ORIGINAL ARTICLE

Use of the AIMS65 and pre-endoscopy Rockall scores in the prediction of mortality in patients with the upper gastrointestinal bleeding

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ABSTRACT

BACKGROUND: Upper gastrointestinal (GI) bleeding is one of the most common reasons for emergency department (ED) visits. This study aimed to evaluate the predictive power of the AIMS65 and pre-endoscopy Rockall scores in predicting in-hospital mortality in patients that presented to ED and were diagnosed with the upper GI bleeding.

METHODS: Data of patients aged 18 years and older, who visited ED of Kartal Dr. Lütfi Kırdar City Hospital during the study period and were diagnosed with upper GI bleeding, were obtained from the electronic-based hospital information system and analyzed retrospectively. Each scoring system was compared using the receiver operating characteristic (ROC) curve analysis.

RESULTS: The study was completed with 592 patients. The mean age of the patients was 63.5±19.0 years, and 68.6% were male. The total in-hospital mortality rate was 5.2%. In the ROC analysis of the AIMS65 and pre-endoscopy Rockall scores in the prediction of in-hospital mortality, the area under the curve values was calculated as 0.822 (95% confidence interval [CI]: 0.788–0.852) and 0.777 (95% CI: 0.741–0.810), respectively. When these two scoring systems were compared, neither had statistically significant superiority over the other in predicting in-hospital mortality.

CONCLUSION: The AIMS65 and pre-endoscopy Rockall scores can be used to predict in-hospital mortality in patients with GI bleeding. However, since the AIMS65 score consists of only five variables that can easily be calculated in ED, we recommend its use in clinical practice.

Keywords: AIMS-65 score; gastrointestinal bleeding; mortality; rockall score.

INTRODUCTION

Upper gastrointestinal (GI) bleeding is one of the most common reasons for emergency department (ED) visits. In the United States, more than half a million patients are admitted to hospitals each year due to GI bleeding.[1,2] Despite new endoscopic techniques and pharmacological treatments, the mortality rate due to this condition can reach 10%.[3] Therefore, many international guidelines on the management of patients with GI bleeding recommend the use of scoring systems to predict undesirable outcomes, such as rebleeding and mortality.[4–6]

The AIMS65 score was derived by Saltzman et al.[7] in 2011 by retrospectively screening the data of 29,222 patients from 187 hospitals and consists of five parameters (albumin less than 3.0 g/dL, international normalized ratio [INR] >1.5, altered mental status, systolic blood pressure 90 mm Hg or lower, and age older than 65 years). This score is used to estimate in-hospital mortality in patients with the upper GI

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bleeding. The probability of in-hospital mortality in a patient with an AIMS65 score of 0 is 0.3%, while it increases to 24.5% in a patient with a score of 5.

The pre-endoscopy Rockall score was developed in 1996 by Rockall et al.,[8] who prospectively evaluated the data of 3981 patients from 74 hospitals and identified three parameters (age, shock status, and comorbidities). The probability of mortality is 0.2% in a patient with a pre-endoscopy Rockall score of 0 and 50% in a patient with a score of 7.

The present study aimed to evaluate the predictive power of the AIMS65 and pre-endoscopy Rockall scores in predicting in-hospital mortality in patients that presented to ED and were diagnosed with the upper GI bleeding and to examine whether either method is superior to the other.

MATERIALS AND METHODS

This retrospective, observational, and single-center study was conducted at the Emergency Medicine Clinic of Kartal Dr. Lütfi Kırdar City Hospital. The institutional management approved the analysis and issued a waiver of consent (ethics committee ruling number: 2022/514/230/18, date: 27.07.2022).

The data of all patients aged 18 years and older, who visited ED between June 1, 2021, and June 1, 2022, and were diagnosed with upper GI bleeding according to the International Classification of Diseases, 10th revision) diagnostic codes, were obtained by screening the electronic medical records of the hospital. Patients with a diagnosis other than GI bleeding, cases in which the AIMS65 and pre-endoscopy Rockall scores could not be calculated, patients that had been transferred to our ED from another hospital, those that died in or were discharged from ED, and those without follow-up data were excluded from the study.

The first two researchers collected the following data by examining the electronic medical records of each patient: Age, gender, vital parameters, symptoms at admission, comorbidities, medications used, laboratory parameters, and in-hospital mortality status. In addition, each patient's AIMS65 and pre-endoscopy Rockall scores were calculated separately. After the data set was established, it was reviewed and confirmed by the remaining researchers.

In this study, we aimed to examine the relationship between the AIMS65 and pre-endoscopy Rockall scores and in-hospital mortality among patients with the upper GI bleeding. The primary outcome of the study was the in-hospital mortality rate.

