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A study to relate 'platelet count to splenic bipolar length ratio' as a tool to predict esophageal varices.

Medicine

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ABSTRACT

Background: Current standards recommend upper gastrointestinal endoscopy (UGES) in all cases of cirrhosis. This study attempts to identify 'platelet count: bipolar splenic length' ratio as a non-invasive tool to predict esophageal varices. Objectives: To relate 'platelet count: splenic bipolar length ratio' as a tool to predict esophageal varices in cirrhosis. Materials and methods: This cross sectional analytical study was done on 79 patients with cirrhosis (based on clinical, biochemical and/ or imaging features) having esophageal varices on UGES. After their consent, required details were captured. The bipolar length of spleen and portal vein diameter were recorded using transabdominal sonography. The 'platelet count: bipolar splenic length ratio' and Child-Pugh score were calculated. The data was analyzed by frequency, percentage and chi square test. Conclusion: The 'platelet count: splenic bipolar length ratio' maybe a simple, cost-effective tool to predict varices in cirrhosis, but we are unable to associate its utility as predictor for grading the varices. Upper gastrointestinal endoscopy still scores high as it can diagnose and facilitate interventions at single instance.

KEYWORDS:

platelet count: splenic bipolar length' ratio; upper GI endoscopy; UGES; esophageal varices; tool; cirrhosis; predict; Child-Pugh score.

Introduction:
Esophageal varices develop in approximately 50% of patients with cirrhosis. (1) Approximately 25-40% of them develop variceal bleeding. (2) Irrespective to aetiology, current recommendations suggest upper gastrointestinal endoscopy (UGES) in all cases of cirrhosis. At times, it is difficult to undertake UGES for various patient and infrastructure related issues. Various non-invasive methods have been used to predict the presence and grades of varices. The 'platelet count: splenic diameter ratio' have been used and found to be a useful tool to predict presence of esophageal varices. (2, 3, 5) This study attempts to identify 'platelet count: bipolar splenic length ratio' as a tool to predict varices in patients with cirrhosis, who are already identified to have varices by UGES.

Objectives:
To relate 'platelet count: splenic bipolar length ratio' as a tool to predict esophageal varices in patients with cirrhosis of liver.

Materials and methods:
Source of data: Patients with liver cirrhosis who underwent UGES at a tertiary hospital and found to have esophageal varices were the source for this study.

Study design: A cross sectional analytical study done over six months with 79 subjects.

Method of data collection: The study was started after obtaining permission from Institutional Ethics Committee. Patients who were diagnosed to have cirrhosis based on clinical, biochemical and/ or imaging features; with evidence of esophageal varices on UGES were selected to this study. The esophageal varices if found on UGES were graded as; small varices - minimally elevated veins above the esophageal mucosal surface (<5mm); large varices - occupying more than one-third of the esophageal lumen. (4) A written informed consent was obtained from those who fulfilled the selection criteria. The details required from history, clinical examination and laboratory investigations (hemoglobin (g/dl), platelet count (cells/mm3), prothrombin time, liver function tests) were captured to preformatted sheet. The bipolar length of spleen and portal vein diameter were recorded using trans-abdominal sonography. The calculated 'platelet count: bipolar splenic length ratio' and Child-Pugh score were entered in data sheet.

Selection criteria: Inclusion criteria: Patients with cirrhosis who have oesophageal varices determined by UGES. Exclusion criteria: 1) Patients with active upper gastrointestinal bleeding. 2) Patients who have previously undergone band ligation or sclerotherapy. 3) Patients with hepatocellular carcinoma/ liver metastasis.

Statistical analysis: The data obtained from the study were analyzed using frequency, percentage and chi-square test.

Results:
Over six months 79 cirrhotic patients with esophageal varices were selected. There were 68 (86.1%) males and 11 (13.9%) females in this study. Most were in the age group of 51-60 years (36.7%) and the mean age was 55.27± 12.59. Etiologies for cirrhosis were alcohol abuse (84.8%), viral (4%), autoimmune (4%) and unknown causes (4%). Varices were graded by UGES, with small varices were seen in 35 (44.3%) and large varices in 44 (55.69%) patients. The 'platelet count: spleen bipolar length ratio' was significantly associated with the presence of esophageal varices (p- 0.014). Large varices had a lower ratio (993.93) as compared to small varices (1085.19) without showing statistical significance (table-1).

Variable	Esophageal varices	Mean	Standard deviation	N
'platelet count: splenic bipolar length ratio'	Small	1085.19	502.31	35
	Large	993.93	540.88	44

Table-1. Comparison on 'platelet count: splenic bipolar length' ratio with variceal grades.

