

Efficacy Platelet/Spleen Diameter Ratio for Detection of Esophageal Varices in Cirrhotic Patients

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INTRODUCTION

Endoscopic screen is advised to detect esophageal varices (EV) in cirrhotic patients^[1]. In patients with normal liver tests, endoscopic screen is advised every two years, and in cirrhotic patients with abnormal liver tests it is advised every 12 months. Also, in patients with small varices endoscopy should be planned once a year^[2,3]. Endoscopy and drug therapies are effective in the prevention of bleeding from high-risk varices and should be started after diagnosis^[4]. The incidence of EV in cirrhotic patients is predicted between 60% to 80% dependant on the severity and etiology of liver diseases^[5]. Therefore, an adequate method that can be used noninvasively in the diagnosis of EV not only increases the number of cirrhotic patients participating in the screening program, but also prevents unnecessary therapies and unwanted side-effects. In addition to the economic importance, such method prevents unnecessary endoscopy and useless therapies^[6].

This study aims to evaluate platelet count/spleen diameter ratio as an invasive method for the detection of EV.

MATERIALS

Cirrhotic patients participating in endoscopic screen at the time of diagnosis or cirrhotic patients who were previously diagnosed but never had endoscopy to detect EV were included in this study. Patients with the following conditions were excluded: portal vein thrombosis, splenectomy, primary bacterial peritonitis and a previous endoscopic management for bleeding varices. The patient should avoid medical therapy with beta-blocker before enroll to the study.

Information including age, sex, etiology of cirrhosis, biochemical parameters such as AST, ALT, total serum bilirubin, prothrombin activity, creatinine, platelet count and the presence of ascites and cirrhotic encephalopathy were recorded according to Child-Pugh class.

The sizes of varices were divided into two groups of small and large. Small varices were flat and had small protuberance into the esophageal duct. Large varices occupied at least 50% of esophageal duct and were in touch with together. Sonography was performed for all the patients, and the spleen diameter of the patients was measured by two operators who were blinded to the biochemical results and findings. platelet to spleen ratio was calculated as described previously by Giannini and colleagues as the ratio between platelet

ABSTRACT

AIM: Prediction of esophageal varices (EV) in cirrhotic patient by platelet count/ spleen diameter ratio (PC/SD ratio) as a noninvasive diagnostic test.

METHODS: We prospectively enrolled 140 liver cirrhotic patients without a history of variceal bleeding during a period of two years. The spleen diameter, platelets count, PC/SD ratio, ascites, serum bilirubin, prothrombin time, albumin and Child–Pugh class were analyzed on the data for the prediction of EVs.

RESULTS: Incidence of varices was seen in 85% of patients. Mean spleen diameter in EV and NEV were 137 and 146 mm respectively ($P=0.36$). Mean platelet count in EV and NEV were 127000 and 114000 n/mm^3 respectively ($P=0.36$). PC/SD ratio had NPV 25.8%, PPV 88.6% at cut- off level 663. The presence of EV had correlation with ascites and prothrombin time ($P=0.001$, $P=0.931$).

CONCLUSIONS: Spleen diameter, platelet count and PC/SD ratio couldn't predict the presence of EV. Endoscopy should be performed to detect EVs in our area.

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Key words: Platelet Count; Spleen Diameter; PC/SD Ratio; Esophageal Varices

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number/mm³ and bipolar diameter of the meaning and use of spleen in millimeters and platelet number/mm³.

Statistics

The validity of the model was measured by concordance statistics (Equivalence to the area under the Roc curves^[8]). A model with a C-Value of 0.7 is considered fair, while a C-Value between 0.8 and 0.9 is good and a C-Value greater than 0.9 is indicates excellent diagnostic category. SPSS version 13 was used for the statistical analysis using the Mann-Whitney U test for continuous variables and X² test for qualitative variable. *P*-values were significant at the 5% level.

RESULTS

One hundred forty patients including 98 men and 42 women were examined in the study. Eighteen out of them were under 30 years old, 33 were between 30 and 50 and 89 were over 50 years old. The etiologies of cirrhosis included Hepatitis B (*n*=51), cryptogenic (*n*=40), Hepatitis C (*n*=24), autoimmune (*n*=12), Wilson's disease (*n*=6), alcohol (*n*=5), primary biliary cirrhosis (*n*=1) and primary hemochromatosis (*n*=1).

Sixty one patients were Child-Pugh class A (43.6%), 59 were class B (42.1%), 19 were class C (13.6%) and one patient was class D (0.8%). One hundred nineteen out of 140 cirrhotic patients had EV (85%). Among these patients, 72 had small varices (51.1%) and 47 had large varices (33.6%). Table 1 shows the correlation between sex, platelet count, spleen diameter and platelet count to spleen diameter ratio.

Statistical analysis was performed using the Mann-Whitney U and X² test: all three parameters showed statistically no significant difference between the two groups.

Table 2 indicates the correlation between EV and serum bilirubin

Table 1 Main characteristics of the two groups of patients.

Variable	EV* present (n=119)	NEV* (n=21)	P
Age, years, median (range)	57(17-85)	53(13-88)	0.048
Sex, male: female	83:36	15:6	0.056
Platelet count, n/mm ³	127000(30-950000)	114000(26000-646000)	0.36
Spleen diameter, mm, median (range)	137(100-217)	146(80-237)	0.36
Platelet count to spleen diameter ratio, medium	900/76(138/25-7037)	791/67(130-4650)	0.79

EV: Esophageal Varices.

Table 2 Univariate analysis of predictive factors in 140 patients.