Table 1. Patient characteristics

	Survivors		Non-survivors		Total		p-value
	Mean Number	SD Percentage	Mean Number	SD Percentage	Mean Number	SD Percentage	
Gender							0.037
Female	171	30.5	15	48.4	186	31.4	
Male	390	69.5	16	51.6	406	68.6	
Age, years	62.8	19.1	77.1	12.1	63.5	19.0	0.001
Systolic blood pressure, mmHg	122.9	16.9	108.7	18.6	122.2	17.4	0.001
Heart rate, bpm	97.7	14.2	104.5	16.6	98.1	14.3	0.010
Hemoglobin, g/dL	9.2	2.8	8.5	3.1	9.2	2.8	0.171
Blood urea nitrogen, mg/dL	79.8	51.5	127.3	66.2	82.3	53.3	0.001
Creatinine, mg/dL	1.16	1.03	2.15	2.34	1.21	1.15	0.001
Albumin, mg/dL	35.3	6.4	28.4	6.5	34.9	6.6	0.001
International normalized ratio	1.06	0.25	2.10	2.59	1.12	0.67	0.001
AIMS65 score	1.04	0.7	2.1	0.8	1.1	0.7	0.001
Pre-endoscopy Rockall score	2.7	1.7	4.3	1.1	2.8	1.7	0.001
Steroids	17	3.0	3	9.7	20	3.4	0.046
Anticoagulants	81	14.4	7	22.6	88	14.9	0.215
Antiplatelet agents	151	26.9	13	41.9	164	27.7	0.069
Non-steroidal anti-inflammatory agents	78	13.9	11	35.5	89	15.0	0.001
Length of hospital stay (days)	5.8	2.5	6.5	2.9	5.9	2.5	0.156

SD: Standard deviation.

Table 2. Optimum cut-off values of the AIMS65 and pre-endoscopy Rockall scores in predicting in-hospital mortality

	AUC	Cut-off	Sensitivity	Specificity	LR+	LR-	PPV	NPV	Youden index	p-value
AIMS65	0.822 (0.788–0.852)	>1	80.7	77.2	3.5	0.3	16.3	98.6	0.578	0.316
Pre-endoscopy Rockall score	0.777 (0.741–0.810)	>3	77.4	64.7	2.2	0.4	10.8	98.1	0.421	

AUC: Area under the curve; LR: Likelihood ratio; PPV: Positive predictive value; NPV: Negative predictive value.

Statistical Analysis

To perform statistical analysis, SPSS v. 25.0 software package (SPSS Inc., Chicago, IL, USA) and MedCalc ver. 12.5 (MedCalc Software Ltd, Ostend, Belgium) was used. Descriptive statistics were presented as mean and standard deviation values and percentage distribution. The conformance of the data to the normal distribution was cross-checked with the Kolmogorov-Smirnov test. The receiver operating characteristic (ROC) curve analysis was used to determine the cutoff values of the AIMS65 and Rockall scores in predicting mortality. The optimal cutoff value, 95% confidence interval (CI), area under the curve (AUC), positive predictive value, and negative predictive value were calculated. The significance level was accepted as $p<0.05$.

RESULTS

Of the 627 patients diagnosed with the upper GI bleeding according to the ICD-10 codes, 592 were included in the study. Excluded were 35 patients, including 23 whose scores could not be calculated due to missing data, four that died in ED, three that had been transferred from another hospital, and five without follow-up data were excluded from the study. The mean age of the 592 patients was 63.5±19.0 years, of which 68.6% were male. Table 1 presents the main characteristic findings of the patients. To compare their various characteristics, the patients were categorized into two groups: Survivors and non-survivors.

The total in-hospital mortality rate was 5.2% (31 patients), and the mean age of these patients was 77.1±12.1 years. The mean AIMS65 and pre-endoscopy Rockall scores, albumin-INR-blood urea nitrogen-creatinine levels, and heart rate were found to be higher in the non-survivors compared to the survivors ($p<0.001$).

According to the ROC analysis of the AIMS65 score in the prediction of in-hospital mortality, the AUC value was 0.822 (95% CI: 0.788–0.852), the Youden index was 0.578, and the p-value was 0.001 (Table 2 and Fig. 1). The ROC analysis of the pre-endoscopy Rockall score in the prediction of in-hospital mortality revealed an AUC value of 0.777 (95% CI: 0.741–0.810), Youden index of 0.421, and p value of 0.001 (Table 2 and Fig. 1). As a result of the statistical analysis, both scores were found to be statistically significant in predicting in-hospital mortality ($p<0.001$). When the two scores were compared, neither had statistically significant superiority over the other in the prediction of in-hospital mortality (Table 2).

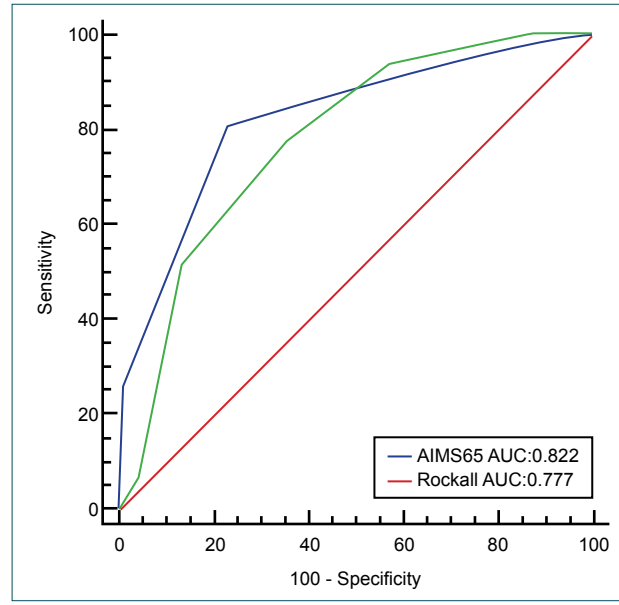

Figure 1. Receiver operating characteristic analysis of the AIMS65 and pre-endoscopy Rockall scores in predicting in-hospital mortality.