Splenomegaly was found in 93.67 % (n-74) by trans-abdominal sonography. UEGS showed 43 patients (58.1%) to have large varices and 31 (41.89%) to have small varices. There were 4 patients with splenic length above 160 mm of whom three had large and one had small varices. Thrombocytopenia was seen in 75.94% (n-60) of the subjects. Among them 31 (51.6%) had large varices and 27 (45%) had small varices. Based on severity of the thrombocytopenia; 'group-1': < 50,000 cells/mm3, 'group-2': 50,000-100,000 cells/mm3 and 'group-3': 100,000-150,000 cells/mm3. There were 2 patients in 'group-1', both having large varices, 31 in 'group-2' of whom 17 (54.83%) had large varices and 27 in 'group-3' of whom 15 (55.5%) had large varices.

Variable		Frequency	Percentage
Gender	Female	11	13.9
	Male	68	86.1

Abdomen distension	No	28	35.4
	Yes	51	64.6
Jaundice	No	49	62.0
	Yes	30	38.0
Melena	No	42	53.2
	Yes	37	46.8
Altered sensorium	No	61	77.2
	Yes	18	22.8
Etiology	Alcohol	67	84.8
	Auto-immune	4	5.1
	Viral	4	5.1
	Unknown	4	5.1
Pallor	No	25	31.6
	Yes	54	68.4
Icterus	No	34	43.0
	Yes	45	57.0
Pedal edema	No	46	58.2
	Yes	33	41.8
Asterixis	No	58	73.4
	Yes	21	26.6
Splenomegaly	No	57	72.2
	Yes	22	27.8
Shifting dullness	Absent	33	41.8
	Present	46	58.2

Table-2: Frequency and percentages of variables.

Abdominal distention was the most frequent presenting symptom (64.6%) followed by melena (46.8%), jaundice (38%) and altered sensorium (22.8%). Pallor was seen in 68.4%, shifting dullness in 58.2%, icterus in 57%, pedal edema in 41.8%, enlarged spleen in 27.8% and flapping tremors in 26.6% of patients in this study (table-2).

Variables	Chi-square (p- value)	Significance
Abdomen distension	0.004	Hs
Jaundice	0.574	
Malena	0.051	
Altered sensorium	0.921	
Etiology	0.515	
Pallor	0.195	
Icterus	0.639	
Pedal edema	0.232	
Asterixis	0.835	
Splenomegaly	0.726	
Shifting dullness	0.027	Sig

Table-3: Comparison of clinical variables with presence of varices.

Among the variables evaluated, only abdominal distention and shifting dullness were significantly associated with the presence of varices (table-3).

Variable	Esophageal varices	Mean	SD	n	t -value	p-value
Hemoglobin	Small	10.44	2.32	35	2.07	0.04*
	Large	9.35	2.33	44		
Albumin	Small	2.88	0.56	35	2.05	0.04*
	Large	2.61	0.58	44		
Spleen bipolar length	Small	121.43	17.42	35	-0.79	0.43
	Large	125.02	21.80	44		

Table-4: Comparative analysis of various biochemical and imaging variables with grades of varices.

Variable	Esophageal varices	Median	Q1, Q3	n	U value	p-value
Platelet count	Small	120000	89000, 150000	35	646.5	0.22
	Large	105000	72000, 157750	44		
Prothrom bin time	Small	16	14.70, 17.40	35	607.5	0.11
	Large	16.8	14.93, 20.20	44		
Bilirubin	Small	2.79	1.33, 5.07	35	737.0	0.75
	Large	2.79	1.61, 4.08	44		
SGOT	Small	72	45, 115	35	673.0	0.33
	Large	85	46, 132	44		
SGPT	Small	33	22, 53	35	766.0	0.97
	Large	34	19.25, 43.00	44		
Portal vein diameter	Small	11.50	10, 13	35	733.5	0.72
	Large	11.25	10, 13	44		

Table-5: Comparative analysis of various biochemical and imaging variables with grades of varices.

A comparative analysis on the ability of the various biochemical and imaging variables to differentiate between small and large varices was performed (table-4 & table-5). Patients with large varices had statistically significant correlation only with low haemoglobin (p- 0.04) and albumin (p- 0.04). Surprisingly, various parameters including platelet count, prothrombin time, bilirubin, portal vein diameter failed to show any statistically significant correlation with varices.

Variable	Large varices	Small varices	Total	p-value
Child-Pugh A	7	0	7	0.040
Child-Pugh B	19	15	34	
Child-Pugh C	24	14	38	

Table-6: Child Pugh class related to grades of varices.

