Original Article

Platelet Count to Spleen Diameter Ratio to Predict Esophageal Varices in Patients with Hepatic Cirrhosis

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Abstract

Introduction: *The prevalence of esophageal varices in patients with liver cirrhosis may range from60% to 80%, and the reported mortality from variceal bleeding ranges from 17% to 57%In cirrhosis patients the risk of variceal rupture is greatest in the 2 years following diagnosis. Repeated endoscopy is required to predict the risk of variceal rupture which increases the burden of endoscopy procedures. Hence, Clinical and laboratory variables were used in various studies but platelet count/spleen diameter ratio had the highest accuracy for identifying patients with esophageal varices.*

Aim and Objective: *To for diagnosing esophageal varices (EVs) in Liver Cirrhosis. study the value of platelet count to spleen diameter ratio as a non invasive parameter*

Patients and Methods: *100 patients diagnosed previously or newly, as cirrhosis of liver, based on physical examination, biochemical parameters, ultrasound abdomen and upper GI endoscopy in departments of General Medicine and Gastroenterology at a tertiary care hospital. All patients underwent biochemical tests, like liver function tests, complete blood counts, renal function tests, prothrombin time, ultrasonography of the abdomen to confirm the presence of cirrhosis, to record the spleen bipolar diameter, portal veinsize, ascites and presence of collaterals followed by Ascitic fluid analysis Upper GI endoscopy was done to confirm the presence of varices and grade them.*

Results: *Mean age of the patients in the study was 42.69.*

No significant gender difference noted. Grade III varices predominated (27 %). Varices were absent (Grade 0) in 17 % of the patients. Among the non invasive markers only Platelet Count (P=0.0001) and Spleen Bipolar diameter (P=0.0002) had statistical significance. Significance was noted between Portal vein size(cm) and presence of Varices in the study group and statistically significant correlation between presence of varices and a platelet count/ splenic bipolar diameter ratio of≤1014. The sensitivity of PC/SD Ratio of ≤ 1014 in predicting presence of esophageal varices was 92.77 %.Its positive predictive value is 92.77 %.

Conclusions: *The use of Platelet count/ Splenic diameter ratio, a non invasive parameters in appropriate subgroups of cirrhotic patients for screening and follow up of esophageal varices can reduce the cost of health care and discomfort for patients and burden on endoscopy units.*

Introduction

Portal hypertension commonly accompanies the presence of liver cirrhosis, and the development of esophageal varices is one of its major complications. The prevalence of esophageal varices in patients with liver cirrhosis may range from 60% to 80%, and the reported mortality from variceal bleeding ranges from 17% to 57%. Esophageal varices appear after the hepatic venous pressure gradient (HVPG) has increased to at least 10 to 12 mm Hg. Prophylactic treatment in patients with non selective Beta blockers in varices that has never bled appears to decrease the incidence of bleeding by 40 to 50 and authors have suggested repeating endoscopy at 2–3 year intervals in patients without varices and at 1–2 year intervals in patients with small varices and every other year in patients with decompensated liver disease so as to evaluate the development or progression of varices. Only the large esophageal varices (LEV), are associated with a substantially increased risk of variceal bleed. With a prevalence of LEV of 20%, estimated that a 100 screening endoscopic examinations need to be performed to prevent 1 to 2 cases of varicealbleeding.In view of increased burden of endoscopy biochemical, clinical, and ultrasonographic parameters alone or together are proposed which have good predictive power for noninvasively assessing the presence of esophageal varices. Thrombocytopenia, splenomegaly and ascites are independent predictors of large esophageal varices in cirrhotic patients. Decreased platelet count may depend on several factors other than portal hypertension and splenomegaly is itself due to the vascular changes induced by portal hypertension. Hence platelet count/spleen diameter ratios is used to predict oesophageal varices in cirrhotic patients in both with and without decompensation. In many studies Serum ascitic albumin gradient (SAAG) was found to be an independent predictor of portal hypertension and Esophageal varices especially in alcoholic cirrhosis. SAAG was proposed to be a factor determining the degree of portal hypertension and the prognosis in patients with cirrhosis due to alcohol.

Aim and Objective

To study the value of platelet count to spleen diameter ratio as anon invasive parameter for diagnosing esophageal varices (EVs) in Liver Cirrhosis.

Patients and Methods

This is a Analytical Cross sectional validation study of a diagnostic test.The Sample of 100 included Outpatients and Inpatients of both Departments of General Medicine and Gastroenterology a tertiary care hospital.

Ultrasound abdomen and upper GI endoscopy were included.

Duration of study: April 2015-April 2018.

All diagnosed, previously or newly, cases of cirrhosis of liver, based on physical examination, biochemical parameters, Patients on medication for primary prophylaxis of varices, with variceal bleed, Unstable patients, with encephalopathy, hepatorenal syndrome, sepsis, history of ligation/sclerotherapy hepatocellularcarcinoma, Portal vein thrombosis, Budd Chiari Syndrome re excluded.

