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Original Research Article

Platelet count splenic diameter ratio as predictor for esophageal varices in patients with cirrhosis: a diagnostic evaluation study

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ABSTRACT

Background: Esophageal variceal bleeding is one among the common complication of cirrhosis which is fatal. Latest studies are focusing more on using non-invasive techniques to classify cirrhotic patients according to their risk of having varices. The platelet count-splenic diameter ratio is considered as one such parameter and is used in predicting esophageal varices in patients with cirrhosis. Objectives of the study was to assess the utility of platelet count-splenic diameter ratio as a useful non- invasive parameter in predicting the presence/ absence /size of esophageal varices in patients with cirrhosis.
Methods: Diagnostic evaluation study was done in a tertiary hospital of Kerala state India. 93 adults above the age of 18 yrs with diagnosis of cirrhosis was selected and detailed history, physical, systemic examination and imaging was done. The degree of correlation between platelet count-splenic size ratio and the presence/absence/size of esophageal varices was studied along with its utility as an independent non- invasive marker. Frequency was expressed in percentages.
Results: Best cut-off for prediction of esophageal varices Grade 1 was platelet count/spleen diameter ratio of 954, which had Specificity of 85.7% and Positive predictive value of 94.1% Cut-off for prediction of Grade 2 esophageal varices was platelet count/spleen diameter ratio of 916 which had a Sensitivity of 78.9%, Specificity of 88.9%. Whereas cut-off for prediction of Grade 3 esophageal varices was a ratio of 899 which had a high Sensitivity of 88% and Negative predictive value of 93.6 % but Specificity was only 64.7% and Positive predictive value of 47.8% only.
Conclusions: The platelet count splenic diameter ratio is accurate to be used as screening tool to predict the presence of Grade 2 Esophageal varices in Patients with Cirrhosis. More studies need to be done around the globe for more evidence.

Keywords: Chronic liver disease, Cirrhosis, Esophageal varices, Platelet count splenic diameter ratio

INTRODUCTION

Variceal hemorrhage is a major cause of mortality in patients with cirrhosis.

The burden of varices in patients with cirrhosis is approximately 60-80% and the risk attributed to bleeding is 25-30%.[1] Cirrhosis is the most common cause of portal hypertension; whereas other causes are grouped as non-cirrhotic portal hypertension. Treatment should be given to decrease portal hypertension and manage complications if condition worsens.

Strategies for prevention of variceal bleeding for cirrhotic patients should be on focus. The first step is to identify the patients at risk of bleeding and provide them prophylactic treatment. Longitudinal studies shower light on varices which eventually develop in all cirrhotic

patients, and once developed they tend to increase in size and to bleed.[2,3] The prevalence of varices is higher in decompensated than in compensated cirrhosis. Large varices have higher chance to bleed than small ones.[4,5]

Patients with esophageal or gastric variceal bleeding complaints of hematemesis or melena or sometimes both. Portal hypertension should be suspected in all patients with GI bleeding and peripheral stigmata of liver disease namely, jaundice, spider telangiectasias, palmar. In cirrhotic patients who do not have esophageal varices at initial endoscopy, new varices will develop at a rate of approximately 5% per year.[6] In patients with small varices at initial endoscopy, progression to large varices occurs at a rate of about 10% per year and is related predominantly to the degree of liver dysfunction. One quarter of patients with newly diagnosed varices experiences variceal bleeding within 2 years.[7] The best clinical predictor of bleeding appears to be variceal size. In 2 years, the risk of bleeding in 7% patients with varices became less than 5 mm in diameter, and patients with varices greater than 5 mm in diameter is 30%.[7] Liver function improved in patients with alcoholic liver disease who refrain from alcohol and is seen decreased risk and varices eventually disappearing.[8]

Current guidelines recommend that all patients with cirrhosis should undergo screening endoscopy for the presence of varices, which is costly and invasive procedure. Recent studies have focused on using noninvasive techniques to stratify cirrhotic patients according to their risk of having varices.

Hence this study was humble attempt to assess the utility of platelet count-splenic diameter ratio as a useful non-invasive parameter in predicting the presence/ absence /size of esophageal varices in patients with cirrhosis.

