Section: Medical Gastroenterology

Original Research Article

NON-INVASIVE PREDICTORS OF HIGH RISK ESOPHAGEAL VARICES AND GASTRIC FUNDAL VARICES IN PATIENTS OF LIVER CIRRHOSIS FROM SOUTH INDIA

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Abstract

Background: Upper gastrointestinal bleeding (UGIB) secondary to the variceal rupture is the most significant complication impacting morbidity and mortality in liver cirrhotics. Hepatic pressure venous gradient (HPVG) is the gold standard to assess high risk of variceal bleeding (VB), but, this is not always available and is an invasive method. Therefore it is necessary to look for non-invasive parameters for predicting high risk of esophageal varices and also predictors of gastric fundal varices. This study will avoid unnecessary endoscopic procedures in patients who did not have a high risk of bleeding and also identify high risk group for gastric fundal varices. **Materials and Methods:** To assess predictors of high risk esophageal varices & predictors of fundal varices in patients of liver cirrhosis from south India. This was a cross sectional observational study. **Result:** The predictors of high-risk esophageal varices in liver cirrhosis were low serum albumin, CTP class B & C, low platelet count, larger spleen diameter and low portal vein flow velocity. The predictors of gastric fundal varices in liver cirrhosis were low serum albumin, CTP class B & C, low platelet count. **Conclusion:** The predictors of high risk esophageal varices in liver cirrhosis were low serum albumin, CTP class B & C, low platelet count, larger spleen diameter and low portal vein flow velocity. The predictors of gastric fundal varices in liver cirrhosis were low serum albumin, CTP class B & C, low platelet count. Based on these parameters, screening endoscopy can be performed in those patients with high risk and can avoid unnecessary endoscopy in patients with low risk for varices.

INTRODUCTION

Esophageal varices (EV) are one of the most dreaded complications of portal hypertension in patients with CLD. 20-40% of patients with EV develop variceal bleeding. EV can be diagnosed and confirmed by endoscopy.[1] As endoscopy is an invasive procedure that most patients will deny and is costly, this has very poor patient compliance. To overcome these problems and reduce endoscopy-induced variceal bleeding in patients at risk of bleeding, studies need to identify other modalities to predict EV by non-invasive methods. Endoscopic screening for esophageal varices and fundal varices in all patients with cirrhosis is recommended to detect the presence and severity of varices and identify those at high risk of bleeding. However, this approach is associated with several challenges, including the limited availability of endoscopy units and the cost and discomfort associated with the procedure. Furthermore, patients with cirrhosis require regular surveillance endoscopy, which can significantly burden the patient. Noninvasive predictors have been developed to identify cirrhosis patients at high risk of esophageal varices and variceal bleeding. There are very few studies on non-invasive predictors of gastric fundal varices. So we assessed predictors of both high risk esophageal varices & predictors of fundal varices.

Aim

To assess predictors of high-risk esophageal varices & predictors of fundal varices in patients of liver cirrhosis from south India.

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MATERIALS AND METHODS

This Prospective observational study was conducted at the government Stanley medical college hospital for one year (july 2022- june 2023). All the data were collected from the persons admitted to the government Stanley medical college hospital with symptoms and signs of chronic liver disease /cirrhosis. After obtaining institutional ethical committee approval, informed consent was obtained from the patients visiting medical gastroenterology OPD who participated in the study during the study period. 209 patients were included in the study, and the baseline medical histories were elicited, followed by a complete physical examination of the patients.

Inclusion criteria: Age >18 years, patients who were diagnosed to have cirrhosis-portal hypertension by clinically, biochemically, radiologically, were screened with upper GI endoscopy. At endoscopy, the esophageal varices were graded as high-risk (all EV of ≥ 5 mm in diameter or small EV showing red spot signs or small EV in patients with Child-Pugh C) or low-risk (< 5 mm without endoscopic risk factors in patients with Child-Pugh A/B). Among those who had high risk esophageal varices and fundal varices were included.

Exclusion criteria: Age, HIV patients, patients on surgical treatment for portal hypertension, patients who are not willing to participate in the study, patients with psychiatric illness, pregnant and lactating mothers, and patients with fever, antiplatelet drug therapy, and malignancy were excluded.

All the patients included in the study were undergone complete blood count, which includes haemoglobin and platelet count, coagulation profile that includes prothrombin time and INR, liver function tests (alanine transaminase, aspartate transaminase, total protein, albumin globulin levels), blood urea, serum creatinine, serum electrolytes, blood sugar levels, viral markers(HBV, HCV), ultrasonography of abdomen (assesses spleen diameter, portal vein diameter, amount of ascites, liver parenchymal abnormalities), upper GI video endoscopy, fibroscan to evaluate the stiffness of the liver. All the parameters were compared with the grading of varices assessed by endoscopy using AASLD threesize classification. Data were entered into MS excel and calculated.

