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Platelet Count / Spleen Diameter Ratio: Can it Predict the Presence of Varices in Patients With Cirrhosis of Liver?

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SUMMARY

Ratio of platelet count and spleen diameter has recently been proposed as predictor of presence of esophageal varices in patients with cirrhosis. This study was carried out to evaluate predictive value of this ratio for presence of varices.. One hundred and one patients with established cirrhosis and no history of variceal bleed were included. Data on physical examination, hematological, biochemical, abdominal ultrasound examination and esophagogastroduodenoscopy (EGD) was recorded for all patients. Presence of varices on EGD was correlated with platelet count/spleen diameter ratio. Esophageal varices were seen in 65 patients while 36 patients had no varices. High grade varices were seen in 15 patients and 50 patients had low grade varices. Value of platelet count/spleen diameter ratio was not significantly different among patients with and without varices. Ratio of platelet count/spleen diameter can not be used to predict the presence of esophageal varices.

Key words: Cirrhosis, Esophageal varices,, Platelet count, Platelet count/Spleen diameter Ratio, Spleen diameter

INTRODUCTION

Portal hypertension is responsible for major complications of cirrhosis.[1] It results form splanchnic vasodilatation as well as from impedance to flow of blood through liver due to fibrosis. Development of varices either esophageal or fundal is the major complication related to portal hypertension.[2] According to one estimate esophageal varices develop in 60-80%[3] of patients of cirrhosis with mortality of 17-57%.[4,5]

In 1996, The American Association for the Study of Liver Disease single topic symposium stated that cirrhotic patients should be screened for the presence of esophageal varices when portal hypertension is diagnosed.[6] Recently, the Baveno III Consensus Conference on portal hypertension recommended that all cirrhotic patients should be screened for the presence of esophageal varices when liver cirrhosis is diagnosed.[7]

As the number of patients with cirrhosis is increasing, strategy of carrying out surveillance endoscopy in each patient is adding to the burden of endoscopy units, especially when endoscopic facility is still not widely available. That is why the focus has shifted to identification of laboratory and ultrasonographic parameters which can predict the presence or absence of esophageal varices.

Considerable research work in recent past in this direction has identified parameters like platelet count, portal vein diameter, serum albumin and diameter of spleen which can predict presence of varices[8-21]. Low platelet count has shown significant association with presence of varices in majority of these studies.

The association of platelet count to the presence of varices is probably a reflection of the degree of portal hypertension and hypersplenism.[22)] Historically, splenic sequestration or antibody-mediated destruction of platelets has been believed

to be the cause of thrombocytopenia in patients with cirrhosis. [23]

But platelet count falls not only due to splenic sequestration but reduced production from bone marrow, absence of thrombopoietin production by liver and shortened life span of platelets are other contributory factors. To overcome this shortcoming, the platelet count/spleen diameter ratio as a parameter linking thrombocytopenia to spleen size is being proposed as predictor of esophageal varices, to introduce a variable that takes into consideration the decrease in platelet count which most likely depends on hypersplenism caused by portal hypertension. Ratio of platelet count/spleen diameter ratio needs to be tested further since such a simple test, which could replace endoscopy to diagnose varices, would lead to substantial cost savings.

Objective

To evaluate platelet count/ spleen diameter ratio as predictor of esophageal varices in patients with cirrhosis.

Type of study

Cross sectional analytical study

Place of study

Study was carried out in Department of Gastroenterology and Hepatology Shaikh Zayed Post Graduate Medical Institute Lahore.

PATIENTS AND METHODS

This study included 101 patients with cirrhosis of liver and no past history of upper or lower gastrointestinal bleeding. Cirrhosis was diagnosed on liver biopsy or on clinical signs of chronic liver disease i.e. palmar erythema, spider nevi, gynaecomastia, splenomegaly or ascites, laboratory tests like deranged clotting profile and low serum albumin and shrunken liver with irregular margins on ultrasound examination. Patients who were not stable were not included in the study, nor were patients who had previously undergone sclerosis or band ligation of esophageal varices, transjugular intrahepatic porto-systemic stent shunt, or surgery for portal hypertension. Patients taking drugs for primary prophylaxis of variceal bleeding and patients with active (less than six months of alcohol abstinence) alcohol abuse were also excluded. All patients included in study were evaluated for clinical, hematological, biochemical and ultrasonographic parameters and were classified according to Child-Pugh's criteria. Ratio between platelet count and spleen diameter was determined for all patients.

Patients underwent upper GI endoscopy to evaluate for presence and degree of esophageal varices using an Olympus video endoscope GIF 160®, and esophageal varices were classified into small and large varices, where small esophageal varices were defined as varices that flatten with insufflations or minimally protrude into the esophageal lumen, while large esophageal varices were defined as varices that protrude into the esophageal lumen and touch each other (presence of confluence), or that fill at least 50% of the esophageal lumen.[24]This simple classification is considered the preferred classification by a recent consensus conference on portal hypertension held in Baveno, Italy.[25] In some cases, endoscopists used the grade (I-IV) classification.[26] when grades I through IV were used, grades I and II were reclassified as small and grades III and IV were reclassified as large for this study.

Statistical analysis:

Statistical analysis was performed using software package (SPSS 10.0.1; SPSS Inc, 1989-1999 Chicago, Ill). Results were expressed as mean ± SD. Each continuous parameter between the two groups, patients with varices and patients without varices, was analyzed with Student's t test. Categorical data was examined using the chi square χ^2 test. Platelet count/spleen diameter ratio in patients with varices was compared with value in patients without varices using two tail un-paired student's t test.