METHODS

The study was conducted at Pushpagiri Institute of Medical Sciences and Research centre, Thiruvalla, Kerala. The study period was from July 2017 to July 2018; i.e. duration of one year. The inclusion criteria were all adults above the age of 18 yrs. with a diagnosis of Cirrhosis at admission or during course of stay in the hospital within one-year duration. The exclusion criteria included patients with acute liver disease, thrombocytopenia and splenomegaly due to other causes. A written and informed consent was obtained from patient and immediate relative. The study population where the patients who came to General medicine Outpatient department were selected by convenient sampling. A detailed history, general physical examination and systemic examination was done, and recorded on a semi structured questionnaire. Blood specimen where sent to Central Laboratory for testing and patient was sent to the Department of Radiology for USG. Using the values from the previous study, the sample size is calculated as 60 subjects.[9] Patients with acute liver disease, thrombocytopenia and splenomegaly due to other causes were excluded in the study. The data was entered into excel and transferred to Spss version 16 for analysis. Frequency was expressed in percentages. The p value of <0.05 were considered statistically significant. Sensitivity, specificity, Positive predictive value and negative predictive value were calculated and documented for PC/SD ratio. ROC curve was used to determine the cut-off values with best sensitivity and specificity to determine PC/SD ratio.

The platelet count was calculated by manual/automated counting and splenic diameter was obtained from routine ultrasound abdomen. Dividing the platelet count by the splenic diameter gave the platelet count-splenic diameter ratio. Endoscopic imaging findings of esophageal varices was noted. The SAAG (Serum Ascites-Albumin gradient) value was also noted in patients with ascites. The degree of correlation between platelet count-splenic size ratio and the presence/absence/size of esophageal varices was studied along with its utility as an independent non-invasive marker.

RESULTS

A total of 93 subjects were enrolled for the study satisfied for the inclusion criteria. 35.5% of the study subjects belonged to the age group of 61-70. Majority 90% of the study subjects were male.

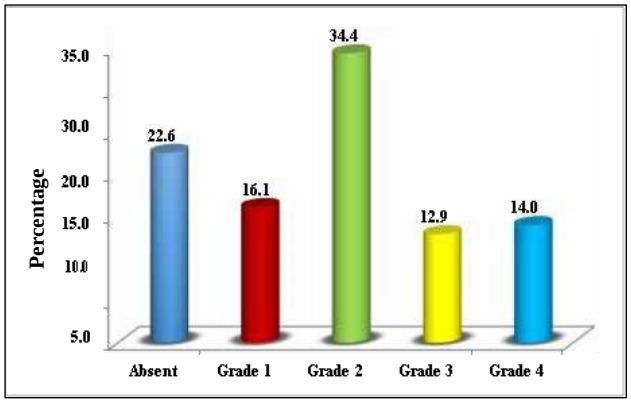


Figure 1: Percentage distribution of the sample according to grade of varices.

There were no varices reported for 22.6% of the study subjects.16.1% of the sample had Grade 1 varices. Most of the varices were reported as Grade 2. Grade 4 varices (14%) were seen little bit higher than Grade 3(12.9%) in this study. The cut-off for prediction of Grade 1 esophageal varices was platelet count/spleen diameter ratio of 954.50, the sensitivity of the test was 66.7, specificity was 85.7%.

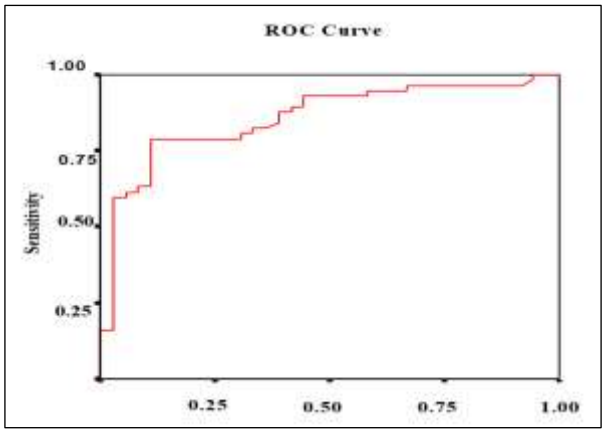
The cut-off for prediction of Grade 2 esophageal varices was platelet count/spleen diameter ratio of 916. The sensitivity of the test was 78.9%, Specificity was 88.9%.

In predicting grade 1 Esophageal varices, the sensitivity of the test was 66.7, specificity was 85.7% and the positive predictive value was 94.1% and negative predictive value was 42.9%.

The false positive cases were 14.3% and false negative cases were 33.3%. The positive likelihood ratio was 4.7% and negative likelihood ratio was 0.4%. For predicting grade 2 Esophageal varices, the sensitivity of the test was 78.9%, specificity was 88.9%.

Table 1: Predictive power of platelet count-splenic diameter ratio in detecting presence of grade 1 varices.

	Presence of varices		
PC/ SD ratio	Present	Absent	Total
<=954.50	48	3	51
>954.50	24	18	42
Total	72	21	93



X axis = 1-Specificity, Area Under the curve = 0.859, (0.78-0.94) (95 % CI), p=0.000, Best cut off = 916.50.

Figure 2: ROC Curve depicting predictive power of platelet count-splenic diameter ratio in detecting presence of varices grade 2.

Table 2: Frequency of different grades of esophageal varices with different parameters of diagnostic evaluation study.

