ORIGINAL ARTICLE

A STUDY OF ROLE OF PLATELET COUNT/SPLEEN DIAMETER RATIO AS A PREDICTOR OF ESOPHAGEAL VARICES IN PATIENT WITH CHRONIC LIVER DISEASE

Jayesh Sharma[1], Mukesh Kumar Yadav[1], Abha Gupta[2], Tungvir S Arya[2]

[1]Senior Resident, Dept. of Medicine, Muzaffarnagar Medical College, Muzaffarnagar (U.P.); [2]Professor, Dept. of Medicine, LLRM Medical College, Meerut (UP)
Correspondence: Dr. Jayesh Sharma, Email: jayeshsns141@gmail.com

ABSTRACT

Background: In patients of chronic liver disease, the parameters directly linked to portal hypertension such as splenomegaly and decreased platelet count were predictors of presence of esophageal varices. The present study was conducted with an objective to find out the predictive efficacy of platelet count / spleen diameter ratio to predict esophageal varices.

Materials and Methods: This is a cross sectional study conducted on cases of chronic liver disease using designed data collection protocol. Information about demographic and clinical profile, laboratory parameters, USG and Upper GI endoscopy were collected. Maximum spleen diameter was determined and bipolar spleen diameter was expressed in millimeter (mm). Platelet count/spleen diameter ratio was collected and compared with the presence/absence of esophageal varices.

Results: It was observed that 71.4% cases of chronic liver disease caused by Hepatitis B and 87.5% cases of Hepatitis C were having Platelet count/spleen diameter ratio of more than/equal to 909. Sensitivity and specificity of platelet count/spleen diameter ratio for detecting esophageal varices was 98.6% and 96%. Negative predictive value of platelet count / spleen diameter ratio to rule out esophageal varices in chronic liver disease patients was 96% positive predictive value was 98.6%. As the child Pugh class advances from A to C (more decompensation) percentage of patients developing esophageal varices increases with p-value < 0.001 which is highly significant.

Conclusion: Platelet count / spleen diameter ratio is a strong parameter which is independently associated with the presence of esophageal varices in chronic liver disease and irrespective of the etiology.

Keywords: Platelet count, spleen diameter, esophageal varices, chronic liver disease

INTRODUCTION

Chronic liver disease develops when duration of illness is more than 6 months. It generally progresses slowly from hepatitis to cirrhosis, often over 20 to 40 years. Portal hypertension, a common complication of cirrhosis, results in the development of collaterals to bypass the increased resistance to flow within the portal vein to return blood to systemic circulation.[1]

The prevalence of varices in patients with cirrhosis is approximately 60-80% and risk of bleeding is 25-35%.[2] Incidence of first variceal hemorrhage ranges from 20 to 30% within 2 years. In order to reduce the increasing burden of invasive procedures, some studies have attempted to identify non-invasive parameters to predict the presence of esophageal varices.[3] Overall, the most common finding of these studies was that parameters directly linked to portal hypertension such as splenomegaly and decreased platelet count were predictors of presence of esophageal varices.

With this in mind, in this study we used the platelet count / spleen diameter ratio as a parameter linking thrombocytopenia to spleen size in order to introduce a variable that takes into consideration the decrease in platelet count which most likely depends on hypersplenism caused by portal hypertension.

METHODOLOGY

The present study is a cross-sectional study conducted in Medicine department of LLRM Medical College and SVBP Hospital, Meerut during July 2011 to May 2012 and included 100 patients of chronic liver disease admitted in medicine wards and OPD (Outdoor Patient Department). Patients with chronic liver disease within an age group of 30-80 years of age were included in the study excluding those who had signs and symptoms of hepatic encephalopathy, with active GI bleed, with history of variceal ligation and sclerosant therapy, with past history of GI bleed, who have undergone Transjugular Intra-hepatic Porto-systemic Shunt Surgery

(TIPSS), on pharmacological treatment for portal hypertension, with acute febrile illness, with causes of splenomegaly other than portal hypertension like tropical splenomegaly and chronic malaria etc., with non cirrhotic portal fibrosis, with hematological malignancies and connective tissue disorders and of chronic renal failure.

