

Role of Ultrasound Findings and Platelet Spleen Ratio in Assessing the Severity of Esophagogastric Varices in Patients with Cirrhosis of Liver

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Abstract

Introduction: One of the main complications of cirrhosis of the liver is “portal hypertension.” The term portal hypertension was first coined by Gilbert and Villaret in 1906 when cirrhosis and high portal pressure were linked pathophysiologically.

Materials and Methods: The study comprised 30 portal hypertensive patients who were submitted in Medical wards of Mahatma Gandhi Memorial Hospital, Warangal District, Telangana State, between February 2012 and July 2013. A detailed clinical history was recorded regarding age, sex, duration of symptoms such as jaundice, distension of abdomen, hematemesis, and melena.

Results: The present study was carried out in the Department of Medicine, Mahatma Gandhi Memorial Hospital, Warangal, between February 2012 and July 2013. 30 portal hypertensive patients were recruited in this study. A detailed clinical history was recorded in each patient regarding age, sex, duration of symptoms, and history of alcohol intake.

Discussion: In the present study, 30 portal hypertensive patients were assessed with ultrasonography (USG) and fiberoptic upper gastrointestinal (GI) endoscopy. Various USG parameters were compared with the severity of varices as detected by upper GI endoscopy.

Conclusion: USG of the abdomen is a simple, convenient, and non-invasive method for assessing the severity of portal hypertensive patients and to predict the severity of esophagogastric varices indirectly.

Key words: Portal hypertension, Spleen size ratio, Ultrasonography

INTRODUCTION

One of the main complications of Cirrhosis of the liver is “portal hypertension.” The term portal hypertension was first coined by Gilbert and Villaret in 1906¹ when cirrhosis and high portal pressure were linked pathophysiologically.

Portal hypertension is defined by a pathologic increase in portal pressure, in which the pressure gradient between the portal vein and inferior vena cava (the portal pressure gradient [PPG]) is increased above the upper normal

limit of 5 mm Hg. Portal hypertension becomes clinically significant when the PPG increases above the threshold value of 10 mm Hg (e.g., formation of varices) or 12 mm Hg (e.g., variceal bleeding, ascites). PPG values between 6 and 10 mm Hg represent subclinical portal hypertension.^{2,3}

Portal hypertension causes esophagogastric varices. Bleeding from ruptured esophageal or gastric varices is the main complication of portal hypertension and a major cause of death.

As per existing guidelines in a case of portal hypertension, we are screening with upper gastrointestinal (GI) endoscopy to look for any esophagogastric varices present or not and grade the severity of varices. And then, we start the prophylactic measures like propranolol to prevent the first bleed. Doubts are expressed regarding the cost-effectiveness of universal screening with upper

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GI endoscopy. A study done by Spiegel *et al.* published in journal "Hepatology"⁴ concluded.

"Empiric β blocker therapy for the primary prophylaxis of variceal hemorrhage is a cost-effective measure as the use of screening endoscopy to guide the therapy adds significant cost with only marginal increase in effectiveness."

In this setting, if we can predict the severity of portal hypertension by a low cost- and non-invasive method, then we can use the upper GI endoscopy for only high-risk patients. Although the occurrence of esophageal varices and the time of GI bleeding in portal hypertension cannot be exactly predicted, there are some endoscopic, ultrasonographic (USG), and clinical signs associated with high risk of bleeding.

Some studies have shown good correlation between USG findings and severity of esophagogastric varices.

In this study, we make an attempt to predict the severity of varices based on USG findings and platelet count spleen diameter ratio its correlation with upper GI endoscopy.

MATERIALS AND METHODS

The study comprised 30 portal hypertensive patients who were submitted in Medical wards of Mahatma Gandhi Memorial Hospital, Warangal between February 2012 and July 2013.

A detailed clinical history was recorded regarding age, sex, duration of symptoms such as jaundice, distension of abdomen, hematemesis, and melena. All patients underwent complete clinical examination including detailed examination of GI system. Routine biochemical investigations and liver function tests were done in every patient.

Every recruited patient underwent USG and fiberoptic upper GI endoscopy. Platelet count spleen diameter ratio was calculated.

Inclusion Criteria

Cases of portal hypertension admitted in the Department of General Medicine and Gastroenterology in Mahatma Gandhi Memorial Hospital.

