European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 10, Issue 02, 2023

Original Research Article

Clinical, laboratory, and imaging criteria for the non-invasive prediction of large esophageal varices

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Abstract

Introduction: A portal pressure gradient of more than 5-10 mm Hg is diagnostic of portal hypertension, a characteristic of cirrhosis. Varices develop in patients with portal hypertension when the portal circulation is relieved by portosystemic collaterals.

Methods: This prospective study comprised consecutive newly diagnosed liver disease patients with or without gastrointestinal bleeding from May 2021 to April 2022, at our tertiary referral facility General Medicine, Kamineni Academy of Medical Sciences and Research Centre, Hyderabad. Before joining the trial, patients signed an informed consent.

Results: There were a total of 80 participants in the study. The median age of the population is 45, and its age distribution is between 18 and 74. The ratio of male to female patients was 2.11 to 1. There were 62 male patients. The typical duration of symptoms was 90 days (range, 10-230 days). Fifty patients had obvious ascites, and another 43 showed pedal edoema.

Conclusion: If proven effective, this would eliminate the need for expensive and intrusive examinations like gastrointestinal endoscopy and allow the use of beta-adrenergic antagonists as preventative treatments against primary variceal bleeding in patients with liver cirrhosis.

Keywords: Clinical, imaging criteria, non-invasive, large esophageal varices

Introduction

A portal pressure gradient of more than 5-10 mm Hg is diagnostic of portal hypertension, a characteristic of cirrhosis. Varices form when the portal circulation is relieved of pressure due to the development of portosystemic collaterals in patients with portal hypertension [1]. Esophageal varices and internal haemorrhaging are two of the more dangerous complications that can occur in patients with portal hypertension. About 40% of patients with compensated disease and 60% of patients with decompensated disease with ascites have esophageal varices at the time of liver cirrhosis diagnosis [2-4].

On average, roughly 5% of the population will develop cirrhosis of the liver each year without developing esophageal varices. Keep in mind that the size of a varix will likely rise with time. In the year following a diagnosis of a mild esophageal varix, the size of the varix may increase in as many as 11 percent of patients. A variceal haemorrhage occurs in about 4% of patients with hepatic cirrhosis each year [4, 5].

Patients with liver cirrhosis will bear a disproportionate share of the cost associated with the increased demand placed on endoscopic units as a result of these guidelines. Large esophageal varices are extremely rare in people who do not have bleeding disorders, leading to a high number of unnecessarily invasive endoscopic treatments being performed on people with cirrhosis who have not actually had any bleeding. For this reason, non-invasive methods are required to determine whether or not significant esophageal varices are present. If these alternatives were more readily available, it is possible that endoscopic procedures for the detection of large esophageal varices would be used less frequently [6, 7].

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Patients with cirrhosis who have a high platelet count, splenomegaly, an advanced Child status, high blood albumin levels, or a big portal vein diameter on ultrasonography are all noninvasive indications of large esophageal varices. Variations in cirrhosis aetiology, liver disease severity, and nutritional status among populations may lead to distinct predictive indications [8]. Indians with liver cirrhosis are understudied despite their late presentation, lower nutritional status, and larger proportion of viral aetiology. Patients with portal hypertension are at greater risk for the development of large esophageal varices; therefore, the purpose of this study is to assess the accuracy of different clinical, biochemical, and ultrasonographic indicators in making this prediction. The purpose of this investigation is to ascertain the frequency with which esophageal varices of varied diameters occur in patients with hepatic illness. Methods for the early detection of large esophageal varices through the use of clinical, biochemical, and ultrasonic indications [9, 11]. The purpose is to pinpoint the most sensitive and specific diagnostic indications for predicting the presence of big esophageal varices. Clinical assessment of the 909 platelet count to spleen diameter ratio for predicting the existence of big esophageal varices.

Methods

Between May 2021 to April 2022, we prospectively analyzed all consecutive patients who presented to our institution General Medicine, Kamineni Academy of Medical Sciences and Research Centre, Hyderabad, a tertiary referral center, with a diagnosis of liver disease, with or without a history of gastrointestinal bleeding. Before participating in the trial, patients were required to sign an informed consent form.

Inclusion Criteria

- 18 to 80 years of age.
- Hepatitis and portal hypertension

Exclusion Criteria

- Problems of the primary haematology.
- Gastrointestinal haemorrhage that was present at admission.
- Using medication to prevent variceal bleeding in the first place.
- Addiction to parenteral drugs in the past.
- Band ligation or EST history, TIPS.
- Co-morbidity for endoscopy that is advanced.
- surgery performed before for portal hypertension

Clinical Evaluation

Each patient was given a thorough medical examination when they signed up. We recorded the patient's age, gender, medical history, and the reason of their liver disease, as well as any symptoms or signs of liver failure, such as hepatomegaly, splenomegaly, and abdominal vein collaterals.

