RESEARCH ARTICLE

The Use of Albumin-to-bilirubin Score in Predicting Variceal Bleed: A Pilot Study from Pakistan

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Abstract

Variceal hemorrhage is a serious consequence of patients having chronic liver disease (CLD). Various scores exist that predict the outcome for non-variceal bleed. However, only a few scores evaluate patients with variceal bleed. We, in our study, evaluated 48 cirrhotics who presented with variceal gastrointestinal (GI) bleed over a period of 3 months. Majority of these were males and the most common etiology was hepatitis C infection. The main presenting complaints were hematemesis seen in 39.6% followed by hematemesis and melena in 31.25%. Most bleeding episodes were secured via banding in 62.5% followed by injection of histoacryl in 12.5%. Finally, Child–Turcotte–Pugh (CTP), model for end-stage liver disease (MELD), albumin-to-bilirubin (ALBI), and the ABC score were applied and none correlated with the presence of esophageal varices. However, the ALBI score did correlate with the presence of tachycardia in our study, a pertinent sign of upper GI bleed.

Keywords: Albumin-to-bilirubin score, Cirrhotic, Variceal Gastrointestinal bleed.

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Introduction

Variceal bleed is a serious complication of CLD that carries a high mortality, accounting for 1/3rd of all deaths in cirrhotic patients.[1]

Various scoring systems exist that predict mortality in noncirrhotic like the AIMS65, (albumin less than 3.0 gm/dL INR more than 1.5 altered mental status systolic BP less than 90 mm Hg age more than 65 years) Glasglow Batchford score (GBS), the Rockall score, and ABC score. However, at present, no score exists that predicts mortality among those patients having varices.[2]

Although noninvasive markers exist, that help distinguishing cirrhotic from noncirrhotic, but they do not differentiate between the cause of bleed in these patients.[3]

The ALBI score has been used previously to assess the in-hospital mortality of cirrhotic patients, and a retrospective study showed that the prognostic capabilities of the ALBI score were comparable to the CTP and the MELD score.[4]

Materials and Methods

This study was conducted at the Department of Hepatogastroenterology, Sindh Institute of Urology & Transplantation, (SIUT), over a period of 3 months. All patients who were already diagnosed with CLD, regardless of their etiology, had developed variceal bleed, and who had been admitted via emergency, were included. Vitals, including blood pressure (BP), pulse, and temperature, were calculated on admission, following which detailed clinical history and physical examination were performed.

Later on, baseline lab parameters like complete blood count (CBC), urea, creatinine and electrolytes (UCE), liver function tests (LFTs), prothrombin time-INR (PT-INR), and albumin were calculated. The CTP, MELD, and the ALBI score were then calculated.

Diagnosis of cirrhosis was confirmed via an ultrasound (US) abdomen that showed a shrunken liver with nodularity with or without signs of portal hypertension (splenomegaly, presence of collaterals, and ascites).

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The management of acute upper GI bleed was done according to the latest AASLD guidelines, with the patient being admitted and managed in the ICU and started on vasopressors along with IV antibiotics.

The ALBI score was calculated via the following formula: $-0.085 \times$ (albumin gm/L) $+ 0.66 \times$ log (bilirubin µmoL/L) (Table 1).

Albumin-to-bilirubin score grades:

Albumin-to-bilirubin score ≤2.60: grade I (lowest mortality risk)

Albumin-to-bilirubin score –2.60< and ≤1.39: grade II (intermediate mortality risk)

Albumin-to-bilirubin score >–1.39 grade III (highest mortality risk)

Later, the CTP, MELD, and the ABC score were compared with the ALBI score.

The ABC score is calculated by using the formula:

Age: 1 point for age 60–74 years, 2 points for age ≥75 years.

Blood tests: 1 point if urea >10 mmoL/L, 2 points if albumin <30 gm/L, 1 point for a creatinine level of 100–150 µmoL/L, and 2 points for level of >150 µmoL/L.

Table 1: Division of patients according to the ALBI score

ALBI score	*Value*
ALBI grade I	7
ALBI grade II	10
ALBI grade III	21

Table 2: Demographic characteristics of our patients ($n = 48$)

Variable (n = 48)	*Value (mean and percentage)*
Age	36 ± 18.1
Gender	Males 35/40 (70%) Females 13/48 (26%)
Comorbids	15/48 (31.2%) *DM 6/48 (12.5%) *IHD 4/48 (8.3%)
Etiologies	*Hepatitis C 18/48 (37.5%) *Hepatitis B and D 6/48 (12.5%)
CLD features on imaging	46/48 (95.8%)
Mean MELD score	17.5 ± 7.5
Mean CTP score	B8
Mean ALBI	–1.2 ± 0.86
Mean ABC score	6
Presenting complaints:	*Hematemesis in 19/48 (39.6%) *Hematemesis and melena 15/48 (31.25%)
Endoscopic appearance	*Isolated eso varix 30/48 (62.5%) *Isolated fundal varix in 4/48 (8.3%) *Eso and fundal in 4/48 (8.3%) *Ulcer with visible vessel 1/48 (2.0%) *Healed ulcer 1/48 (2.0%)
Bleed managed	*Banding in 30/48 (62.5%) *Injection of histoacryl 6/48 (12.5%) *Banding + Histoacryl in 4/48 (8.3%) *Banding + inj. STD in 1/48 (2.0%)

IHD, ischemic heart disease

Comorbidity: 2 points for altered mental status, 2 points for liver cirrhosis, 4 points for disseminated malignancy, 1 point for an American Society of Anesthesiologists (ASA) score of 3, and 3 points for an ASA score ≥4.