Exclusion Criteria

1. Cases of portal hypertension who are on β blockers
2. Cases of portal hypertension who underwent endoscopic sclerotherapy or endoscopic variceal ligation
3. Cases of portal hypertension who underwent transjugular intrahepatic portosystemic shunt or shunt surgery

4. Hepatocellular carcinoma
5. Primary hematological disorders
6. Active GI bleeding on admission
7. Previously known GI bleeding
8. Taking alcohol <6 months before enrollment
9. History of parenteral drug addiction
10. Other diseases with life expectancy of <1 year
11. Unstable medical condition.

RESULTS

The present study was carried out in the Department of Medicine, Mahatma Gandhi Memorial Hospital, Warangal, between February 2012 and July 2013. 30 portal hypertensive patients were recruited in this study. A detailed clinical history was recorded in each patient regarding age, sex, duration of symptoms, and history of alcohol intake.

All patients underwent complete clinical examination of GI system and other systems. Each patient was evaluated with routine biochemical parameters, liver function tests, and ascitic fluid analysis if present.

USG and fiberoptic GI endoscopy were done in every recruited patient. Platelet count spleen diameter ratio is calculated.

The result which was obtained as follows.

Age Distribution

All the cases were grouped according to their age into 3 as <20 years, 21-40 years, and 41-60 years (Table 1).

Of the 30 cases, 3 patients were below 20 years age, i.e., 10% of all cases. 15 patients were in the age group of 21-40 years, i.e., 50% of all cases. 12 patients, i.e., 40% were in the 41-60 years age group.

Sex Distribution

Of the 30 patients, 21 were males, i.e., 70% of all cases and 9 were females, i.e., 30% of all cases (Figure 1).

Upper GI Endoscopy Findings

In the patients of portal hypertension we studied, 18 patients had large grade varices, i.e., Grade III and Grade IV varices, 12 patients had small grade varices, i.e., Grade II varices (Table 2).

Table 1: Age distribution

Age group	Number of cases (%)
<20 years	3 (10)
21-40 years	15 (50)
41-60 years	12 (40)

USG Characteristics

Out of 30 patients we studied, 24 patients had portal vein dilatation, i.e., 80% of all patients. The average portal vein diameter was 13.1 mm. 22 patients had splenic vein dilatation, i.e., 73% of all patients. The average splenic vein diameter was 12.4 mm.

Of the 30 patients, 22 patients had splenomegaly, i.e., 73% of all patients. The average spleen size was 15 cm. 20 out of 30 patients had shrunken liver, i.e., 66% of all patients. The average liver size was 13.6 cm.

24 out of 30 patients had altered, coarse echotexture of liver, i.e., 80% of all patients. Collaterals were present in 14 patients, i.e., 47% of all patients on USG.

USG characteristics of all patients are summarized in Table 3.

Comparison of USG characteristics in large varices and small varices patients (Table 4)

Portal Vein Dilatation

In large grade varices group, 18 patients had Portal vein dilatation, i.e., 100% patients had portal vein dilatation. The mean portal vein diameter in this group was 14.5 mm.

In small grade varices group, 6 patients had portal vein dilatation, i.e. only 50% patients had portal vein dilatation. The mean portal vein diameter in this group was 10.9 mm (Figure 2).

Splenic Vein Dilatation

In large grade varices group, 16 patients had splenic vein dilatation, i.e., 88% of all patients had splenic vein dilatation. The mean splenic vein diameter was 14.1 mm. In small grade varices group, 4 patients had splenic vein dilatation, i.e., only 33% patients in this group had splenic vein dilatation. The mean splenic vein diameter was 9.75 mm.

Splenomegaly

In large grade varices group, 18 patients had splenomegaly, i.e., 100% patients had splenomegaly. The average spleen size in this group was 17.6 cm.

In small grade varices group, 4 patients had splenomegaly, i.e., only 33% patients had splenomegaly. The average spleen size in this group was 13.6 cm (Figure 3).

Liver Echotexture

In large grade varices group, 16 patients had altered or coarse echotexture of liver, i.e., 88% of all patients in the group had altered liver echotexture.

