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The effectiveness of the MAP(ASH) score in predicting clinical outcomes in patients with acute variceal bleeding

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Abstract

Acute variceal bleeding is one of the most fatal complications of cirrhosis. Accurate risk stratification is crucial to guide management and predict prognosis. Most existing scoring systems have limitations due to subjective variables and difficulties in practical application. This study aimed to evaluate the prognostic performance of the MAP(ASH) score, a novel and bedside applicable system previously validated in nonvariceal upper gastrointestinal bleeding, in patients with acute variceal bleeding. Between January 2019 and December 2024, 681 patients admitted with suspected upper gastrointestinal bleeding were retrospectively screened. Active variceal bleeding was confirmed in 162 patients, of whom 66 with complete data were included. The MAP(ASH) score was calculated by assigning 2 points for hemoglobin <10 g/dL, systolic blood pressure <90 mmHg, and albumin <2.5 g/dL, and 1 point each for Glasgow Coma Scale <15, ASA score ≥2, and pulse >100/min (range 0–9). Demographics, endoscopic findings, variceal characteristics, MELD-Na, CTP, and MAP(ASH) scores were recorded. Outcomes included in hospital and 6-week mortality and rebleeding. Of the patients, 60% were male with a mean age of 63 years. The most common etiology of cirrhosis was steatotic liver disease (43.9%), followed by hepatitis B (27.3%). Endoscopic band ligation was performed in 93%. Patients who died or rebled during hospitalization or within 6 weeks had significantly higher MAP(ASH), CTP, and MELD-Na scores. A MAP(ASH) score ≥3.5 predicted in-hospital and 6-week mortality as well as rebleeding with sensitivity and specificity exceeding 70%. MAP(ASH) is a simple and practical scoring system that does not rely on subjective parameters and can be easily applied at the bedside. Our findings suggest that it performs comparably to established prognostic models in cirrhosis. Validation in larger cohorts may further support its use in routine clinical practice.

Keywords: MAP(ASH), acute variceal bleeding, scores, MELD, cirrhosis

Introduction

Acute variceal bleeding (AVB) occurs when the increased portal pressure exceeds the elastic limit of the variceal wall. Since portal hypertension is the main pathophysiological mechanism underlying AVB, treatment strategies should primarily aim to reduce portal pressure rather than correcting hemostatic abnormalities [1]. The main goals in AVB management are to achieve hemostasis, prevent early rebleeding (within the first 5 days), and reduce 6 week mortality [2,3]. A hepatic venous pressure gradient (HVPG) ≥20 mmHg is a strong predictor of both early rebleeding and 6 week mortality; however, it is rarely measured in daily practice. For this reason, clinical prognosis is often assessed using scoring systems that evaluate the severity of cirrhosis, such as the Child–Turcotte–Pugh (CTP) score and the Model for End-Stage Liver Disease (MELD) [4]. Nevertheless, the subjectivity of ascites and encephalopathy assessment in the CTP score, and the variability of creatinine levels during bleeding episodes in the MELD score, may limit their reliability in AVB patients [5,6]. Furthermore, although CTP may be elevated in specific etiologies such as alcohol related cirrhosis, it may not predict mortality with the same accuracy [7]. Similarly, the Glasgow-Blatchford and Rockall scores perform poorly in predicting outcomes in variceal bleeding [8].

The MAP(ASH) score is a recently developed bedside scoring system based on mental status, heart rate, systolic blood pressure, albumin, hemoglobin, and the American Society of Anesthesiologists (ASA) score [9]. In this study, we hypothesized that, due to the limitations of conventional scoring systems in

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AVB and the drawbacks of cirrhosis specific scores, there is a need for a practical and reliable tool to predict prognosis in this patient group. Accordingly, we aimed to investigate the utility of the MAP(ASH) score previously shown to be effective in upper gastrointestinal bleeding in predicting clinical outcomes of patients with acute variceal bleeding.

