywords: Cirrhosis of liver; Gastro-oesophageal varices; Portal vein diameter; Spleen size; Ultrasonography

Introduction

When the liver's functional ability is no longer sufficient to maintain healthy physiological circumstances, chronic liver disease occurs ^[1]. Portal hypertension is one of the serious complications of cirrhosis of liver leading to unwanted life-threatening variceal bleeding. In cirrhosis, the loss of liver architecture results in greater intrahepatic resistance to blood flow, which in turn causes splenomegaly, ascites, and oesophageal varices. It is defined as a rise in hepatic venous pressure gradient of more than 5 mmHg. Oesophageal varices form when the portal vein's diameter surpasses 13 mm, according to research by Dib *et al.* ^[2] Esophageal varices are present in 60–80% of individuals with liver cirrhosis, and 25–30% of these patients are at risk for bleeding. Every year 5–10% of individuals with mild varices advance to big varices. Variceal-wall strain will build as varices grow in size, and when it reaches a critical level, varices may burst and produce potentially fatal haemorrhage. 20% of people with variceal haemorrhage will still die even with the best medical care ^[4].

The rate of early rebleeding corresponds to a higher mortality rate. Oesophageal varices are therefore thought to be a prognostic indicator and a factor influencing the morbidity and mortality of surgical treatments. Despite its benefits, endoscopy is still a painful and costly intrusive procedure.

Additionally, the possibility of bleeding from manipulation exists. Both the existence of varices and the risk of variceal bleeding can be predicted by the ultrasound findings in the portal system (Portal vein diameter and spleen size). It can be utilized to diagnose individuals with portal hypertension as well as to follow them clinically over an extended period of time. It is important to investigate the relationship between portal vein width and spleen size and the existence of gastro-esophageal varices in liver cirrhosis patients. [5-7]

Hence, the present study was done to assess the correlation of portal vein size with presence of esophageal varices in patients with cirrhosis of liver and to assess the ability of ultrasound to predict the presence of esophageal varices.

Aim and Objectives

To Correlate Portal Vein Diameter and Spleen Size with Gastro-esophageal Varices by Ultrasonography

Materials and method

This research study was descriptive observational in nature and included all patients who were admitted to the department of general medicine and attend the general medicine and medical gastroenterology departments as outpatients.

Study population

The study included patients presenting to General medicine department diagnosed with chronic liver disease based on clinical and ultrasonographic findings. The study excluded patients with history of upper gastrointestinal bleeding, Bleeding disorders apart from secondary to liver disease, Congestive gastropathy, patients who have already received endoscopic or surgical intervention for portal hypertension and patients with evidence of hepatocellular carcinoma on ultrasonography, or previous or current treatment with beta-blockers, nitrates and diuretics.

Study Procedure

The study included 50 patients with cirrhosis, attending the medical wards and outpatient Medical and Gastroenterology department. Each participant in the study underwent a thorough clinical assessment. In particular, the presence or absence of haematemesis, melena, bleeding per rectum, bleeding tendencies, alcoholism, blood transfusion, tuberculosis, consumption of hepatotoxic drugs, contact with STDs, intravenous drug abuse, jaundice, anaemia, edema, stigmata of chronic liver disease, dilated abdominal veins, ascites, splenomegaly, and encephalopathy were noted.

To confirm the presence of cirrhosis, measurement of the portal vein's diameter, ascites, the size of the spleen, the presence of collaterals, and other biochemical tests like liver function tests, complete blood counts, renal function tests, prothrombin times, and abdominal ultrasounds were performed on all patients.

Upper Gastrointestinal endoscopy was done in all patients to confirm the presence of varices and also to grade them. All endoscopies were performed in a single endoscopy unit using a video endoscope. Portal vein diameter was recorded ultrasonographically and >13mm was considered dilatation irrespective of sex and was compared between two groups with and without esophageal varices confirmed endoscopically.

Statistical analysis

The data was analysed using SPSS (Statistical Package for Social Sciences) package 26.0 for relevant statistical comparisons. Results was presented in the form of tables. Descriptive statistics was performed by calculating mean and standard deviation for the Continuous variables. Categorical variables was summarized as frequencies and percentages. Inferential statistics was done using the chi-square test for the categorical variables and unpaired t-test was used for the comparison of mean values (continuous variables) between 2 groups. Level of statistical significance was set at p-value less than or equal to 0.05.