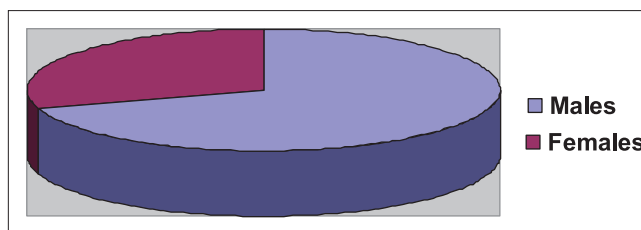


Figure 1: Sex distribution

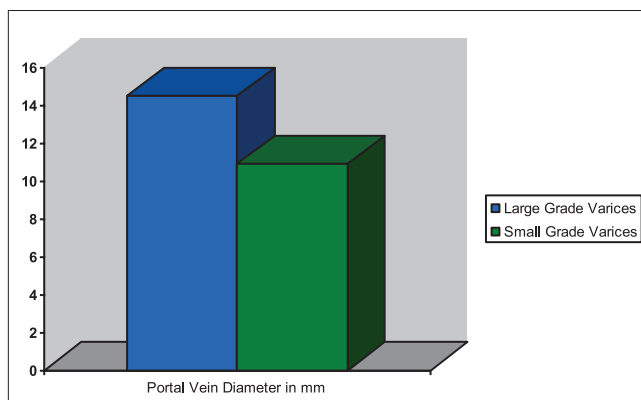


Figure 2: Mean portal vein diameter in large and small grade varices

Table 2: Upper GI endoscopy findings

Type of varices	Number of patients (%)
Small grade varices	12 (40)
Large grade varices	18 (60)

GI: Gastrointestinal

Table 3: USG characteristics

USG parameter	Number of patients (%)	Mean (average)
Portal vein dilatation	24 (80)	13.1 mm
Splenic vein dilatation	22 (73)	12.4 mm
Splenomegaly	22 (73)	15 cm
Shrunken liver	20 (66)	13.6 cm
Altered echotexture	24 (80)	-
Collaterals	14 (47)	-

USG: Ultrasonography

Table 4: Comparison of USG characteristics in large varices and small varices patients

USG parameter	Large grade varices (18 patients)		Small grade varices (12 patients)	
	Number of patients (%)	Mean	Number of patients (%)	Mean
Portal vein dilatation	18 (100)	14.5 mm	6 (50)	10.9 mm
Splenic vein dilatation	16 (88)	14.1 mm	4 (33)	9.75 mm
Splenomegaly	18 (100)	17.6 cm	8 (67)	11.75 cm
Shrunken liver	14 (77)	13.6 cm	8 (67)	13.6 cm
Altered echotexture	16 (88)	-	8 (67)	-
Collaterals	12 (66)	-	2 (17)	-

USG: Ultrasonography

In small grade varices group, 8 patients had altered or coarse echotexture of liver, i.e. 67% of all patients in this group had altered liver echotexture (Figure 4).

Presence of Collaterals

About 12 of 18 patients in the large grade varices group had the presence of collaterals, i.e., 66% patients had collaterals. However, only 2 out of 12 patients in the small grade varices group had collaterals, i.e., only 17% patients had collaterals.

Platelet Count Spleen Diameter Ratio

In large grade varices group, the average platelet count spleen diameter ratio is 471 and the percentage of large grade varices group patients <858 is 100%.

In small grade varices group, the average platelet count spleen diameter ratio is 1438, and the percentage of small grade varices group patients >858 is 100%. The average platelet count spleen diameter ratio of all the 30 patients is 858 (Figure 5).

DISCUSSION

In the present study, 30 portal hypertensive patients were assessed with USG and fiberoptic upper GI endoscopy. Various USG parameters were compared with the severity of varices as detected by upper GI endoscopy.

In the present study, 100% patients had esophagogastric varices. In a similar study done by Sudhindra *et al.*,⁴ 100% patients had esophageal varices.

In the present study, 60% patients had larger grade varices. Similar results were obtained in a study done by Sudhindra *et al.*,⁴ in which 63% patients had larger grade varices.

In the present study, 80% patients had portal vein dilatation, with mean portal vein diameter as 13.1 mm. In a study done by Sudhindra *et al.*,⁴ 83% patients had portal vein dilatation, with mean portal vein diameter as 15 mm.

In patients with larger grade varices, the average portal vein size is 14.5 mm as against 10.9 mm in patients with small grade varices. In a study done by Plestina *et al.*,⁵ the average portal vein diameter in patients with larger grades varices was 15.38 ± 0.24 mm as against 12.43 ± 0.16 mm in patients with smaller grade varices.