Material and Methods

Study Population

This retrospective cross sectional study screened 681 patients who presented to the emergency department of our hospital between January 2019 and December 2024 with suspected gastrointestinal bleeding and underwent esophagogastroduodenoscopy (EGD). Patients with no bleeding or with nonvariceal upper GI bleeding were excluded. A total of 162 patients had endoscopically confirmed active variceal bleeding or a variceal nipple sign. Patients with malignancies (including hepatocellular carcinoma), noncirrhotic portal hypertension, or incomplete clinical data were excluded, leaving 66 patients for final analysis.

All patients received standard initial management in the emergency department, including intravenous fluid resuscitation, blood transfusion to maintain hemoglobin above 8 g/dL, antibiotic prophylaxis (ceftriaxone 1 g IV), and terlipressin therapy. Emergency endoscopy was performed in all patients within 12 hours. Patients with actively bleeding varices or nipple sign accompanied by hematemesis, melena, or hematochezia, and a drop in hemoglobin were classified as having AVB. Cirrhosis was confirmed in all patients by abdominal ultrasonography performed within the last 6 months. Patients were hospitalized for at least 5 days and followed for a minimum of 3 months. During followup, data on rebleeding, rehospitalization, or death were recorded.

Clinical and Laboratory Assessment

Demographic characteristics, endoscopic findings, cirrhosis etiology, baseline biochemical parameters, endoscopic interventions, and length of hospital stay were collected. CTP, MELD, and MAP(ASH) scores were calculated using admission data.

The CTP score was determined based on bilirubin, albumin, international normalized ratio (INR), and the presence and severity of ascites and encephalopathy, as previously described [3]. The MELD score was calculated using the formula:

$0.957 \times \ln(\text{creatinine, mg/dL}) + 0.378 \times \ln(\text{bilirubin, mg/dL}) + 1.120 \times \ln(\text{INR}) + 0.643$ [4].

The MAP(ASH) score was calculated by assigning 2 points each for hemoglobin <10 g/dL, systolic blood pressure <90 mmHg, and albumin <2.5 g/dL, and 1 point each for GCS <15, ASA score ≥2, and pulse >100 bpm, yielding a score range of 0–9 [9].

Rebleeding was defined as new onset hematemesis, melena, or hematochezia, with endoscopic evidence of recurrent bleeding. In hospital and post discharge rebleeding or mortality within 6 weeks were recorded. Patients were grouped according to the presence or absence of in hospital rebleeding, 6 week rebleeding, or mortality, and their CTP, MELD, and MAP(ASH) scores were compared. The predictive accuracy of each score for these outcomes was assessed.

Ethical Approval

This study was approved by the Ethics Committee of Samsun University Non-Interventional Clinical Research on 14 May 2025 (Approval No: 2025/10/9).

Data Analysis and Statistics

For descriptive statistics, mean, standard deviation, median, and interquartile ranges (25th–75th percentile) were used for numerical variables, and frequencies and percentages were reported for categorical variables. Differences between two groups with parametric distribution were assessed using the independent samples t-test, while the Mann–Whitney U test was applied for nonparametric variables. Intergroup comparisons of categorical data were performed using Pearson's chi-square test. The predictive performance of scoring systems was assessed using the area under the receiver operating characteristic curve (AUROC) to determine sensitivity, specificity, and optimal cutoff values. Univariate regression analyses were conducted to examine the associations between specified variables and the outcome of interest. A p-value <0.05 was considered statistically significant.

Result

A total of 66 patients were included in the final analysis. The mean age was 63.9 years, and 60% were male. The most common etiology of cirrhosis was MASLD, followed by HBV and alcohol (Table 1). Varices were most frequently located in the esophagus (89.4%). Baseline biochemical data are shown in Table 1. The mean length of hospital stay was 9.8 days, and 94% of patients underwent endoscopic band ligation (Table 1).