Procedure: Clinical history and physical examination findings were recorded with particular attention to present or previous hematemesis, malena, bleeding per rectum, bleeding tendencies, alcoholism, blood transfusion, intake of hepatotoxic drugs, exposure to Sexually transmitted diseases, IV drug abuse, jaundice, anemia, edema, stigmata of chronic liver disease, dilated abdominal veins, ascites, splenomegaly and encephalopathy. All patients underwent biochemical tests, like liver function tests, complete blood counts, renal function tests, prothrombin time, ultrasonography of the abdomen to confirm the presence of cirrhosis and to record the spleen bipolar diameter, portal vein size, ascites and presence of collaterals and Ascitic fluid analysis with SAAG in patients with

ascites. Upper GI endoscopy was done in all patients to confirm the presence of varices and also to grade them.

Results

TABLE 1 : RELATIONSHIP BETWEEN AGE OF THE STUDY POPULATION AND GRADE OF VARICES

Varices		age group						Total
		<20	21-30	31-40	41-50	51-60	>60	
Grade of varices	I	1	4	6	7	4	1	23
	II	2	3	4	7	5	2	23
	III	0	5	6	7	7	2	27
	IV	0	0	0	7	3	0	10
	0	4	2	3	2	4	2	17
Total		7	14	19	30	23	7	100

$\chi^2 = 7.96$ P=0.94 NS

Distribution of grade of varices was studied in various age groups and no significant correlation was detected.

Mean age of the patients in the study was 42. 69. SD = 12.62.

TABLE 2 : DISTRIBUTION BASED ON SEX

Varices		Sex		Total
		Male	Female	
Grade of Varices	I	14	9	23
	II	16	7	23
	III	13	14	27
	IV	5	5	10
	0	12	5	17
Total		60	40	100

$\chi^2 = 3.67$ P= 0.45 NS

No significant gender difference in the distribution of grade of varices was found in our study.

TABLE 3 : DISTRIBUTION BASED ON GRADE OF VARICES

Varices		Frequency	Percent
Grade of Varices	I	23	23.0
	II	23	23.0
	III	27	27.0
	IV	10	10.0
	0	17	17.0
	Total	100	100.0

Based on Conn's Grading, the grading of the varices in study population was done. Grade III

varices predominated (27 %). Varices were absent (Grade 0) in 17 % of the patients.
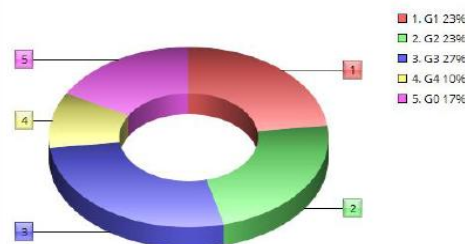

Frequency of Grade of Varices

1. G1 23%
2. G2 23%
3. G3 27%
4. G4 10%
5. G0 17%

TABLE 4 : RELATIONSHIP BETWEEN LAB PARAMETERS AND PRESENCE OF VARICES

Parameter	Varices	N	Mean	Std. Deviation	Student t-test
Serum Bilirubin	Present	83	3.831	2.0062	t= 0.13
	Absent	17	3.764	1.6116	P= 0.89
	Total	100	3.864	3.7869	
Serum Albumin	Present	83	2.883	.6337	t=1.07
	Absent	17	2.711	.3924	P=0.285
	Total	100	2.854	.603	
Hemoglobin	Present	83	10.409	2.4099	t=1.26
	Absent	17	11.235	2.6685	P=0.20
	Total	100	10.55	6.1275	
Platelet Count	Present	83	121084.33	23784.273	t=5.83
	Absent	17	158235.29	24551.337	P=0.0001
	Total	100	127400.00	27690.0704	
Spleen Bipolar Diameter	Present	83	140.90	10.316	t=3.87
	Absent	17	128.70	17.682	P=0.0002
	Total	100	138.83	12.746	

Relationship between non invasive parameters like Serum Bilirubin, Serum albumin, Hemoglobin, Platelet count, spleen Bipolar diameter to resence of varices was studied. Of this only Platelet Count (P=0.0001) and Spleen Bipolar diameter (P=0.0002) had statistical significance

TABLE 5: RELATIONSHIP BETWEEN PORTAL VEIN SIZE AND PRESENCE OF VARICES

Parameter	Varices	N	Mean	Std. Deviation	Student t-test
Portal Vein Size	Present	83	14.361	1.3315	t=5.58
	Absent	17	12.352	1.4528	P=0.01

Significance was noted between Portal ven size (cm) and presence of Varices in the study group.