Information about demographic and clinical profile and laboratory parameters were collected on the predesigned semi-structured questionnaire. Detailed clinical history (history of jaundice, drug abuse, alcohol intake, blood transfusion, sexual contact etc.) was elicited from the participants. General physical and systemic examination was conducted for presence of ascites, splenomegaly and other peripheral signs of liver cell failure such as jaundice, palmer erythema, spider nevi, alopecia, testicular atrophy etc. Laboratory parameters includes complete Haemogram, bleeding time, clotting time, prothrombin time, liver function test and renal function tests. USG abdomen was conducted to measure the spleen diameter and Upper GI endoscopy to confirmatory diagnose of the presence of esophageal varices.

All the patients were enrolled in the study after taking voluntary informed consent from them. The data was entered in the Microsoft excel sheet. Odds ratio with 95% Confidence interval was calculated for dichotomus variable while student T-test was applied for continuous variable.

RESULTS

The present study was conducted on 100 cases of chronic liver disease. The study consisted of 74% male participants and 26% female participants. The mean age of male participants was 50.23±12.13 years and that of female was 45.77±11.27 years.

Table 1: Association of gender, Platelet count/spleen diameter ratio, Child Pugh's class with esophageal varices (n=100)

	Esophageal varices (EVx)		Total	OR (95% CI)
	Present	Absent		
Gender				
Male	56 (75.67)	18 (24.32)	74 (100.0)	1.146 (0.414 – 3.167)
Female	19 (73.08)	7 (26.92)	26 (100.0)	
Total	75 (75.0)	25 (25.0)	100 (100.0)	
Platelet count / spleen diameter ratio				
≤909	74(98.66%)	01 (4 %)	75 (75.0)	1776.0 (106.9 -29494.4)
>909	1(1.33%)	24(96%)	25 (25.0)	
Total	75 (100.0)	25 (100.0)	100 (100.0)	
Child Pugh's class				
A	1 (0.05)	17 (94.45)	18 (100.00)	0.006 (0.0007 – 0.0543)
B	49 (85.96)	8(14.07)	57 (100.00)	
C	25 (100.00)	0 (0.00)	25 (100.00)	

*Child Pugh's Class B and C are merged to calculate OR

Table 2: Distribution of cases according to etiology of chronic liver disease in relation to ratio of platelet count /spleen diameter ratio (n=100)

Platelet count/spleen diameter ratio	Hepatitis B	Hepatitis C	Alcoholic	Others	Total
≤909	5	7	31	32	75
>909	2	1	2	20	25
Total	7	8	33	52	100

The proportion esophageal varices in chronic liver disease were present equally in both males and females. The association of gender with the presence of esophageal varices in chronic liver disease was statistically non-significant. (p value >0.05).

Sensitivity and specificity of platelet count/spleen diameter ratio for detecting esophageal varices was 98.6% and 96%. Negative predictive value of platelet count / spleen diameter ratio to rule out esophageal varices in chronic liver disease patients was 96% positive predictive value was 98.6%.

As the child Pugh class advances from A to C (more decompensation,) percentage of patients developing esophageal varices increases with p-value < 0.001, which is highly significant.

It is evident from the table 2 that 71.4% cases of chronic liver disease caused by Hepatitis B and 87.5% cases of Hepatitis C are having Platelet count/spleen diameter ratio of more than/equal to 909.

Table 3: Distribution of cases according to platelet count/spleen diameter ratio and ascites (n=100)

Ratio	Ascites		OR
	Present (%)	Absent(%)	(95% CI)
≤909	74 (98.67)	1 (1.33)	68.30
>909	13 (52.00)	12 (48.00)	(8.17 – 571.1)
Total	87(87.00)	13(13.00)	

p<0.001

It is evident from Table 3 that 87% cases of chronic liver disease had ascites whereas 13 patients don't have ascites. The incidence of ascites in patients with platelet count / spleen diameter ratio < 909 was 98.67% wit p-value <0.001 which was significant.