In hospital mortality was 18%, 6 week mortality was 19.6%, in hospital rebleeding occurred in 9%, and 6 week rebleeding in 12% of cases. Both in hospital and 6 week rebleeding, as well as mortality, were significantly associated with higher CTP, MELD-Na, and MAP(ASH) scores (Table 2). ROC analysis demonstrated that the MAP(ASH) score was superior to both CTP and MELD-Na in predicting in hospital rebleeding (AUC 0.8, p=0.005; Table 3, Figure 1). Similarly, MAP(ASH) outperformed CTP and MELD-Na in predicting 6 week rebleeding (AUC 0.8, p=0.005; Table 3, Figure 2).

For in hospital and 6 week mortality, the MAP(ASH) score also showed significant predictive ability with high sensitivity (AUC 0.77, p=0.01 and AUC 0.74, p=0.008, respectively; Table 3, Figure 3 and 4). Also for MAP(ASH) score, univariate regression analysis for MAP(ASH) score and outcomes was shown in Table 4.

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Table 1. Basic characteristics of the patients

Variable	Number/Mean (%)	Median	SD (±)
Age	63.9	65	11.6
Male:Female	40 (60.6):26(39.4)	-	-
Etiology			
MASLD	29 (43.9)	-	-
HBV	18 (27.3)	-	-
Alcohol	12(18.2)	-	-
PBC-AIH	2 (3)	-	-
Other	4 (6.1)	-	-
Location of Varices			
Esophagus	59 (89.4)	-	-
GOV-1	5 (7.6)	-	-
GOV-2	2 (3)	-	-
Grdae of Varices			
F3	53 (80.3)	-	-
F2	11 (16.7)	-	-
F1	2 (3)	-	-
Hemoglobin g/dL	8.1	7.7	2.1
Creatinine mg/dL	1.1	0.9	1
Platelet*10^3	131	110	71.7
INR	1.36	1.3	0.3
Albumin g/dL	2.87	2.9	0.59
Total Bilirubin mg/dL	2.1	1.2	3.36
Duration of admission (day)	9.8	7	10.7
Endoscopic procedure			
Band ligation	62 (94)	-	-
Histoacryl injection alone	2 (3)	-	-
Combined treatment	2 (3)	-	-
CTP	7	7	1.4
MELD-Na	14	11.5	6.2
MAP(ASH)	3.8	3	1.9

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Table 2. Comparison of the outcomes of the patients with risk scores

	In hospital rebleeding		
Parameters	**Yes (6) -9 %**	**No (60)- 91%**	**p**
CTP	8.5±2.4	6.8±1.2	0.02
MELD-Na	19±5.3	13.5±6.1	0.05
MAP(ASH)	6.1±1.8	3.6±1..8	0.01
	In hospital mortality		
	Yes (12) - 18%	**No (54)- 82%**	
CTP	8.5±1.7	6.7±1.1	0.02
MELD-Na	20±7.8	12.7±5	0.009
MAP(ASH)	5.5±2.2	3.4±1.6	0.03
	Rebleeding in 6 weeks		
	Yes (8) - 12%	**No (58)- 92%**	
CTP	8.2±2.1	6.8±1.3	0.1
MELD-Na	18.7±6.2	13.4±6	0.04
MAP(ASH)	5.7±1.7	3.5±1.8	0.09
	6 weeks mortality		
	Yes (13)- 19%	**No (53)- 81%**	
CTP	8.4±1.7	6.6±1.1	0.01
MELD-Na	20.1±7.5	12.5±4.9	0.004
MAP(ASH)	5.7±2.2	3.3±1.5	0.002