Results

A total of 50 adult patients with cirrhosis of liver were included in the study, out of which 40 (80.0%) were male and 10 (20.0%) were female of ages between 22-71 years, mean 47.89±10.60 years.

Table 1

	Varices	No Varices	p-value
Hb	10.27±1.19	10.72±1.34	0.202
Serum Bilirubin	5.27±1.96	5.72±2.29	0.310
Serum Albumin	2.64 ± 0.31	2.80 ± 0.32	0.430
Platelet count	1,22,000±18,000	1,67,000±23,000	0.008*
PT	24±4.09	20.5±1.63	0.109
INR	1.78±0.37	1.59±0.25	0.189
Portal vein diameter	13.46±1.03	10.91±0.93	0.034*
Spleen size	15.18±2.35	12.67±1.78	0.039*

The mean portal vein diameter, platelet count and spleen size were significantly more among subjects with varices.

Table 2

	Varices	No Varices	p-value
Ascites	20	5	0.001*
Splenomegaly	15	3	0.003*

Ascites and splenomegaly was significantly more among subjects with varices compared to without varices.

Out of 30 cases, 70% had oesophageal varices and 16 cases had other significant endoscopic findings like portal hypertensive gastropathy, erosive gastropathy and red colour sign which were not taken into consideration for grading or significance of varices. 30% cases had no varices.

Discussion

The most frequent consequence of liver cirrhosis and one of the major causes of mortality is portal hypertension. Due to its high fatality rate, oesophageal variceal haemorrhage is one of the most dangerous side effects of cirrhosis. All patients with liver cirrhosis should have an upper gastrointestinal endoscopy to screen out esophageal varices, according to several studies. Despite its benefits, endoscopy is still a painful and costly intrusive procedure. Additionally, there is a chance of bleeding, particularly in individuals with extensive varices. To lessen the medical, social, and financial impact of the condition, there is a special need for a non-invasive predictor for the occurrence of oesophageal varices. The assessment of patients with cirrhosis for the risk of variceal bleeding using ultrasonography is simple, commonly

available, non-invasive, but reliable and cost-effective. It may be used to diagnose and clinically monitor patients who have portal hypertension, which is crucial for their ongoing care.

According to Prihartini *et al.* and Plestina *et al.*,^[9, 10] portal vein width is a reliable, non-invasive predictor of oesophageal varices.

The research conducted by Devrajani *et al.*, the average age was 39 years^[11]. There were 90% men and only 10% women. This male preponderance trend is analogous to Sharma and Aggarwal's study, which contained 86.1% male patients^[12]. The proportion of men afflicted was higher in the current study compared to the study by Devarajani *et al.* because of alcohol intake, which is more common in male patients, was the predominant cause of cirrhosis in the present patients^[11]. In the current study, 70% of patients with an upper gastrointestinal endoscopy had varices, whereas only 30% had none. Which is comparable to a study by Sarwar *et al.* in which 64.3% of patients had varices^[13]. Chalasani *et al.* discovered 70% of esophageal varices, which is equivalent to the current study^[14].

Abdominal ultrasound revealed ascites in 93.3% of patients, splenomegaly in 76.6%, and portal vein enlargement (>13mm) in 66.6% of cases. The majority of patients (43.3%) had portal veins between 13 and 13.9 mm, and the mean portal vein width in the current research was 13.1 mm.

The cut off portal vein size for prediction for oesophageal varices has changed for several research^[15]. Despite the difficulty of grading on the basis of portal vein size, the current study shows that a portal vein diameter of more than 13 mm strongly predicts the occurrence of varices.

When we compare the results of different research, we can observe that the size of the portal vein varies depending on the study population and location. There might be a variance in the study sample's racial, ethnic, and sexual distribution. There are several studies and the PVD cut-off value for the existence of varices. The size of the portal vein by Devrajani *et al.*^[11] (14.0 mm), Prihartini *et al.*^[8] (11.5 mm), Plestina *et al.*^[10] (15.0 mm), Schepis *et al.*^[16] (13.0 mm), Sarwar *et al.*^[13] (11 mm) and Lopamudra *et al.*^[17] (11.5 mm).

Conclusion

Therefore, USG assessment of the portal vein diameter and splenic size is a non-invasive prognostic indicator of oesophageal varices. Ultrasonography has enormous potential for identifying instances of cirrhosis with portal hypertension, assessing varices, and managing patients over the long term. To quantify the severity of oesophageal varices and establish a threshold at which prevention is necessary, more research is required.

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