In the present study, the average splenic vein diameter is 12.4 mm. In larger grade varices group, the average splenic vein diameter was 14.1 mm as against 9.75 mm in patients with smaller grade varices. Similar results were obtained in a study done by Sudhindra *et al.*⁴

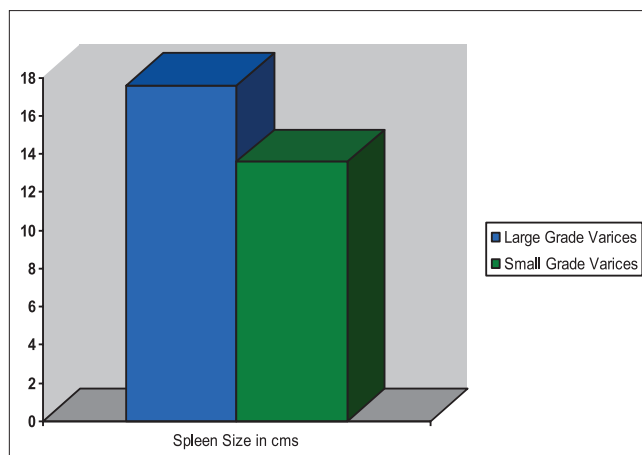


Figure 3: Mean spleen size in large and small varices

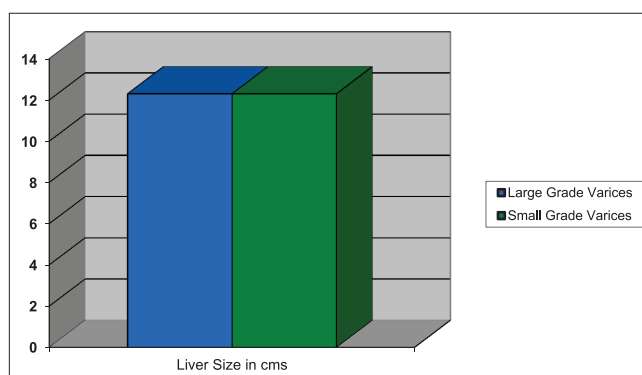


Figure 4: Mean liver size in large and small grade varices

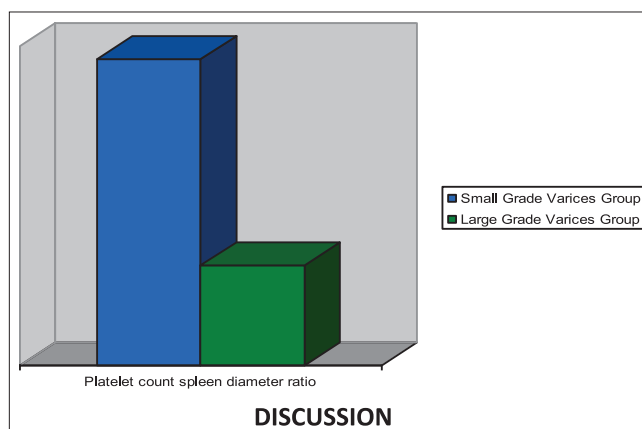


Figure 5: Platelet count spleen diameter ratio

In the present study, splenomegaly was found in 73% patients, and average spleen size was 15 cm. In a study done by Sudhindra *et al.*,⁴ 80% patients had splenomegaly and average spleen size was 14 cm, which was a predictor of larger grades of varices. In a study done by Watanbe *et al.*,⁵ splenomegaly was an indicator of the severity of varices.

In the present study, 66% patients with larger grade varices had collaterals, whereas only 17% of patients with small grade varices had collaterals. In a study done by Vilgrain

et al.,⁶ the best sign on USG to predict the severity of varices is the visualization of portosystemic shunts with a sensitivity of more than 80% and a specificity of 100%. Similar results were obtained in a study done by Subramanyam *et al.*⁷

In the present study, 80% patients had altered, heteroechoic liver echotexture. 88% of patients with larger grade varices had altered liver echotexture. Similar results were shown in a study done by Sudhindra *et al.*⁴ which concluded that altered, heteroechoic liver echotexture can be a sign of severe grades of varices.

In the present study, mean platelet count spleen diameter ratio is 838. In large grade varices group, mean platelet count spleen diameter ratio is 471 as against 1438 in small grade varices group. Similar results were obtained in a study group done by Testa *et al.*⁸

Thus, the present study has shown that there is a correlation between USG findings and platelet count spleen diameter ratio with the severity of esophagogastric varices.

CONCLUSION

USG of abdomen is a simple, convenient, and non-invasive method for assessing the severity of portal hypertensive patients and to predict the severity of esophagogastric varices indirectly.

Patients having portal vein diameter >14.5 mm, splenic vein diameter >14 mm, spleen size >17.6 cm, and the

presence of collaterals on USG and platelet count spleen diameter ratio <858 were found to have higher grades of varices which were indirect evidence of the severity of portal hypertension. The above said parameters tend to predict the higher grades of varices when they occur in combination than they occur individually.

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