Table 3. ROC analysis of the risk scores according to outcomes

Parameters	**AUC**	**Cutoff**	**p**	**Sensitivity**	**Specifity**
6 weeks mortality					
MELD-Na	0.79	15.5	0.002	84	81
CTP	0.80	7.5	0.001	61	79
MAP(ASH)	0.77	3.5	0.001	69	60
In hospital mortality					
MELD-Na	0.77	15.5	0.003	83	79
CTP	0.79	7.5	0.001	58	77
MAP(ASH)	0.74	3.5	0.008	66	59
In hospital rebleeding					
MELD-Na	0.78	15.5	0.01	75	74
CTP	0.72	7.5	0.04	62	75
MAP(ASH)	0.82	3.5	0.005	87	60
Rebleeding in 6 weeks					
MELD-Na	0.76	15.5	0.01	75	74
CTP	0.72	7.5	0.04	62	75
MAP(ASH)	0.8	4.5	0.005	75	77

Table 4. Regression analysis of MAP(ASH) for in hospital mortality and rebleeding, 6 weeks mortality and rebleeding

Parameters	Univariate OR [95% CI]	p
In hospital mortality	1.76 [1.23-2.53]	0.001
In hospital rebleeding	1.94 [1.19-3.16]	0.008
Rebleeding in 6 weeks	1.74 [1.16-2.61]	0.007
Mortality in 6 weeks	1.96 [1.34 -2.87]	0.000

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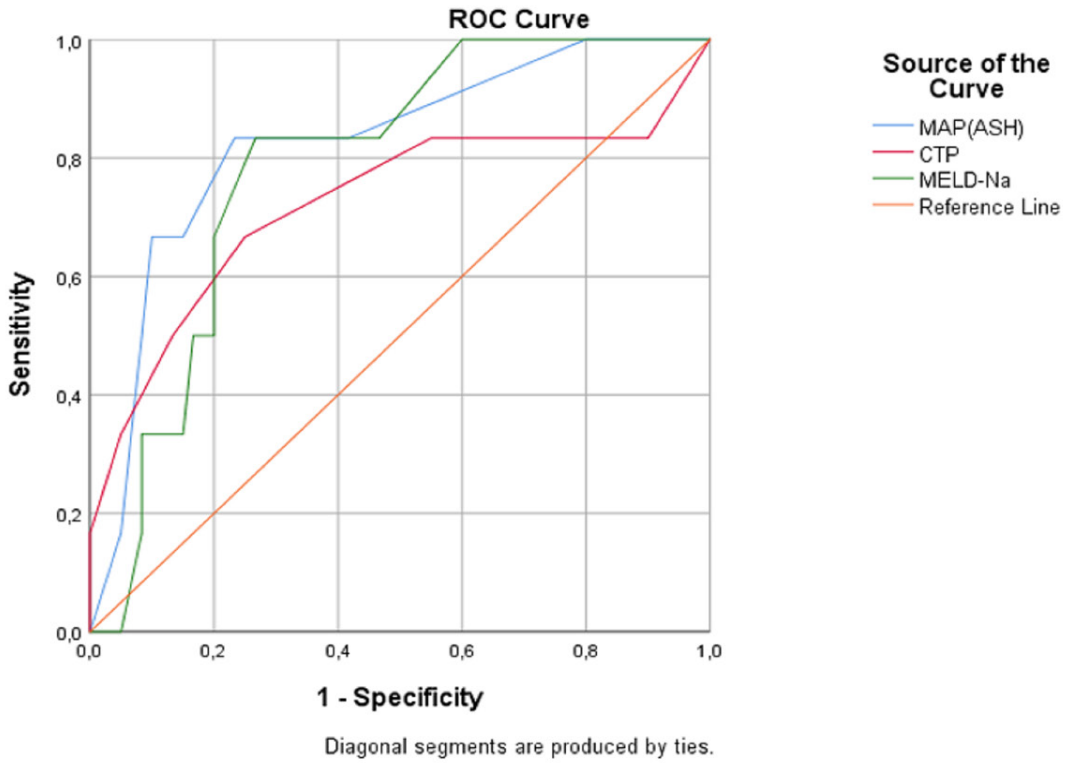

