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Research Article

Platelet Count to Spleen Diameter Ratio as a Predictor of Esophageal Varices in Choronic Liver Diseases Due To Hepatitis C

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ABSTRACT

Objective: To determine the diagnostic accuracy of platelet, count to spleen diameter ratio for presence of oesophageal varices in patients of chronic liver disease secondary to Hepatitis C taking endoscopy as gold standard.
Study design: Cross sectional survey.
Setting: Department of Medicine K.E.M.U/Mayo Hospital, Lahore.
Duration: Six months
Sampling Technique: Non-probability consecutive sampling
Subjects and Methods: After informed consent from patients, 180 patients fulfilling clinical case definition of CLD secondary to Hepatitis C were included in the study. Upper GIT endoscopy was done by standard protocol and oesophageal varices having a size of more than or equal to 5 millimetre (mm) were considered positive. The platelet counts in number per micro litre (µl) was measured by doing complete blood count (CBC) and the spleen diameter in millimetre was measured by doing abdominal ultrasonography (USG).
Results: The study population consisted of 180 patients of CLD secondary to HCV. Mean age of patients was 50.76±12.872 years. There were 86 (47.8%) male and 94 (52.2%) females, out of 180 patients. On Upper GIT endoscopy, the EVs were present in 95 (52.8%) and 85 (47.2%) patients have no EVs. The mean of PC/SD ratio of patients with varices was 831.0287 and those of without varices was 1358.4154. The mean of PC/SD ratio of all the patients was 1080.0724. The sensitivity and specificity for the diagnostic accuracy of PC/SD ratio were 71.6% and 58.8% respectively. The positive predictive value and negative predictive value were 66.0% and 64.9% respectively. The diagnostic accuracy of PC/SD ratio for prediction of EVs was 65.6%.
Conclusion: The PC/SD ratio is non-significantly associated with prediction of esophageal varices having a diagnostic accuracy of 65.6%.

Key words: Platelet Count to Spleen diameter ratio, esophageal varices, Chronic liver disease, Hepatitis C

INTRODUCTION

Chronic Liver Disease is a progressive and relapsing liver disease that occurs due to persistent injury to liver parenchyma by viral infection, toxins, deposition of copper in Wilson disease & iron in Hemochromatosis and autoimmune hepatitis. Amongst all the above causes of cirrhosis, Hepatitis C virus infection is common in Pakistan (1). Chronic Liver Disease (CLD) remains asymptomatic till the end stage liver disease occurs which manifests with complications of ascites, gastro esophageal variceal bleeding, encephalopathy, coagulopathy, spontaneous bacterial peritonitis and hepato-renal

syndrome. WHO estimated that ESLD is responsible for the 1.1% of all deaths(3).

Cirrhosis of the liver causes increase pressure to flow of blood in portal system. When portal pressure rises above 20 mmHg(3) it causes dilatation of veins at Porto-systemic junctions which are situated at gastro-esophageal junctions, peri-umbilical area and ano-rectal junction. The dilated veins at gastro-esophageal junction are called gastro-esophageal varices. The gastro-esophageal varices are prevalent in 24-80% of ESLD patients (2). These varices bleed in 20-40% of patients(4) and mortality rate of variceal bleeding is 20-30% (3).According to the Baveno IV consensus 2005, every patient of cirrhotic liver should have screening endoscopy for early detection of esophageal varices (4). The patients having high risk esophageal varices (HREVs) should be given primary prophylaxis (non-selective β blockers or endoscopic band ligation) for the prevention of variceal bleeding which reduces risk of variceal bleeding up to 50% (4). But the American Association for the Study of Liver Disease (AASLD) recommends annual screening of varices by endoscopy in decompensated CLD and after every 2-3 years in compensated CLD, if varices are not present at index endoscopy. (5)

To reduce burden on endoscopy unit for screening of varices, various studies are done to predict varices presence by non-invasive parameters. These variables include clinical radiological and biochemical markers, like liver enzymes serum albumin, platelet count, spleen diameter, portal vein diameter, liver span and presence of ascites.Although several studies are done to determine the diagnostic accuracy of PC/SD ratio for presence of esophageal varices there is variability among their results. Studies by Amin.K et al,Mattos AZ et al. and Sarwar. S et al have cut off value (909) of PC/SD ratio. Amin K et al showed significant diagnostic accuracy of PC/SD ratio for esophageal varices while Mattos AZ et al and Sara. S et al showed non-significant diagnostic accuracy of PC/SD ratio for esophageal varices, so further research is required to see diagnostic accuracy of PC/SD ratio for esophageal varices and to apply noninvasive parameters (PC/SD) for screening of esophageal varices.