RESULTS

There were 139 males and 70 female patients with mean age of 53.2 ±11.2 years. The main demographic, laboratory, and endoscopic features of the patients are summarised in Table 1. Overall, any grade EVs were present in 155 (74.2%) patients, of whom 49(23.4%) had grade I EV, 63(30.1%) had grade II EV, and 43(20.6%) had grade III EV, among them 104(49.8%) patients combined with gastroesophageal junction varices. Large EV were present in 106(50.7%) patients.

Table 1: Clinical and demographic characteristics of the study population.

Characteristics	**n = 209**
Age (years)	
Mean±SD	53.2 ±11.2
Range	21–68
Male sex, n (%)	139(66.5%)
Platelet count (109/L)	75.7±42.4
White cell count (109/L)	4.37±6.4
Bilirubin (µmol/L)	29.1±27.4
AST (IU/L)	86.7 ± 64.5
ALT (IU/L)	68.6 ± 60.4
Albumin (g/L)	31.8±6.1
PT(s)	14.3±2.4
Portal vein diameter (mm)	14±2
Portal vein flow velocity (cm/sec)	16±4.6
Spleen diameter (mm)	16±2.2
Liver stiffness measurement (Kpa)	31±4
Child–Pugh class	
A (scores 5–6)	95(45.5%)
B (scores 7–9)	82(39.2%)
C (scores 10–15)	32(15.3%)
Esophageal varices	
grade 0	54(25.8%)
grade 1	49(23.4%)
grade 2	63(30.1%)
grade 3	43(20.6%)
Gastroesophageal varices	104(49.8%)

Predictors of high-risk esophageal varices:

Variables associated with the presence of high risk esophageal varices were first assessed by univariate analysis and Subsequent multivariate analysis showed that independent predictors of high risk EV were: low serum albumin (OR, 3.4; 95% CI, 2.14-3.87; P = 0.001), CTP class B & C (OR, 2.4; 95% CI, 1.87–3.76; P = 0.001), low

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platelet count (OR, 4.2; 95% CI, 3.3–7.4; P = 0.002), larger spleen diameter(OR, 2.9; 95% CI, 2.4-8.4; P = 0.002)and low portal vein flow velocity (OR, 4.1; 95% CI, 2.9-9.4; P = 0.001) [Table 2].

Table 2: Multivariate analysis for high risk esophageal varices

Parameters	P value	Odds ratio	Confidence interval	
			Lower	Upper
Serum albumin (< 3.1 g/dl)	0.001	3.421	2.148	3.877
CTP (B & C)	0.003	2.465	1.878	3.762
Platelet count (< 1,00,000/µl)	0.000	4.294	3.313	7.424
Spleen bipolar diameter (>160 mm)	0.001	2.977	2.439	8.424
Portal flow velocity (< 15 cm/sec)	0.000	4.134	2.967	9.413

Predictors of fundal varices:

Variables associated with the presence of fundal varices were first assessed by univariate analysis and Subsequent multivariate analysis [Table 3] showed that independent predictors of fundal varices were: low serum albumin (OR, 2.8; 95% CI, 1.7-6.2; P = 0.001), CTP class B & C (OR, 2.2; 95% CI, 1.4–4.6; P = 0.004), low platelet count (OR, 3.1; 95% CI, 1.5–4.9; P = 0.002) [Table 3].

Table 3: Multivariate analysis for gastric fundal varices

Parameters	P value	Odds ratio	Confidence interval	
			Lower	Upper
Serum albumin (< 3.1 g/dl)	0.003	2.844	1.741	6.214
CTP (B & C)	0.004	2.224	1.439	4.621
Platelet count (< 100,000/µl)	0.000	3.128	1.568	4.994

DISCUSSION

Majority of patients with cirrhosis will develop varices during their lifetime. Once the diagnosis of cirrhosis has been made, there is an incidence of new varices of 5% per year and these progress from small to large varices at a rate of 10 to 15% per year.[1] Growth seems to be influenced by the progression of liver failure.