Mean and standard deviation were calculated for continuous variables, while percentages along with frequencies for categorical variables. Data were analyzed via SPSS v 22, and a *p*-value of less than 0.05 was taken as statistically significant.

Results

Out of 70 patients who presented with upper GI bleed, 48 (68.5%) patients having variceal bleed were included in this study. The predominant gender was male, seen in 35/40 (70%), while females were 13/48 (26%). The mean age noted was of 36 years. Comorbid conditions like diabetes mellitus, ischemic heart disease (IHD), asthma, tuberculosis, and chronic kidney disease were noted in 15/48 (31.2%) patients. Diabetes was the major comorbid condition evident in 6/48 (12.5%) with hypertension in 4/48 (8.3%), IHD in 3/48 (6.25%), and asthma in 2/48 (4.16%) (as shown in Table 2).

The chief presenting complaint noted was hematemesis in 19/48 (39.6%) followed by hematemesis and melena 15/48 (31.25%), melena 8/48 (16.6%) drop in hemoglobin 4/48 (8.3%), and altered level of consciousness in 1/48 (2.0%).

On endoscopy, isolated esophageal varix was noted in 30/48 (62.5%), while isolated fundal varix (GEVI) in 4/48 (8.3%). Both esophageal and fundal varix (GEVII) were appreciated in 4/48 (8.3%), and ulcers with visible vessels 1/48 (2.0%), while healed ulcers 1/48 (2.0%). Findings of esophageal varix with portal hypertension were seen in 6/48 (12.5%) patients. A venous bleb in the esophagus was evident in 1/48 (2%) while a duodenal ulcer in 1 patient (2%).

The main etiologies noted in our patient population were as follows: hepatitis C in 18/48 (37.5%), hepatitis B and D in 6/48 (12.5%), followed by hepatitis B alone in 8/48, Wilson's disease in 2/48, hepatocellular carcinoma (HCC) in 3/48 (6.25%), Budd–Chiari syndrome in 1/48 (2%), nonalcoholic fatty liver disease (NAFLD) in 6/48 (12.5%), and secondary biliary cirrhosis in 1/48 (2%).

The mean MELD score was 17 ± 7.5, the mean CTP score was B8, while the mean ALBI was –1.2 ± 0.86, and mean ABC score of 5.

The mean temperature was 99.2 °F ± 0.755, mean respiratory rate 16.5 breaths per minute ± 2.9, and mean pulse rate was of 108 beats per minute ± 14.3.

Ultrasound abdomen had features suggestive of CLD in 46/48 cases (95.8%). The bleed was secured by banding alone in 30/48 (62.5%) followed by injection of histoacryl in 6/48 (12.5%), by banding along with histoacryl in 4/48 (8.3%), and by banding and injection of sodium tetradecyl (STD) in 1/48 (2.0%).

Esophageal varices (EV) were seen more often in those aged 20 years or more, and hence endoscopic variceal band ligation (EVBL) episodes were more evident in those aged more than 20 years ($p = 0.00$).

The serum glutamate pyruvate transaminase (SGPT), serum chloride, and bicarbonate correlated with the methods used to secure bleed ($p = 0.015$), ($p = 0.05$), and ($p = 0.015$), respectively.

An ALBI score of more than –1.39 correlated with the presence of esophageal/fundal varices ($p = 0.033$), while no such correlation was found with the MELD score ($p = 0.649$) in our patient population. Furthermore, an ALBI score more than –1.39 was seen in those aged 20 or more ($p = 0.013$).

Discussion

The ALBI score is a new tool, which has been used to assess the severity of liver dysfunction in patients having HCC.[5] Being a mathematical model, it is based on routine lab parameters and does not take into account the presence or absence of ascites or encephalopathy.[6]

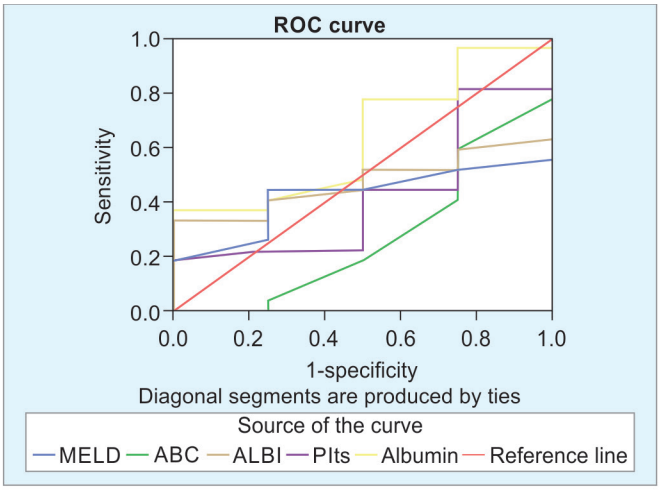
However, its role in upper GI bleed is yet to be established. Various studies have shown it to be a good predictor of upper GI bleed in cirrhotic patients and have found it comparable to the CTP and MELD score in predicting the in-hospital mortality.[6]