METHODOLOGY

180 consecutive patients of Chronic liver disease secondary to Hepatitis C came in central endoscopy unit of Department of Medicine Mayo Hospital via Emergency/OPD and had given informed consent for study were recruited for study. Detailed History was taken and thorough clinical examination was done of each patient. Platelet count (number/ micro liter) was done of each patient and spleen diameter was measured in millimeters by doing ultrasonography. The Upper gastro intestinal endoscopy of each patient was done by the experienced endoscopist for presence /absence of esophageal varices. All the information was collected on pre-designed proforma. The data is analyzed using SPSS statics.

RESULTS

The study population consisted of 180 cases of CLD secondary to HCV infection. The average age was 50.82±12.912 (mean ± Standard deviation). In the distribution of patients by gender, 86 (47.8%) patients were male and 94 (52.2%) patients were female.The means ± standard deviations of Platelet count (128116.67 ± 82727.747), spleen diameter (127.49 ± 24.758) and PC/SD ratio (1080.0724 ± 809.12154) are as shown in Table 1. There were 103 (57.2%) cases having PC/SD ratio less than 909, while 77(47.8%) have PC/SD ratio more than 909. The mean of PC/SD value having PC/SD ratio < 909 is 561.1746 ± 174.99 and those of PC/SD value > 909 is 1774.18 ± 804.86. Gastroscopy findings reveal 95(52.8%) cases have EVs present and there are no EVs in 85(47.2%) cases. The mean of spleen diameter in patients having EVs is 131.56 ± 24.285 and those, without EVs is 122.94 ± 24.627. The mean value of PC/SD ratio in patients having EVs on Gastroscopy is 831.0287 ± 594.32062 and in patients without EVs it is 1358.4154 ± 922.64748.

By analyzing the data of EVs on basis of PC/SD, taking Gastroscopy as gold standard test for detection of EVs, into 2 X 2 Table, the following results were observed.There were 68 true positive (TP) cases, 35 false positive (FP) cases, 50 true negative (TN) and 27 false negative (FN) cases. The sensitivity and specificity of PC/SD ratio as a predictor of esophageal are 71.6% and 58.8% respectively (Table 02). The positive predictive value and negative predictive value of this test is 66% and 64.9% respectively(Table 03)The positive likelihood ratio (LR+) of this test is 1.74 and negative likelihood ratio is 0.48. The diagnostic accuracy of PC/SD ratio is 65.6%. Summary of statistical analysis has been given in Table 04.

Table 1- Descriptive Statistics of Numeric Data

Sr. No	Variables	Range	Minimum	Maximum	Mean	Std. Deviation
1	PATIENT AGE IN YEARS	67	18	85	50.82	12.912
2	PLATELET COUNT PERMICRO LITER	411000	23000	434000	128116.67	82727.747
3	SPLEEN DIAMETER INMILLIMETER	130	80	210	127.49	24.758
4	PC/SD RATIO VALUE	4175.72	164.28	4340.00	1080.0724	809.12154

Table .02- Esophageal Varices on Platelet Count to Spleen Diameter Ratio X Esophageal Varices on Gastroscopy Cross Tabulation Showing Sensitivity and Specificity

			Esophageal varices on Gastroscopy		
			> Present on Gastroscopy	**Absent on Gastroscopy**	**Total**
Esophageal varices on platelet count to spleen diameter ratio	**PCSD less than 909**		**68**	**35**	**103**
		% within esophageal varices on platelet count to spleen diameter ratio	**71.6%**	**41.2%**	**57.2%**
	PCSD more than 909		**27**	**50**	**77**
		% within esophageal varices on platelet count to spleen diameter ratio	**28.4%**	**58.8%**	**42.8%**
Total			**95**	**85**	**180**
		% within esophageal varices on platlet count to spleen diameter ratio	**100.0%**	**100.0%**	**100.0%**

Table 03-Esophageal Varices on Platelet Count to Spleen Diameter Ratio X Esophageal Varices on Gastroscopy Cross Tabulation Showing Positive Predictive Value and Negative Predictive Value

			Esophageal varices on Gastroscopy		Total
			> present on Gastroscopy	Absent on Gastroscopy	
Esophageal varices on platelet count to spleen diameter ratio	PCSD less than 909	Count	68	35	103
		% within esophageal varices on platelet count to spleen diameter ratio	66.0%	34.0%	100.0%
	PCSD more than 909	Count	27	50	77
		% within esophageal varices on platelet count to spleen diameter ratio	35.1%	64.9%	100.0%
Total			95	85	180
		% within esophageal varices on platlet count to spleen diameter ratio	52.8%	47.2%	100.0%