The patients were classified for severity of the liver disease using Child-Pugh score and related to grades of varices(table-6). It showed that in Child-Pugh A all 7 (8.86%) patients had large varices. Among the 34 (43.03%) with Child-Pugh B there were 19 (55.88%) patients with large varices and in 38 (48.1%) patients with Child-Pugh C there were 24 (63.15%) patients with large varices.

Discussion:

Upper gastrointestinal endoscopy is the 'gold standard' in diagnosis esophageal varices. The increase in cirrhosis patients have resulted in large numbers of UGES used for screening varices. (2) This can result in a strain on the limited healthcare facilities in developing countries. Such situation demand the need for an alternate non-invasive tool to predict esophageal varices.

At diagnosis, 40% patients with compensated and 60% with decompensated liver disease have esophageal varices. (3) Almost 30% of these varices bleed within a year of diagnosis. The mortality from bleeding is over 10% in Child-Pugh A to over 75% in Child-Pugh C. (4) Various factors contribute to thrombocytopenia in liver disease. These include reduced production of TPO, bone marrow suppression, increased sequestration from splenomegaly, immune mediated destruction, hyper-fibrinolysis, bacterial and sepsis. (5) Splenic enlargement seen in liver diseases may be congestive due to increase venous pressure or hyperemia due to increased splenic arterial flow or hypertrophic due to hyperfunctioning of splenic reticuloendothelial system. (6)

Giannini et al proposed 'platelet count to splenic bipolar diameter ratio' for the non-invasive diagnosis of esophageal varices. They found a ratio of < 909 had a sensitivity of 91.5%. (7) Similar studies concurred these results, but they considered only the presence or absence of varices as selection criteria. (8,9) Our study could significantly co-relate the 'platelet count: splenic bipolar length ratio' with the presence of esophageal varices. The sensitivity for the cut off ratio < 909 was

comparatively lower (50.63%). The selection of endoscopically proved esophageal varices could be the reason for this observation.

In this study, most patients were alcoholic males in the middle age. Most patients presented with abdominal distension and had ascites; like other Indian studies. (1,8,9)

Development and enlargement of varices are associated with severity of liver disease; which is assessed by Child-Pugh score. (10) In our study, most patients belonged to class C. As the class progressed from A to C (compensated to decompensated liver disease) the percentage of patients with large varices increased. In this study, most of the patients with Child-Pugh class B and C had large varices. Cherian et al found that Child-Pugh score was the most sensitive parameter (95% sensitivity) for large varices and saved 16.6% UGES. (11)

In the present study, when various laboratory and imaging parameters were analyzed for their ability to predict large varices, none were found efficient. Hemoglobin, platelet count, spleen size and portal vein diameter had better predictive accuracy for varices. (10) In our study, patients with large varices had a lower mean value of haemoglobin, albumin and platelet count. A larger mean splenic bipolar length compared to patients with small varices. We noticed a statistically significant relation with low haemoglobin and albumin levels, similar to observations by Tiwari et al. (8)

Abassi et al found an inverse relation between thrombocytopenia with the grades of esophageal varices. In our study patients with large varices had a lower platelet count as compared to patients with small varices. (12)

Splenomegaly is a feature of portal hypertension in cirrhosis and considered as a non-invasive parameter to predict esophageal varices. Like observed by Rasheid et al, we found patients with large varices to have splenomegaly, but without statistical significance. (13)

WGO practical guidelines states an INR above 1.5, portal vein diameter above 13 mm and thrombocytopenia to positive prediction of varices in patients with cirrhosis. Studies have showed significant association between prothrombin time, bilirubin, portal vein diameter and presence of varices (14,15,16). In the present study, none of these factors related to the grade of esophageal varices. The factors involved in progression of varices from small to large are decompensated cirrhosis (Child Pugh B/C), alcoholic cirrhosis and presence of red wale marks on baseline endoscopy. (4)

The small sample size and inter-observer variability of splenic measurement might be a limitation of this study. The selection of patients with proven esophageal varices by endoscopy might have altered the predictive values and statistical outcomes of our postulate.

Conclusion:

The 'platelet count: splenic bipolar length ratio' might be a simple, cost-effective tool to predict varices in cirrhosis, but were unable to associate its utility with the grades of varices. Its specificity is not good enough for it to replace periodic endoscopic screening for varices. Current recommendations demand upper gastrointestinal endoscopy in all patients with cirrhosis and intervention in case of varices. Though invasive, it still scores high as it can diagnose and facilitate intervention.

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