A study done in Portugal on 111 patients showed how the ALBI score was a better predictor of both in-hospital and 30-day mortality and found it to be the best tool for forecasting the short-term mortality among cirrhotics.[7] Similar results were also noted in a study from China and also showed better survival in ALBI grade I than in ALBI grade II.[8]

Most of the participants in our study were males, a similar finding was observed in a prior study from Pakistan on ALBI score and its prognostication in cirrhotics.[9]

Hepatitis C was the main etiology noted in our patients also similar to a prior study from our country.[9]

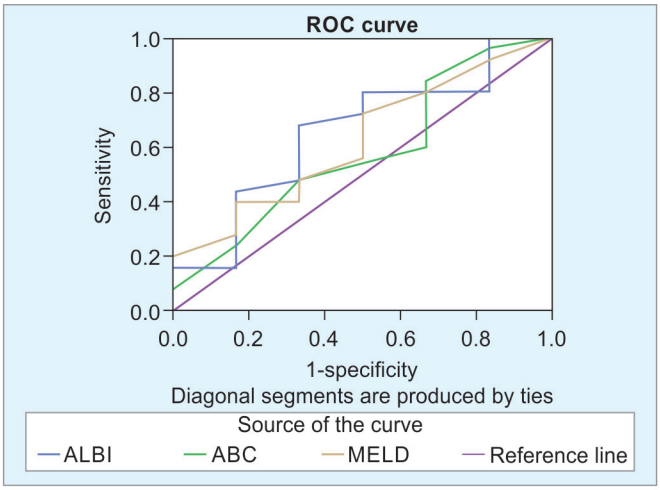
Albumin-to-bilirubin score is a simple prognostication tool that uses only two parameters, namely albumin and bilirubin to



Area under the curve

Test result variable(s)	Area	Std. error[a]	Asymptotic sig.[b]	Asymptotic 95% confidence interval	
				Lower bound	Upper bound
MELD	0.421	0.104	0.616	0.218	0.625
ABC	0.273	0.142	0.149	0.000	0.551
ALBI	0.472	0.101	0.860	0.274	0.670
Plts	0.421	0.142	0.616	0.144	0.699
Albumin	0.639	0.138	0.377	0.369	0.909

Fig. 1: Shows how different scores correlated with the presence of esophageal varices



Area under the curve

Test result variable(s)	Area	Std. error[a]	Asymptotic sig.[b]	Asymptotic 95% confidence interval	
				Lower bound	Upper bound
ALBI	0.653	0.127	0.250	0.405	0.901
ABC	0.580	0.133	0.549	0.320	0.840
MELD	0.623	0.123	0.355	0.382	0.864

Fig. 2: Correlation of the different scores with the pulse rate

predict liver dysfunction in cirrhotics, with a better predictive value in cirrhotics when compared with the CTP and the MELD scores.[10]

Majority of our patients fell in ALBI grade III (21 patients), which is similar to what was noted in an Egyptian study 11, followed by ALBI grade II in 10 patients and ALBI grade I in 7 patients.

Another study showed that at a cutoff of –1.69, the ALBI score had a 52.9% sensitivity of predicting esophageal varices with a positive predictive value of 64%.[11]

While Zou et al. in their study had a cutoff –1.492, had a 100% sensitivity of, and 69.6% specificity of predicting esophageal varices.[4] However, in our study, the ALBI score did not correlate with the presence of varices (AUC 0.47), neither did the MELD (0.421) nor the ABC (0.27). However, serum albumin correlated best with the presence of EV (AUC 0.639) as shown in Figure 1, which could be related to the poor nutrition status seen in patients with decompensated cirrhosis.

When used to predict a pulse rate of more than 100 bpm (which is a major sign of blood loss),[12] the ALBI score had the best area under the curve with a 0.653 followed by the MELD score of 0.623 and the ABC score of 0.580. At an ALBI score of –1.67, a sensitivity of 80% and a specificity of 66.7% were obtained as shown in Figure 2.

While the ABC score, which is commonly used for non-variceal bleed, has been shown to be more accurate than the Glasgow Blatchford and the AIMs 65 score in predicting 1-month mortality, however, it along with the other scores did not predict survival outcomes in our study as only 3 patients expired during this time period (6.2%).[13]

Conclusion

Although all the current available scores are clinically useful, their exact application and their predictive value is yet to be established. Our study reinforces on the fact that signs on physical examination are of utmost importance followed by laboratory parameters in predicting the severity of GI bleed.

A limitation of our study was the small sample size (collected over a period of 3 months), however, since this is an ongoing project, future work on this topic might be able to depict the usefulness of the ALBI score.

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