Figure 1. The AUC's of the scoresfor in hospital rebleeding

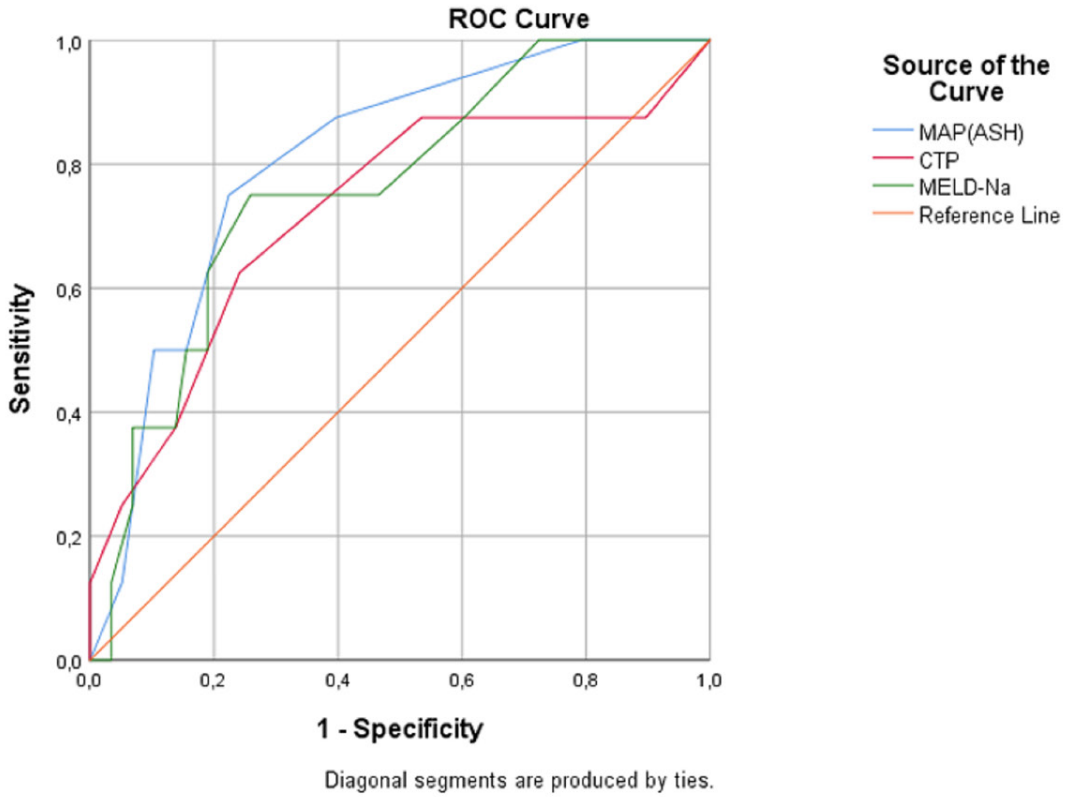

Figure 2. The AUC's of the scores for 6 weeks rebleeding

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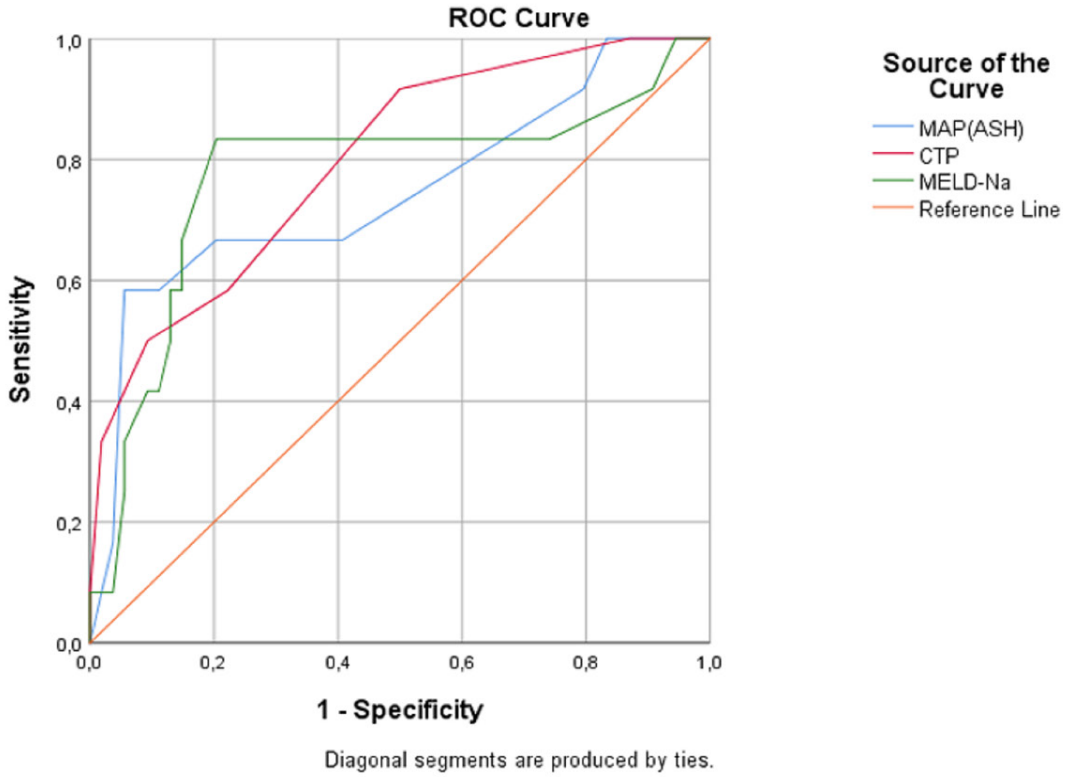

Figure 3. The AUC's of the scores for in hospital mortality.