Results

There were a total of 80 participants in the study. The median age of the population is 45, and its age distribution is between 18 and 74. The ratio of male to female patients was 2.11 to 1. There were 62 male patients. The typical duration of symptoms was 90 days (range, 10-230 days). Fifty patients had obvious ascites, and another 43 showed pedal edoema. Fifty-three of the patients had some sort of gastrointestinal bleeding, such as hematemesis or malena. Fifty-three people were discovered to have jaundice during the presentation. Alcohol abuse was revealed to be the leading cause of liver disease, followed by hepatitis B virus, autoimmune hepatitis, and hepatitis C virus. In this section, we present CTP's evaluation of the severity of

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liver disease. The severity of the disease and the underlying cause of liver cirrhosis are just two of the demographic and clinical factors listed in Table1.

Table 1: Manifestations of portal hypertension on endoscopy

Sr. No.	Endosciopic findings	Number
1	No varices	03
2	Small varices	25
3	Large varices	30
4	Esophagogastric varices	02
5	Portal hypertensive gastropathy	20
	Total	80

Endoscopy findings are summarized above; two patients were diagnosed with esophagogastric varices. Twenty of the patients with esophageal varices also suffered from portal hypertensive gastropathy. There was never just one stomach varix for anyone.

Table 2: Classification of varicose vein presence (CTP)

Sr. No.	CTP class	Varices	Large varices
1	A=25	15	10
2	B=32	24	08
3	C=23	20	03

Analyzing One Variable at a Time Large varices were substantially related with elevated bilirubin levels, low platelet counts, a high complete blood count time point (CTP) score, a small spleen, and large portal and splenic veins.

Table 3: Predictors of large esophageal varices using multivariate logistic regression

Sr. No.	Predictor	P-value
1	Bilirubin	0.09
2	Palpable spleen	0.001
3	Platelet count	0.0001
4	Spleen size	0.0003
5	Portal vein size	0.0001
6	Splenic vein size	0.0001

Table 3 displays the results of a logistic regression analysis conducted on 80 patients using the predictors that were found to be significant in the univariate analysis. The presence of a palpable spleen, the amount of platelets in the blood, the size of the portal vein, and the size of the splenic vein were all found to be statistically significant.

Comparing the size of the platelets to that of the spleen can indicate whether or not major esophageal varices are present. The prediction function's area under the receiver operating characteristic curve was 0.95. When the threshold was set to 908, both the sensitivity and specificity were 99%.

Discussion

As more patients are likely to be diagnosed with chronic liver disease in the near future, there will be a greater demand for OV screenings. Non-invasive predictors of the development of varices are actively sought after because to the high medical, social, and economic consequences associated with this condition. Several research lacked homogeneity in OV classification or proper statistical analysis, and only one study looked at people with compensated sickness [12, 13]. Furthermore, the majority of studies on the non-invasive diagnosis of OV were conducted on a limited sample of patients. One prospective study was conducted, and its findings were consistent with those of the retrospective investigations.

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Consistent non-invasive indicators of OV include low platelet levels and splenomegaly. For this reason, we only considered standardised, generally accepted, and re-producible metrics. Based on information from 106 persons with portal hypertension, 51 of whom had large esophageal varices, six characteristics were identified as having univariate predictive value for the occurrence of large esophageal varices. A multivariate analysis showed that just four of these, a low platelet count, splenomegaly, a large portal vein, and a large splenic vein, were predictive. The areas under the ROC curve for splenomegaly and platelet count were only moderately effective, at 0.883 and 0.701, respectively, in the studies [14, 15]. Internal bleeding from varices is a major source of morbidity and mortality in patients with portal hypertension.

However, people with smaller esophageal varices are much less likely to experience this condition than those with larger varices. Since pharmaceutical treatments, such as beta-adrenergic receptor antagonists, can reduce the risk of variceal bleeding, it is crucial to identify patients who have extensive esophageal varices and would most benefit from preventative interventions [16]. In individuals with liver cirrhosis, it is important to examine for the existence of significant esophageal varices at the time of initial diagnosis and at regular intervals throughout life. This method, however, places a substantial strain on endoscopic centres and results in substantial patient financial outlays. Therefore, research has been conducted to see if the presence or absence of significant esophageal varices can be reliably predicted from a patient's clinical, laboratory, and imaging characteristics. Splenomegaly, thrombocytopenia, ascites, spider naevi, hepatic encephalopathy, serum albumin concentration, serum bilirubin levels, prothrombin time, Child-Pugh score, aetiology of liver disease, portal vein diameter, and derived measures like the ratio of platelet count to splenic size have all been shown to be helpful in this regard [17, 18].