TABLE 6 : ASSOCIATION BETWEEN PC/SD RATIO AND PRESENCE OF VARICES

		Varices
PC/SD ratio	Pearson Correlation	-.2741
	Sig. (2-tailed)	.000
	N	100

** Correlation is significant at the 0.01 level (2-tailed).

There was statistically significant correlation between presence of varices and a platelet count/ splenic bipolar diameter ratio of ≤1014. 0-0.2 poor correlation,0.2-0.4 fair,0.4-0.6 moderate,0.6-0.8 good, 0.8- 1.0 Very good.

TABLE 7 : RELATIONSHIP BETWEEN PC/SD RATIO AND GRADE OF VARICES

		PC/SD RATIO		Total
		≤1014	>1014	
Grade of Varices	I	21	2	23
	II	20	3	23
	III	26	1	27
	IV	10	0	10
	0	6	11	17
Total		83	17	100

χ^2 = 31.1 P=0.0001 S

Patients were categorized in to two groups based on cut off value of 1014 for Platelet count / splenic diameter ratio.

It's relation to the grade of varices was studied.

A significant difference between the presence or absence of esophageal varices and platelet count to spleen diameter ratio of ≤1014 was observed.

TABLE 8 : ROLE OF PC/SD RATIO IN PREDICTING VARICES

		Varices		Total
		Present	Absent	
PC/SD RATIO	≤1014	77	6	83
	>1014	6	11	17
Total		83	17	100

	Value in %	95 % CI
Sensitivity	92.77	84.9-97.3
Specificity	64.71	38.33-85.8
Positive Likelihood ratio	2.63	1.38-5.02
Negative Likelihood ratio	0.11	0.05-0.26
Positive Predictive Value	92.77	87.05-96.08
Negative Predictive Value	64.71	44.01-81.05

The sensitivity of PC/SD Ratio of ≤ 1014 in predicting presence of esophageal varices was 92.77 %.Its positive predictive value is 92.77 %.

Discussion

A total of hundred patients who met the inclusion criteria, were included in the study. Among whom sixty were male and forty were female. The mean age was 42.69. (SD = 12.62). No age and gender differences in the distribution of grade of varices was noted in our study. Grade 3 varices predominated in our study. Of the various non invasive parameter studied, only Platelet Count (P=0.0001) and Spleen Bipolar diameter (P=0.0002) had statistical significance. (Table 4). The results indicating the relevance of platelet count are on par with studies by Thomopolos et al (2003), Madhotra et al (2002), Pilette et al (1999). A significant difference between the presence or absence of esophageal varices and platelet count to spleen diameter ratio of 1014 was observed. (P= 0.0001) (Table 7,8,9). This finding is in agreement with study by Giannini et al 2003.With platelet count/ splenic diameter ratio cut off > 1014, the two groups showed statistically significant difference (P= 0.0001) based on presence and absence of varices. (Table 7,8,9; figure 4) which is consistent with studies by Torres et al(1996), Gurubacharya et al (2005).

The sensitivity of PC/SD Ratio of ≤1014in predicting presence of esophageal varices was 92.77% with 95 % CI 84.9-97.3% It's positive predictive value is 92.77 % with 95 % CI 87.05-96.08% (Table 8). However study by Gianni et al (2003) showed a sensitivity of 100 % and

specificity of 93 % if Platelet count/Splenic diameter ratio was used in predicting varices.

Thus use of these parameters may help identify patients with a low probability of esophageal varices who may not need endoscopy and reduce the financial burden .The principal non invasive marker of PC/SD ratio will identify high risk cases which can be followed by endoscopy and also can be used in cases where general health condition do not permit endoscopy. The cutoff point for the PC/SD ratio in our study was higher than that reported by Giannini et al (< 1014 and< 909, respectively).This difference is probably influenced by racial characteristics. In the study by Chalasani et al, the PC and splenomegaly independently predicted the presence of esophageal varices. Though PC/SD cannot substitute for endoscopy, can still be used as a non invasive marker for predicting oesophageal varices.

Summary and Conclusions

100 newly diagnosed cases were recruited in the study and upper gastro intestinal endoscopy was done in all the cases and non invasive marker Platelet count/Splenic diameter ratio was assessed to predict oesophageal varices.

Decrease in platelet count was found to be an predictor of esophageal varices in patients with cirrhosis.

Ultrasound parameters Spleen bipolar diameter and portal vein size also predict the presence of esophageal varices.

When a cut off value of Platelet count/ splenic diameter ratio of ≤ 1014 was applied in order to take in to consideration the decrease in platelet count due to hypersplenism; it was found to be a good predictor of presence and grade of esophageal varices.

The sensitivity of PC/SD Ratio of ≤ 1014 in predicting presence of esophageal varices was 92.77 % with it's positive predictive value was 92.77 %.

Limitations

1) Small sample size.
2) Prospective studies were not done to validate the role of predictive parameters.
3) Large-scale assessment that takes into account the etiology of cirrhosis is needed to define the role of the PC/SD ratio and to compare the diagnostic exactitude of this ratio with that of other noninvasive parameters.

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