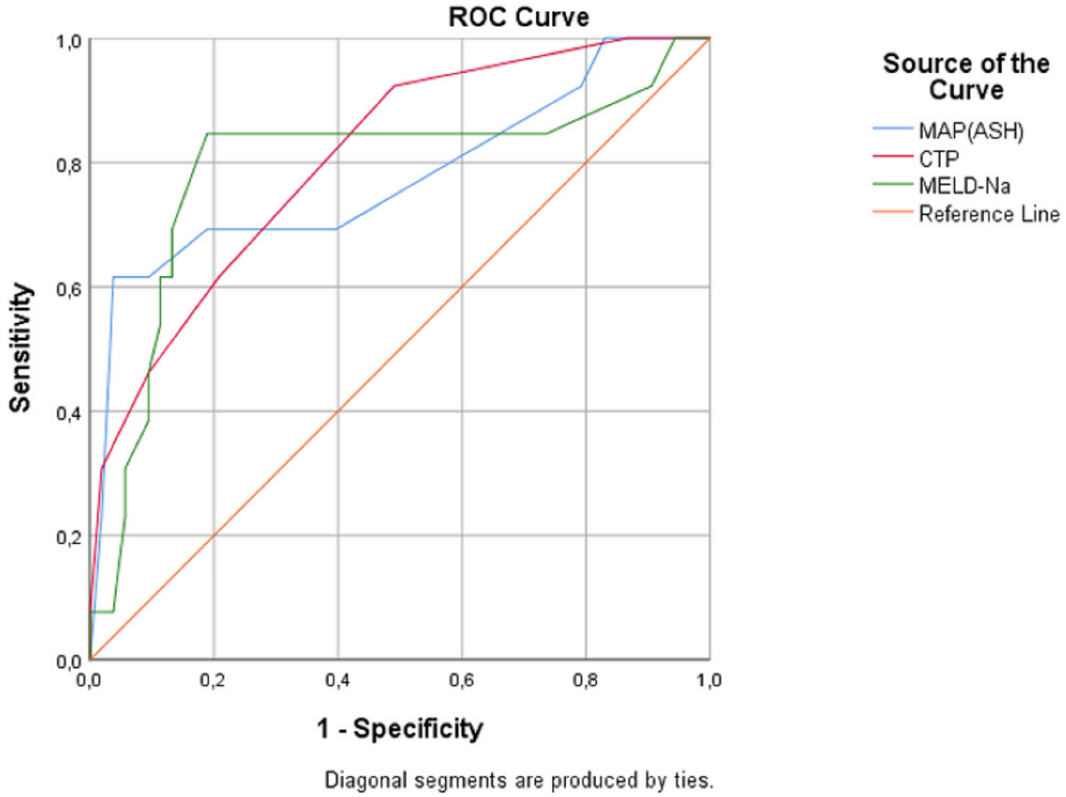

Figure 4. The AUC's of the scores for 6 weeks mortality

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Discussion

In this study, we investigated the predictive value of the MAP(ASH) score for early mortality and rebleeding in patients with acute variceal bleeding. The MAP(ASH) score is a simple, bedside tool that was found to be effective in estimating short term prognosis in AVB, comparable to CTP and MELD-Na scores. Importantly, it demonstrated superior predictive accuracy for in hospital and 6 week rebleeding compared with both CTP and MELD-Na.

In our cohort, MASLD was the most common etiology of cirrhosis. The increasing prevalence of steatotic liver disease worldwide, including in Türkiye, suggests that cirrhosis and its complications related to this etiology will become even more frequent in the future [10]. Consistent with prior studies, esophageal varices were the most common type and endoscopic band ligation was the most frequently applied treatment. The average hospital stay in our cohort was longer than that reported in the literature [11]. In an Egyptian study, the 6 week mortality was 9% and the 6 month mortality was 31% [12]. Although our 6 week mortality rate was somewhat higher, it remains broadly comparable with published data [11,12].

The predictive performance of MELD and CTP scores for rebleeding in upper GI bleeding has been reported as similar [13,14]. Unlike the CTP score, MAP(ASH) does not rely on subjective parameters such as ascites or encephalopathy, rendering it more objective and potentially advantageous. By contrast, serum creatinine, included in the MELD-Na score, can be transiently altered during acute GI bleeding episodes. Moreover, Trotter et al. [15] reported significant variability in INR measurement across laboratories in the USA, while Lisman et al. [16] confirmed similar interlaboratory differences across seven European centers.