Receiver operating characteristic (ROC) curve was used to determine the cut off value with best compromise sensitivity and specificity, of platelet count/spleen diameter ratio for the presence of esophageal varices.

RESULTS

Total of 101 patients with cirrhosis and no history of GI bleeding were included in this study. Male to female ratio was 1.1:1 (54/47). Mean age of patients was 52.48 (±11.11).

On clinical examination 12 patients had hepatomegaly and spleen was palpable in 24 patients. After examination and hematological and biochemical investigations, 15 patients belonged to child class A, 49 to class B and 17 patients were in Child Pugh class C. Mild ascites was noted in 28 patients, moderate in 50 patients and tense ascites was found in 4 patients while 19 patients had no ascites.

All patients underwent upper GI endoscopy. Esophageal varices were seen in 65 patients whereas 36 patients had no varices. High grade varices were seen in 15 patients and 50 patients had low grade varices. Nine patients with high grade varices were treated with band ligation due to signs of impending bleed. Seventeen patients had gastric varices and 3 patients were also given treatment for gastric varices with Histoacryl® (Cyno-acrylate) injection.

Clinical, biochemical, and ultrasonographic characteristics of the patients with and without esophageal varices are given in table I. Mean platelet count in patients with varices was 99.63 x $10^3/\mu L$ compared to 109.91 x $10^3/\mu L$ in patients with no varices on endoscopy. This difference was significant (p 0.014). When we compared mean spleen diameter in patients with and without varices, it was 14.50(±2.29) vs 14.73(±2.54) respectively. Difference in diameter of spleen was not significant (p 0.429). We calculated ratio of platelet count and diameter of spleen for all patients. Mean value of this ratio was 617.08 in patients with varices compared to 798.09 in patients without varices. Difference in value of this ratio between these groups was not significant (p 0.117).

When we attempted to determine cut off value with best sensitivity, specificity using receiver operating characteristic (ROC) curve, no value with optimum sensitivity and specificity could be identified. We also tested cut off value of 909 for platelet count/ spleen diameter ratio mentioned in earlier studies, it was found to have sensitivity of 13% with specificity of 77%, which is far from being significant.

Table 1: Comparison of variables in patients with and without varices

	Patients with varices (Mean± SD)	Patients with no varices (Mean± SD
Age (years)	51.52 ± 10.82	54.22 ± 11.57
Platelet count (x $10^3/\mu L$)	99.63 ± 73.09	109.91± 69.23
Prothrombin time (sec)	18.50 ± 6.03	21.48 ± 19.20
Serum potassium (mEq/dl)	3.99 ± 0.81	4.40 ± 0.82
Serum albumin (grams/dl)	2.92 ± 0.07	3.16 ± 0.61
Cholesterol (mg/dl)	103.86±148.64	160.6 ± 27.97
Child score	8.49 ± 1.86	8.65 ± 1.94
Portal vein diameter (mm)	12.66 ± 2.07	12.26 ± 2.68
Size of spleen (cm)	14.50 ± 2.27	14.73± 2.54

Table 2: Platelet count/spleen diameter ratio for prediction of varices

Variables	Esophageal varices present	No esophageal varices	P value
Platelet count X 103/μL	99.63	109.91	0.014
Spleen diameter (cm)	14.50	14.73	0.429
Platelet count/Spleen diameter ratio	617.08	798.09	0.117

DISCUSSION

Effort have been made in recent time to develop non-invasive prediction model for presence of varices in stead of carrying out endoscopy in all patients. Reason for this effort is simple, as the number of patients with cirrhosis is on rise,[27,28] development of prediction model for varices will relieve the work load of endoscopy units.

Apart from individual variables like platelet count, prothrombin time, portal vein diameter and spleen diameter, recently lot of enthusiasm has been shown regarding ratio of platelet count and diameter of spleen for prediction of esophageal varices. First such study was published in GUT in 2003 by E Giannini et al.[29] This study identified very strong correlation of this ratio and presence of varices. They identified value of 909 as cut off for predicting varices with sensitivity of 100% and specificity of

93% with overall accuracy of 98%. This value of platelet count/ spleen diameter was found to be reproducible in second part of study.

Identification of this ratio and its strong predictive value for presence of varices created lot of interest as it looked very promising. Zimbwa TA found this ratio reproducible in patients with alcoholic liver disease in a study of 40 patients and identified same value 909 as cutoff for presence of varices.[30] But results are being contradicted now. Brotman JD has questioned statistical method used in original study of Giannini et al.[31] Thabut D et al were of opinion that value of this ratio is only due to predictive power of platelet count alone.[32]

In our study we were unable to identify significant predictive value of ratio between platelet count and spleen diameter for presence of esophageal varices. We did find significant correlation between low platelet count and esophageal varices. It is believed that good discriminative power of index proposed by Giannini et al is due to strong association of platelet count with presence of varices. We think that the excellent performance they obtained was not due to their index but to the surprisingly good performance of platelet count alone in their patients. Considering the results carried by platelet count for the prediction of oesophageal varices in the already published studies, the proposed index of platelet count/spleen diameter ratio has not shown significant value in our study.

CONCLUSION

Platelet count/spleen diameter ratio could not reliably predict the presence of esophageal varices in our patients with cirrhosis. Further large sized studies are needed to test the value of this ratio before bringing it in clinical practice.

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