Table 04: Summary of Statistical Analysis

Data	Value
Sensitivity	71.6%
Specificity	58.8%
Positive Predictive Value	66%
Negative Predictive Value	64.9%
Diagnostic Accuracy	65.6%.
Positive Likrelihood Ratio (LR+)	1.74
Negative Likrelihood Ratio (LR-)	0.48

DISCUSSION

Upper GIT bleeding is a renowned complication of CLD. In Pakistan, HCV infection is a most common cause of CLD (1). To reduce the risk of mortality caused by upper GIT bleeding, Baveno IV consensus on endoscopy updates (2005) recommended that every person of CLD should have screening by Gastroscopy at the time of diagnosis for the early detection of EVs and institution of primary prophylaxis once the EVs are present on Gastroscopy (4). As the Gastroscopy is an invasive procedure, having a risk of infection spread and also cost effectiveness and availability problems, noninvasive parameters like (platelets count and spleen diameter ratio) are studied by different researchers(2-7) to see the diagnostic accuracy for prediction of EVs including this study.

The PC/SD ratio uses two parameters, which are routinely done in cirrhotic patients.In this study the mean age, of patients included, is 50.82 which is comparable to both of the studies by Amin. K et al (57.61) (3) and Mattos et al (56.6) (6). A female to male ratio is 1.09:1 with an overall female preponderance of 52% which is consistent with the study by Amin. K et al where female to male ratio was 1.03:1 (3).

In the present study, the EVs diagnosed by Gastroscopy are 52.8%, which fall in the range of 24-80% as mentioned in the literature [6]. This reveals that about half of the patients, whose screening endoscopy is done, do not require endoscopy for early detection of EVs. In other words, they are exposed to infections by doing an invasive procedure. Noninvasive parameters can

be established for detection of EVs to prevent the risks and discomfort of Gastroscopy.

PC/SD ratio has gained more attention by the researchers as compared to other noninvasive parameters because of the fact that with time platelets count decreases in natural course of CLD, mainly due to hyper-splenism, immune-mediated destruction of platelets (in viral hepatitis) and decreased production of platelets secondary to myelo-toxic effect of viral hepatitis & alcohol and decreased production of thrombo-poietin. The spleen diameter increases during natural course of CLD secondary to portal hypertension. This study is based on the concept that PC/SD decreases during natural course of disease (due to decrease in platelet count and increased spleen size) along with complications of CLD, like EVs. Thus in patients with decrease in PC/SD ratio the risk of development of EVs increases. A cut off value of 909 is used in this study, as used by Amin. K et al (3), Mattos et al (6)and Sarwar. Set (7) al in the literature.

In this study, 68 (71.6%) patients having PC/SD ratio < 909 had EVs on Gastroscopy and 35 (41.1%) patients do not have EVs on Gastroscopy. There were 50(58.8%) patients having PC/SD Ratio >909 and no EVs on Gastroscopy, while 27 (28.8%) with PC/SD > 909 have EVs on Gastroscopy. By using the confidence interval (CI) of 95%, PC/SD ratio has sensitivity of 71.6%, specificity of 58.8%, PPV of 66%, NPV of 64.4% and diagnostic accuracy of 65.6%. The diagnostic accuracy of PC/SD is comparable to that predicted by Mattos et al(68.9%) (6).

Although this study reveals association of PC/SD ratio with presence of EVs on Gastroscopy, but its sensitivity, specificity, PPV, NPV and diagnostic accuracy are not same as, are described by Amin. K et al (3). Our study does not favor the use of PC/SD ratio for prediction of EVs because the risk of missing the patients having EVs is more dangerous, leading to the risk of bleeding from EVs which has greater mortality in patients of CLD (4).Moreover, a cut off value of (909) for detection of EVs should be re-evaluated as advised by Mattos. AZ et al (6)·Sarwar. S et al (7)andSchwarzenegger. E et al(8).

CONCLUSION

We are not in favor of platelet count/spleen diameter ratio to be used as an adequate index for the prediction of EVs in cirrhotic patients. At the moment, we still think cirrhotic patients must have a screening endoscopy in order to identify EVs at the time of their diagnosis. It is also important that PC/SD ratio having a different cut off value and other non-invasive parameters should be developed in order to reduce the burden on health system and to improve cost effectiveness for early detection of EVs and initiation of primary prophylaxis for EVs.

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