	Grade 1	Grade 2	Grade 3	Grade 4
Sensitivity	66.7	78.9	88.0	84.6
Specificity	85.7	88.9	64.7	56.3
False Negative	33.3	21.1	12.0	15.4
False positive	14.3	11.1	35.3	43.8
Positive Predictive value	94.1	91.8	47.8	23.9
Negative Predictive value	42.9	72.7	93.6	95.7
Positive Likelihood ratio	4.7	7.1	2.5	1.9
Negative Likelihood ratio	0.4	0.2	0.2	0.3
Accuracy	71.0	82.8	71.0	60.2

The positive predictive value was 91.8% and the negative predictive value was 72.7%. The positive likelihood ratio was 7.1% and negative likelihood ratio was 0.2%. The false positive cases were 11.1% and false negative cases were 21.1%. In predicting grade 3 Esophageal varices, the sensitivity of the test was 88.0, specificity was 64.7% and the positive predictive value was 47.8% and negative predictive value was 93.6%. The false positive cases were 35.3% and false negative cases were 12.0%. The positive likelihood ratio was 2.5% and negative likelihood ratio was 0.2%. For predicting grade 4 Esophageal varices, the sensitivity of the test was 84.6, specificity was 56.3% and the positive predictive value was 23.9% and negative predictive value was 95.7%. The false positive cases was 43.8% and false negative cases were 15.4%. The positive likelihood ratio was 1.9% and negative likelihood ratio was 0.3%.

DISCUSSION

In the study conducted by Arul Prakash Sarangapani et al, involving 106 patients, cut-off value of 909 for the Platelet Count-Splenic diameter ratio had a sensitivity of 88.5% and specificity of 83% for detecting esophageal varices.[10] Incidence of large varices was seen in 41%. On multivariate analysis, independent predictors for the presence of Esophageal varices were palpable spleen, low platelet count, spleen size >13.8 mm, portal vein >13 mm, splenic vein >11.5 mm. The Receiver Operating Characteristic (ROC) curve showed 0.883 area under curve. They concluded that a cut off value of 909 could be used to predict esophageal varices. In the study conducted by Alejandro et al, involving 91 patients.[11] Total patients of liver cirrhosis studied after exclusion were 191, Esophageal varices was present in 125 patients (65.4%). The platelet count/spleen diameter ratio using a cutoff value of ≤909 to detect Esophageal varices independent of the grade had 93% sensitivity and 100% specificity and positive and negative predictive values of 100% and 91% respectively. They concluded that PC/SD ratio now can be used as a predictor of presence of esophageal varices in liver cirrhosis.

In the study conducted by Gianini et al, they concluded that a platelet count/spleen diameter ratio cut off value of 909 had 100% negative predictive value for a diagnosis of Esophageal Varices.[12] Of the total cases, 29(70.7%) had PC/SD ratio more than 909 and only 12(29.3%) had less than 909. The sensitivity of PC/SD ratio of 909 in predicting varix is 89.66% and specificity was 75%. Thus it can be considered a good and reliable tool for predicting varices. Conclusion was use of platelet count/ splenic diameter ratio in cirrhotic patients for screening and follow up for esophageal varices can substantially reduce the cost of health care and discomfort for patients as well as reduce burden of endoscopy unit. However, in the study conducted by Schwarzberger et al, done in 137 patients , cut off value of 909 for platelet count/spleen diameter ratio had a positive predictive value of only 74% and a negative predictive value of only 73%.[13] Hence, they concluded that the count/spleen diameter ratio was not an accurate tool to predict the presence of esophageal varices. In the present study, best cut-off for prediction of esophageal varices Grade 1 was platelet count/spleen diameter ratio of 954, which had Specificity of 85.7% and Positive predictive value of 94.1%. But it had sensitivity of 66.7% and Negative predictive value of 42.9% only. Cut-off for prediction of Grade 2 esophageal varices or larger varices was a platelet count/spleen diameter ratio of 916 which had a Sensitivity of 78.9%, Specificity of 88.9%, Positive predictive value of 91.8% and a Negative predictive value of 72.7%This findings suggest that platelet count/spleen diameter ratio is a good predictor for Grade 2 varices. Whereas cut-off for prediction of Grade 3 esophageal varices was a ratio of 899 which had a high Sensitivity of 88% and Negative predictive value of 93.6 % but Specificity was only 64.7% and Positive predictive value of 47.8% only. Sensitivity of 84.6% and Specificity of 56.3% was seen for Grade 4.

CONCLUSION

In this study predictive power of platelet count splenic diameter ratio was found to be good enough to predict Grade 2 varices with cirrhosis and sensitivity was higher for grade 3. Further Meta-analysis studies need to be done to bring out more valid evidence.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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