Table 4: Comparison of laboratory parameters with platelet count /spleen diameter ratio

Laboratory Parameters	Platelet count / spleen diameter ratio		P value
	>909(n=75)	<909(n=25)	
S. bilirubin (mg/dl)	4.37±4.10	3.12±4.35	>0.05
S. albumin (g/dl)	2.81±0.35	3.72±0.35	<0.001
PT (sec.)	20.72±2.54	19.28±2.09	>0.05
INR	1.32 ±0.1 7	1.23±0.10	0.05
Platelet count (n/mm3)	105457.33±85973.81	157960.00±20994.25	<0.001
Spleen diameter (mm)	146.05±17.50	122.92±13.39	<0.001
Platelet count/spleen diameter ratio	676.03±147.21	1302.22±261.19	<0.001

The above table shows the comparison of mean values of various laboratory parameters with platelet count/spleen diameter ratio. Serum albumin level, platelet count, spleen diameter (mm) ratio <909 had significantly higher S. total bilirubin well as lower prothrombin activity and platelet count compared with patients having ratio >909.

DISCUSSION

The number of patients undergoing screening for the presence of esophageal varices is likely going to increase in the near future as a result of growing pool of patients with chronic liver disease.[4] Therefore there is particular need for non - invasive predictors of the presence of esophageal varices as they might relieve medical, social and economic costs.

Present study showed that esophageal varices are present equally in both males (75.67%) and females (73.08%) which were not significant. This findings is supported by study done by Grace ND et al[5] which showed that incidence of varices was 74% in males and 72.5% in females so on sex difference was present.

In the present study, platelet count / spleen diameter ratio <909 had 98.6% sensitivity as well as 96% specificity for esophageal varices. In the present study, positive predictive value of the ratio for presence of varices was 98.6% and negative predictive value was 96%. In a study by Giannini EG et al[6] showed that prevalence adjusted positive and negative predictive value of platelet count / spleen diameter ratio <909 were 96% and 100% respectively. In a study by Giannini EG et al.[7] they concluded that with the platelet count / spleen diameter ratio cut off 909, a 71% of prevalence adjusted positive predictive value and a 100% prevalence adjusted negative predictive value were obtained.

In our study mean of S. bilrubin and prothromboin time were not statistically significant which suggest that raised S. bilirubin and prothrombin time have only prognostic value for chronic liver disease and their raised value are not indicative of presence of esophageal varices. Similarly, study by Grace ND et al[5] showed non-significant relationship between S. bilirubin level. Study by E. Gianini et al[8] showed that patients with

CONCLUSION

Platelet count / spleen diameter ratio is a strong parameter which is independently associated with the presence of esophageal varices in chronic liver disease and irrespective of the etiology. Platelet count / spleen diameter ratio is better predictor of presence of esophageal varices than platelet count alone because low platelet count can't be solely attributed to portal hypertension but use of this ratio bypasses this - possible drawback since it normalizes - platelet count to splenic sequestration most likely representing the aliquot of thrombocytopenia caused by portal hypertension.

REFERENCES

1. De Franchis R, Primignani M. Natural history of portal hypertension in patients with cirrhosis. Clin Liver Dis 2001; 5:645-63.
2. Garceau AJ, Chalmers TC. The Boston Inter-hospital Liver Group. The natural history of cirrhosis : I. Survival with esophageal varices. N Engl J Med 1963 ; 268 : 469-73.
3. Graham D, Smith JL. The course of patients after variceal hemorrhage. Gastroenterology 1981 ; 80 : 800-9.
4. Harrison's principle of internal medicine. Edition 17.
5. Grace ND, Groszmann RJ, Garcia-Tsao G et al. Portal hypertension and variceal bleeding : An AASLD single topic symposium. Hepatology1998 ; 28 : 868-80.
6. Giannini EG, Botta F, Borro P, Dulbecco P, Testa E, Mansi C, Savarino V, Testa R. Application of the platelet count/spleen diameter ratio to rule out the presence of oesophageal varices in patients with cirrhosis: a validation study based on follow-up. Dig Liver Dis. 2005;37:779-85.
7. Giannini EG, Zaman A, Kreil A, Floreani A, Dulbecco P, Testa E, et al. Platelet count/spleen diameter ratio for the noninvasive diagnosis of esophageal varices: results of a multicenter, prospective, validation study. Am J Gastroenterol. 2006;101:2511-9.
8. Giannini E. Botta E, Borro P, Risso D, Mele MR. Testa E, MansiC. Platelet count / spleen diameter ratio : Proposal and validation of a non invasive parameter to predict the presence of esophageal varices in patients with cirrhosis. Gut 2003 ; 52 :1200-1205.