Previous study has repeatedly demonstrated that the presence of an enlarged spleen is a predictor [19], in addition to a low platelet count, a wide portal vein, and a small splenic vein. In contrast to prior studies, this one found that none of these other characteristics were at all significant in predicting success. All things considered, this investigation's findings jived with what had already been stated. It was shown that 50% of patients had esophageal varices, with 17% of those patients (33/92) having severe varices, according to research conducted by K. C. Thomopoulos *et al*. Large esophageal varices were revealed to be independently linked with the occurrence of ascites, splenomegaly, and elevated bilirubin levels [19-21] within a dataset of 22 covariates by univariate analysis.

According to multivariate analysis, a high platelet count, a large spleen, and the presence of ascites by ultrasound were all independently linked with the size of the oesophageal varices. The median value cutoffs for the absence of varices were reached by 5/39 (12.8%) of the 39 patients with platelets below 118 (109/l), spleen length below 135 mm, and no ascites. In addition, the patients' varicose veins were not severe. While 18 individuals had ascites, a spleen length >135 mm, and a platelet level 118 109/l, 15 (83.3%) of these patients also developed varices. Five patients out of eighteen (28.1%) had significant varices. Independent predictors of large oesophageal varices in cirrhotic patients were thrombocytopenia, splenomegaly, and ascites [22, 23].

According to univariate and multivariate analyses conducted by Zaman A. *et al*., the only predictor related with the development of major esophageal varices or stomach varices was a platelet count of 88,000. (p 0.05). 33 According to studies conducted by Zaman A. *et al*., high platelet counts and a Child-Pugh class are both independent risk factors for the development of varices, and the presence of big varices in particular. A platelet count of 90,000 was linked to a Child-Pugh classification of advanced. Both a platelet count of 80,000 and a severe Child- Pugh class were independently linked to the presence of extensive varices [24, 25].

In their investigation of 47 patients, Prihatini J *et al*. found that the prevalence of varices was 76.6%.

35 Using bivariate analysis, we identified a platelet count of 82,000/ul as a predictor of esophageal varices in liver cirrhosis (90.9% sensitivity; 41.7% specificity), a portal vein diameter of 1.15 cm as having 75% sensitivity and 54.5% specificity, and a splenic size of

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10.3 cm as having 83.3% sensitivity and 63.0% specificity. Esophageal varices in cirrhotic patients can be diagnosed with noninvasive tests [26], including platelet count, portal vein diameter, and anteroposterior splenic measurement.

The research conducted by Jeon SW *et al*. indicated that 48 percent of people suffer from esophageal varices.

Serum albumin, total bilirubin, prothrombin time, platelet count, spleen size, portal vein velocity, and portal vein diameter were among the 41 biomarkers found to have significant associations in univariate analysis. The platelet count, the spleen diameter, and the ratio of the two were the independent variables in a multivariate analysis. Varices can be detected during an endoscopic examination of a patient with cirrhosis and splenomegaly. This research backs up the 909 value that Giannini *et al*. determined as the optimal platelet-spleen diameter ratio limit. The ratio of 909 between platelet and spleen diameters was found to be sensitive at 98.5% and specific at 99% for predicting the presence of big esophageal varices. An AUC of 0.95 was found for the ROC curve. Clinically severe portal hypertension can be roughly estimated by dividing the platelet count by the spleen's diameter [22-26].

Conclusion

A total of 48.1% of people were found to have severe esophageal varices. Low platelet count, splenomegaly, portal vein size, and splenic vein size are all independently linked with the presence of large esophageal varices in people with liver cirrhosis. Patients who don't have massive esophageal varices may not need an upper GI endoscopy, and these tests could aid with that. As a result, the patient may have less discomfort and the cost of the endoscopic unit may go down. These variables only partially explained the presence of large esophageal varices. Portal hypertension can be diagnosed by comparing the size of the platelets to the size of the spleen. It would appear that the "platelet count/spleen diameter ratio technique" for detecting OV is more cost-effective than the "scope all strategy." Further study is required to ascertain whether or not the platelet count/spleen diameter ratio is a valid noninvasive diagnostic tool for varices. If this works, it could lead to the use of beta-adrenergic antagonists instead of gastrointestinal endoscopy to avoid primary variceal bleeding in patients with liver cirrhosis, which would be less expensive and less intrusive.

Conflict of Interest

None

Funding Support

Nil

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