To date, the upper gastrointestinal endoscopy remains the golden diagnostic methods for detection of esophageal varices(EV).[2] However, routine endoscopy screening may not be cost-effective, as less than 50% of all patients with cirrhosis have EV.[3] Furthermore, there is a low prevalence of varices which requires primary prophylaxis.[3] Also, the upper endoscopy is an invasive and uncomfortable procedure which may not be acceptable for the patients. Hence, predicting the presence of EV through non-endoscopic and non-invasive markers is important in order to identify the patients who benefit from routine endoscopy screening and may reduce considerably the number of avoidable endoscopies.[4] At least one-third of cirrhotics will bleed from their varices and despite significant improvements in treatment and diagnosis, the mortality rate still remains high (30%). The prevention of the first variceal bleed is therefore an important therapeutic aim, as it offers the chance to reduce the mortality and morbidity associated with variceal hemorrhage. To institute effective primary prophylaxis we need to be able to predict and target those patients most at risk of variceal hemorrhage and avoid administering therapy with potential side effects to those with a low risk of bleeding. Prospective studies have suggested criteria for predicting the risk of bleeding using clinical data, laboratory results and endoscopic findings

Several studies in the past have shown independent parameters like splenomegaly,[5,6] ascites,[5] spider naevi,[7] child's grade,[7] platelet count,[5,8] prothrombin time/activity,[8] portal vein diameter,[10] platelet count/ spleen diameter ratio,[9] serum albumin,[11] and serum bilirubin,[11] as significant predictors for the presence of esophageal varices.

Latest Baveno consensus VII suggests endoscopy for variceal screening if LSM by TE is ≥20 kPa or platelet count is ≤ 1,50,000.[12]

In our study, variables associated with the presence of high-risk esophageal varices were low serum albumin, CTP class B & C, low platelet count, larger spleen diameter and low portal vein flow velocity. An algorithm for screening endoscopy in newly diagnosed cirrhotics, to rule out large esophageal varices based on the present study is given in [Figure 1].

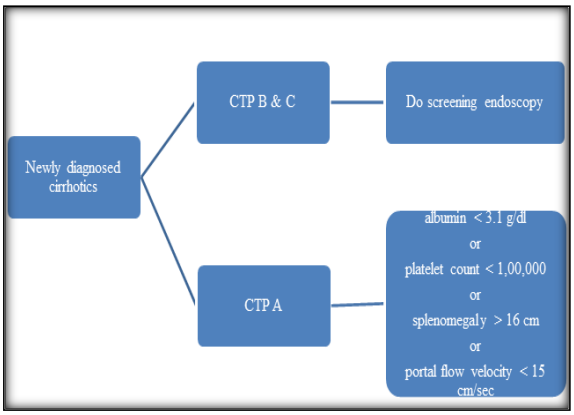

Figure 1: Algorithm for screening endoscopy (for ruling out large esophageal varices) in newly diagnosed cirrhotics based on the present study

Gastric fundal varices:

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Child–Pugh score has been the only clinical variable shown to correlate with gastric variceal bleeding.[13] Interestingly, the mean portal pressure in patients with gastric varices is lower than those with esophageal varices. This could be due to the presence of gastro-renal shunts. Two studies have now shown that a significant number of patients with gastric varices bleed with a portal pressure gradient < 12 mmHg.[13,14] In our study, apart from CTP score, other variables shown to correlate with gastric fundal varices were low serum albumin and low platelet count. An algorithm for screening endoscopy in newly diagnosed cirrhotics, to rule out gastric fundal varices based on the present study is given in [Figure 2].

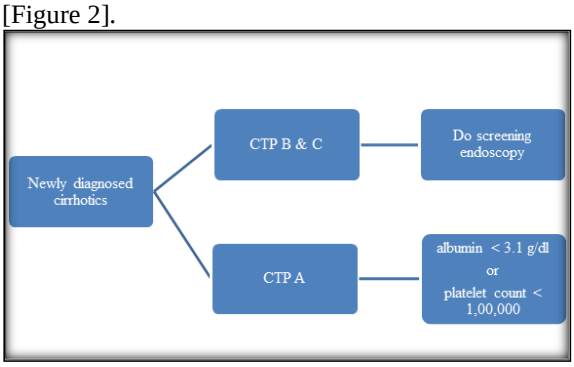

Figure 2: Algorithm for screening endoscopy (for ruling out fundal varices) in newly diagnosed cirrhotics based on the present study

CONCLUSION

The predictors of high risk esophageal varices in liver cirrhosis were low serum albumin, CTP class B & C, low platelet count, larger spleen diameter and low portal vein flow velocity. The predictors of gastric fundal varices in liver cirrhosis were low serum albumin, CTP class B & C, low platelet count. Based on these parameters, screening endoscopy can be performed in those patients with high risk and can avoid unnecessary endoscopy in patients with low risk for varices.

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