Variable	Presence of varices n=119	Absence of varices n=21	P
Total bilirubin Mg/dL			0.74
<2	54(45.4%)	10(47.6%)	
2-3	23(19.3%)	4(19%)	
>3	42(35.3%)	7(33.3%)	
serum Albumin Mg/dL			0.770
<3	56(47.1%)	10(47.6%)	
3-3.5	23(19.3%)	5(23.8%)	
>3.5	40(33.6%)	6(28.6%)	
Prothrombin time (S)			0.931
<16	10(8.3%)	5(25%)	
16-18	30(24%)	0(0%)	
>18	80(66.6%)	15(75%)	
Ascites			0.001
Tense	40(33.6%)	10(47.6%)	
Moderate	35(29.4%)	2(9.5%)	
Mild	24(20.2%)	5(23.8%)	
No	20(18.8%)	4(19%)	
Child- plug			0.001
Class A	51(43.5%)	8(40.9%)	
Class B	50(41.6%)	9(42.9%)	
Class C	17(14.1%)	2(9.5%)	
Class D	1(0.8%)	0 (0%)	

level, serum albumin, prothrombin time and ascites.

DISCUSSION

The presence of EVs is an independent predictor of mortality and need for noninvasive methods to predict the presence of EVs in patients with cirrhosis^[9]. The ability of platelet count, spleen diameter and combination of these factors (i.e. ,ratio of platelet count to spleen size, liver stiffness X spleen size/platelet count) assessed with variable results^[10]. In this study, we determined the usefulness of PC/SD for the prediction of esophageal varices. In 20 studies, the hierarchical summary receiver operating characteristic (HSROC) for EVs were 0.95 at various thresholds. At the threshold of 909, the summary sensitivities and specificities were 0.92 and 0.87 respectively. The HSROC was also 0.95 at the threshold of 909. If PC/SD was below 909 for EVs or over 909 the post test probability was only 9%^[11]. We found, PC/SD ratio predicted EVs with 47/1% sensitivity, 75.3% specificity and 88.6% positive predictive value (PPV) and 25.8% negative predictive value (NPV).

In a systematically review, A total of 1275 patients in eight studies investigated for sensitivity, specificity, PPV and NPV PC/SD ratio less than 909 using meta-disc software. Meta-analysis yielded a pooled sensitivity of 89% and a pooled specificity 74%. The pooled PPV was 3/5% and pooled NPV was 0.12. This study shows the test characteristics of PC/SD ratio of 909 may not be adequate to replace endoscopy as a noninvasive screening tool for EVs^[12].

In a study by Gentile *et al*^[13] non endoscopic variable as predictors of EVs in 254 patients with chronic hepatitis evaluated. A score based on age>50 years, platelets<150000/mm³, AST/ALT ratio>1, only 3.2% of patients with a score <2 had varices. This study shows patients with chronic viral hepatitis and a score less than 2 need not undergo endoscopy^[13].

We couldn't detect correlation between other variables such as prothrombin time, serum albumin level, bilirubin level with the presence of EVs (*p*=931%, *p*=73%, *p*=74% respectively). The prevalence of EVs in patients with tense, modest and mild ascites was 33.6%, 29.4% and 20.2% respectively. The prevalence of EVs in patients with ascites in compare without ascites was significant. (*p*=0.001). In the present study, 43.3% of patients with Child A, 41.6% Child B, 17% Child C and 0.8% Child D had EVs. The decrease in the number of cirrhotic patients in child C and D was due to the previous instances of bleeding from EV which resulted in exclusion of them. In this study the correlation between EV and Child C-Pugh was statistically significant (PV=0.001). Raj vanish *et al*^[14] suggested that the prevalence of esophageal varices increased with higher Child-Pugh, but this parameter could not predict the presence of EVs.

The study by Agha *et al*^[15] on 114 compensated cirrhotic patients with hepatitis C with cut-off value of 909, NPV=100% and PPV=93.8% was effective in the diagnosis of EVs. Baig *et al*^[16] in their study with cut-off value of 1014 reported NPV and PPV of 95.1% and 95.4% respectively in the prediction of EVs. In a study by Arulprakash *et al*^[17] with cut-off value 909, sensitivity=88.5%, specificity=83%, PPV=83.5% and NPV=90.5%. In another study by Mattos *et al*^[18] on 164 cirrhotic patients, platelet count to spleen diameter ratio showed sensitivity=77.5%, specificity=45.5%, PPV=79.5%, NPV=42.6% and Accuracy=68.9%. Our findings are similar to those reported by this study and different from others. In our study, with cut-off value=663, with sensitivity=47.1%, specificity=75.3%, PPV=88.6%, NPV=25.8%. Table 3 compares the results of our study with other studies.

Table 3 Previous study published about accuracy of platelet count to spleen diameter ratio in detection of esophageal Varices.

	Number	Cut-off value	Specificity	Sensitivity	NPV	PPV
Giannini(2003)	145	909	93%	100%	100%	96%
Giannini(2005)	68	909	73%	100%	100%	71%
W.W.Baig(2008)	150	1014	98.1%	88.6%	95.1%	95.4%
Prulprakash(2010)	106	909	83%	88.5%	90.5%	83.5%
Mattos AZ(2010)	164	909	45.5%	77.5%	42.6%	79.5%
This study(2010)	140	663	47.1%	75.3%	25.8%	88.6%

CONCLUSION

The results of this study shows that thrombocytopenia and platelet count to spleen diameter ratio cannot be appropriate criteria to estimate the prevalence of EVs in cirrhotic patients. However, endoscopy should be performed as the best modality to detect EV in our area. More studies are needed to evaluate the significance of other parameters especially Child-Score, ascites and prothrombin time in the prediction of EV.

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