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Predictors of Oesophageal Varices in Cirrhosis of Liver with Portal Hypertension

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ABSTRACT

Background

Portal hypertension, oesophageal varices, and bleeding from varices are leading causes of mortality in patients with cirrhosis of the liver.Platelet count, splenic diameter, portal vein diameter, prothrombin time, International normalized ratio (INR), serum bilirubin has a predictive role in diagnosing the hepatic cirrhosis as per recent studies.

Aim

To study the diagnostic value of non-invasive parameters as predictors of oesophageal varices in patients with cirrhosis of liver and portal hypertension.

Material & Methods

This is an observational cross-sectional study done in department of General Medicine in GSL Medical College & General Hospital, Rajahmundry from October 1st, 2019 to March 31st 2021. All patients diagnosed with cirrhosis of various aetiologies and portal hypertension of age 30-80years were included.

Results

PC/SD in group of patients with varices is 764.5 ± 493.7 while in the group without varices is 1416.1 ± 624.4. The ratio of PC & SD is significantly different between the groups. ROC curve was applied and the cut-off value obtained was 957.14 which indicates that PC/SD ratio <957.14 had higher chances of having varices. Area undertheROC curve (AUC) was 0.878 at 95% confidence interval (0.796to0.936) which is statistically significant($p<0.0001$). The sensitivity, specificity, NPV and PPV of splenic length in predicting the oesophageal varices were 85.71, 86.96, 72.7 and 93.7 respectively.

Conclusion

Non-invasive parameters like platelet count, spleen length and their ratio can be utilized as cost-cutting measures when procedures like endoscopy are not available and when patients cannot afford the cost.

Keywords

Cirrhosis of liver, Portal hypertension, platelet count, spleen length.

INTRODUCTION

Liver cirrhosis is characterized by extensive fibrosis involving hepatic parenchyma and also the portal tract leading to the well-known complication of portal hypertension. Portal hypertension, oesophageal varices, and bleeding from varices are leading causes of mortality in patients with cirrhosis of the liver.[1] The prevalence of oesophageal varices in patients with cirrhosis ranges from 60- 80%.[2] 15%-20% of cirrhotic patients develop upper gastrointestinal bleeding due to esophageal varices every year, and 20%-30% of them die due to this bleeding within the first 4-6 weeks [3]. The American Association for the Study of Liver Diseases (AASLD)(6) and the Baveno Consensus(4,5) have stated that every patient diagnosed with cirrhosis should be investigated for esophageal varices. Upper Gastro Intestinal Endoscopy is the gold standard test for diagnosing esophageal varices. Non-invasive methods that predict oesophageal varices in cirrhotic patients will help in sparing them from the discomfort and risks of endoscopy and cut costs on the health care systems. In recent years, several clinical, laboratory, and ultrasonological variables have been explored as non-invasive alternatives to endoscopy. Platelet count, splenic diameter, portal vein diameter, prothrombin time, International normalized ratio (INR), serum bilirubinhas a predictive role as per recent studies.

AIM & OBJECTIVES

AIM

To study the diagnostic value of non-invasive parameters as predictors of oesophageal varices in patients with cirrhosis of liver and portal hypertension.

OBJECTIVES

- To examine some clinical, biochemical, and ultrasonographic parameters which may predict the presence of oesophageal varices.
- To examine the association of the identified parameters with upper GI Endoscopy

MATERIAL & METHODS

This is an observational cross-sectional study done in department of General Medicine in GSL Medical College & General Hospital, Rajahmundry from October 1st, 2019 to March 31st 2021. All patients diagnosed with cirrhosis of various aetiologies and portal hypertension of age 30-80yearswere included. (Diagnosis of cirrhosis was based on clinical, biochemical, and radiological findings). Patients who are unstable, those with active gastrointestinal bleeding at admission, who had a history of gastrointestinal bleeding, having signs and symptoms of hepatic encephalopathy, who had previously undergone sclerotherapy or band ligation of oesophageal varices, trans jugular intrahepatic portosystemic stent shunt or surgery were excluded.

General physical and systemic examination was carried out for the presence of ascites, splenomegaly and other peripheral signs of liver cell failure such as jaundice, palmar erythema, spider nevi, alopecia, and testicular atrophy. The investigations like complete blood picture, liver function tests, renal function tests, prothrombin time and INR were done. Ultrasonographic evaluation of spleen length and

portal vein diameter and upper gastrointestinal endoscopy were done on every study subject.