Due to these limitations, alternative scores have been explored. The PALBI score, derived from the ALBI score (originally developed for prognostication in hepatocellular carcinoma), has been investigated in AVB patients. Elshaarawy et al., in a study including 1,517 patients with AVB, demonstrated PALBI as a simple, inexpensive, and effective tool for predicting rebleeding and mortality [17]. Similarly, MAP(ASH), as discussed, is easy to calculate, bedside applicable, and free of subjective variables. A large multicenter study including 367 patients (19% with variceal bleeding) found MAP(ASH) comparable to AIMS65 and Glasgow-Blatchford scores in predicting 30 day mortality [9]. However, subgroup analysis specifically for variceal bleeding was not performed. A more recent study on upper GI bleeding reported that MAP(ASH) was comparable to AIMS, ABC, and Glasgow Blatchford scores for predicting in hospital mortality, and superior for predicting rebleeding. Yet again, the subgroup of variceal bleeding patients (n=99) was not separately analyzed.

Conclusion

Our study is the first to specifically evaluate MAP(ASH) in cirrhotic patients with AVB. We found that it was at least as effective as CTP and MELD-Na in prognostic prediction, and superior in estimating in hospital rebleeding and mortality.

The retrospective design and relatively small sample size are important limitations. However, the fact that this is the first study to specifically assess MAP(ASH) in AVB patients represents a significant strength.

Unlike non variceal upper GI bleeding scores, MAP(ASH) appears to be a promising tool for predicting in hospital rebleeding and mortality in patients with variceal bleeding. Larger prospective validation studies are warranted, and wider adoption in clinical practice can be anticipated.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
The study received ethical approval from the Ethics Committee of Samsun University Non-Interventional Clinical Research on 14 May 2025 (Approval No: 2025/10/9).

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