OBSERVATION & RESULTS

The etiology of cirrhosis in the majority of patients in this study was alcoholism (73.2%). Other aetiologies include Hepatitis B (9.3%), Hepatitis C (9.3%).In the present study 90 patients had ascites. Among 71.1% patients with oesophageal varices, the majority are of grade 2 varices. Out of 69 patients with oesophageal varices, 35 are of grade 2 which constitutes 50.7%. 17(24.6%) had grade 1 varices, 16 (23.2%) patients had grade 3 varices and only 1 patient had grade 4 varices. The clinical parameters studied and compared between the patients with varices and without are listed in table 1.

Platelet count and incidence of varices

The cut-off value for platelet count calculated from the ROC curve was 1,17,000/mm3. That is the incidence of varices increased with a decrease in platelet count. (Less than 1,17,000/mm3). The area under the ROC curve (AUC) is 0.868 with 95% confidence interval (0.784 to 0.928) at a p value of <0.0001. The sensitivity, specificity, NPV and PPV of platelet count in predicting the oesophageal varices were 92.86, 75.36, 60.5 and 96.3% respectively.

Spleen length and size of varices

There was no statistically significant difference between different grades of varices and spleen length and their values were given in table 3.

Area under the ROC curve (AUC) was 0.686 at 95% confidence interval (0.584to0.776) which is statistically significant (p= 0.0045). The sensitivity, specificity, NPV and PPV of splenic length in predicting the esophageal varices were 79.71, 57.14, 82.1, 53.3 respectively.

PLATELET COUNT TO SPLEEN LENGTH RATIO (PC/SD)

PC/SD in group of patients with varices is 764.5 ± 493.7 while in the group without varices is 1416.1 ± 624.4. The ratio of PC & SD is significantly different between the groups. ROC curve was applied and the cut-off value obtained was 957.14 which indicates that PC/SD ratio <957.14 had higher chances of having varices. Area under the ROC curve (AUC) was 0.878 at 95% confidence interval (0.796to0.936) which is statistically significant(p<0.0001). The sensitivity, specificity, NPV and PPV of splenic length in predicting the oesophageal varices were 85.71, 86.96, 72.7 and 93.7 respectively.

COMPARISON OF PC/SD RATIO WITH DIFFERENT GRADES OF VARICES

The mean and standard deviation of PC/SD ratio with different grades of varices showed no significant difference between them.

Figures & Tables

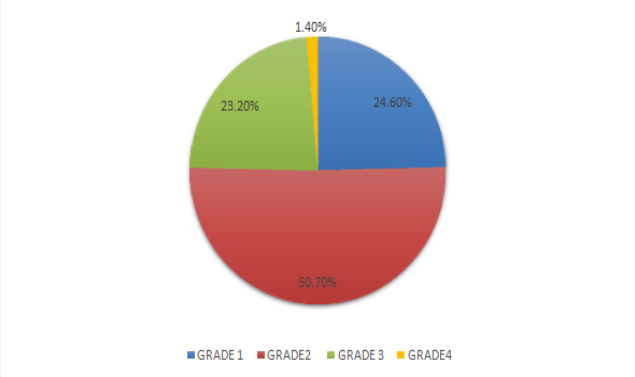

Figure 1: Distribution of different grades of varices.

VARIABLE	VARICES PRESENT (N=69)		VARICES ABSENT		P-VALUE
	MEAN	SD	MEAN	SD	
AGE	51.07	11.302	50.00	11.424	.674
HEMOGLOBIN	10.177	1.9957	11.057	1.8670	.048
SERUM BILIRUBIN	5.245	6.6851	4.718	6.1949	.720
SERUMALBUMIN	2.62	0.644	2.70	0.73	.547
Prothrombin time	21.881	6.5271	21.139	6.1753	.608
PORTAL VEINDIAMETER [mm]	10.88	1.827	10.61	1.912	0.506
PLATELETS(n/mm3)	108753.62	67887.48	187678.57	82825.11	.001
SPLEEN LENGTH[mm]	144.83	14.634	134.79	19.871	0.007

Table 1: Comparison of different clinical variables between the groups

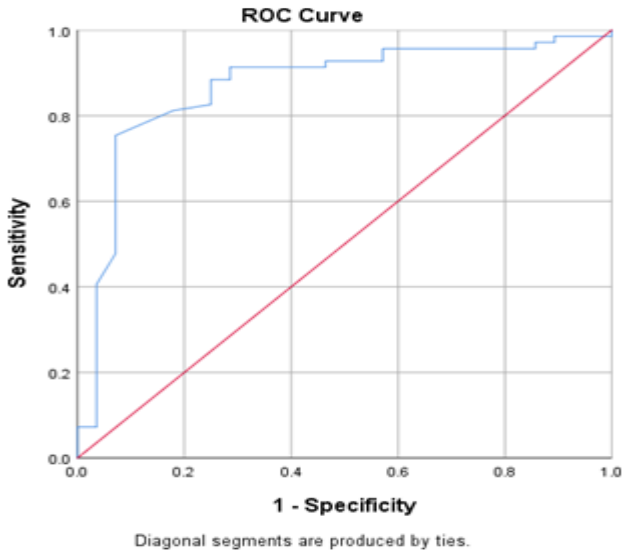

Figure 2: Receiver Operating Characteristics curve of platelet count

VARIABLE	LARGE (N=17)		SMALL (N=52)		P-VALUE
	MEAN	SD	MEAN	SD	
SPLEEN LENGTH[mm]	146.82	11.933	144.17	15.462	0.521

Table 3: Comparison of spleen length and size of varices

Grades of varices	N	Mean	Std. Deviation	P-VALUE
GRADE 1	17	1005.53	830.72	0.126
GRADE 2	35	712.16	322.70	
GRADE 3	16	633.49	201.55	
GRADE 4	1	595.23	-	
Total	69	764.50	493.76	

Table 4: Comparison of PC/SD ratio in different grades of varices

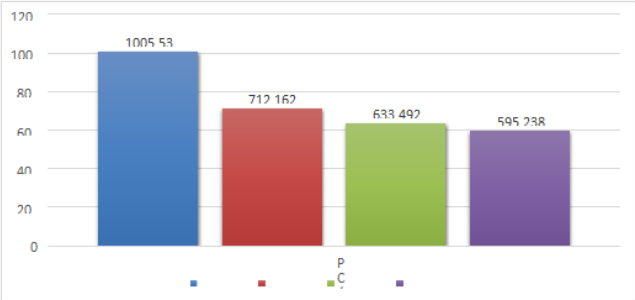

Figure 3: Bar diagram showing mean of PC/SD ratio in different grades of varices

DISCUSSION

In the present study, the mean platelet count in the group with varices was 1,08,753/mm^3 and in the group without varices was 1,87,678/mm^{3}showing a statistically significant difference between the two groups. studies conducted by **Ponnusamy et al**[7], **Ali hekmatnia et al**[8], and **Agha et al**[9] also showed a statisticallysignificant difference between groups with varices and without varices.There is asignificant difference between the two groups with respect to spleen length in the present study (p = 0.007). Previously conducted studies on spleen length as a predictor ofesophageal varices, include, studies conducted by **Ponnusamy et al**[7], **Ali hekmatnia et al**[8], **P.Sathish Sreenivas et al** [10], **Agha et al**[9], **W WBaigh et al**[11] **and Giannini et al** [12] also showed a significant difference in spleen length between the two groups.The present study is comparable with the studies conducted by **Sarangapani et al**[14], **P. Sathish Sreenivas et al**[10] with cut-off values138mm and 137mm each. The sensitivity and specificity of our

study is similar to the studies conducted by **Sami cicf et al**[13] and **WW Baigh et al**[11]. They are low when compared to **Sarangapani et al** [14]study.

In the present study, the mean PC/SD ratio of grade 1 varices was1005, grade 2 was 712, grade 3 was 633 and grade 4 was 595.2. The mean PC/SD ratio is compared with the study done by **Alempijevic et al** [15]**.** This study did not show the significance of the Platelet count/ Spleen length ratio for the grading of varices (p = 0.578). The study done by **Alempijevic et al.**[15] showed a statistically significant value of Platelet Count/Spleen Length ratio in detecting the presence and grading of varices.Another study conducted by **P. Sathish Sreenivas et al**[10]is similar to our study, it did not show any statistical difference between PC/SD andgrading of varices.

CONCLUSION

Parameters like low platelet count, low hemoglobin Splenomegaly low PC/SD ratio had an association with upper GI endoscopy and can predict the presence of esophageal varices.The parameters like platelet count, spleen length can be easilyobtained. Platelet count to spleen length can be readily calculated. The advantage of these parameters is that they are reproducible and do not have examiner variance. In developing countries like India, these non-invasive parameters can be utilized as cost-cutting measures when procedures like endoscopy are not available and when patients cannot afford the cost. Moreover, all these parameters are non-invasive.

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