DISCUSSION

In this study, the predictive power of the AIMS65 and pre-endoscopy Rockall scores in predicting in-hospital mortality in patients that visited ED due to the upper GI bleeding was examined, and it was concluded that both scores were successful, and neither was superior to the other.

Various scoring systems are used to classify high-risk patients and differentiate low-risk patients in the presence of the upper GI bleeding. Scoring systems can assist ED physicians in predicting mortality and rebleeding rates in these patients and guide treatment decisions. However, not every scoring system can be used in every hospital. For example, the Rockall score, which includes endoscopic findings, will not be useful in a hospital that does not have access to endoscopy. Therefore, in the present study, we examined the AIMS65

and pre-endoscopy Rockall scores, which can be easily calculated in almost all EDs.

In the literature, there are many studies examining clinical risk scores in patients with GI bleeding.[9–11] Hyett et al.[12] investigated the AIMS65 score and the Glasgow-Blatchford score (GBS) in patients with the upper GI bleeding and concluded that the former was superior in predicting in-hospital mortality, while the latter was more successful in predicting blood transfusion requirement. In a study from Korea, the AIMS65 score had a higher AUC value compared to GBS, Rockall, and pre-endoscopy Rockall in the estimation of in-hospital mortality (0.84 vs. 0.72, 0.75, and 0.74, respectively), but no statistically significant difference was between these scoring systems.[13] In another study, Robertson et al.[14] evaluated 424 patients with GI bleeding and found the AIMS65 and full Rockall scores to be superior to GBS and the pre-endoscopy Rockall score in predicting in-hospital mortality. In a multicenter and prospective study, the risk scores for 90-day mortality and rebleeding outcomes of 1024 patients with the upper GI bleeding were examined, and the ABC and pre-endoscopy Rockall scores were determined to be superior to the AIMS65 score and GBS in predicting 90-day mortality.[15] In our study, although the AIMS65 score had a higher AUC value than the pre-endoscopy Rockall score (0.82 vs. 0.77), both were similarly successful in predicting in-hospital mortality, with no statistically significant superiority.

In our cohort, the total mortality rate was 5.2%. In the literature, studies conducted with patients with GI bleeding have reported different mortality rates. Yaka et al.[16] determined the in-hospital mortality rate as 7.1%, and Stanley et al.[17] reported the 30-day mortality rate to be 7%, while Robertson et al.[14] calculated the in-hospital mortality rate as 4.2%, and Budimir et al.[18] found the 30-day mortality rate to be 5.2%. In light of these data, the results of our study are in agreement with the literature.

Limitations

There are certain limitations to our study. First concerns the single-center design and a relatively small sample; therefore, our findings should be validated in a larger multicenter cohort. In addition, due to the retrospective nature of our study, data were obtained from the electronic registry system, resulting in incomplete or outdated information. However, to minimize errors, the medical records collected were first recorded in a form by two researchers, and then double-checked by the remaining two other researchers.

Conclusion

In this study, it was concluded that both the AIMS65 and pre-endoscopy Rockall scores were successful in predicting in-hospital mortality in patients with GI bleeding. However, since the AIMS65 score consists of only five variables (albumin, INR, mental status, systolic blood pressure, and age) and can be easily calculated in EDs, we recommend the use of this score in clinical practice.

Ethics Committee Approval: This study was approved by the Kartal Dr. Lütfi Kırdar City Hospital Clinical Research Ethics Committee (Date: 27.07.2022, Decision No: 2022/514/230/18).

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Conflict of Interest: None declared.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Üst gastrointestinal kanaması olan hastalarda mortalite tahmininde AIMS65 ve endoskopi öncesi Rockall skorlarının kullanımı

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AMAÇ: Üst gastrointestinal (Gİ) kanama acil servislerde (AS) en sık görülen ziyaret nedenlerinden biridir. Bu çalışmanın amacı AS'i ziyaret edip üst Gİ kanama tanısı alan hastalarda AIMS65 ve pre-endoscopy Rockall skorunun hastane içi mortalite tahmininde tahmin güçlerini değerlendirmektir.
GEREÇ VE YÖNTEM: Çalışma süresi boyunca Kartal Dr. Lütfi Kırdar Şehir Hastanesi Acil Servis'ine başvuran 18 yaş ve üzeri üst Gİ kanamalı hastaların verileri geriye dönük olarak analiz edildi. Veriler elektronik tabanlı bir hastane bilgi sisteminden elde edildi. Her puanlama sistemi, alıcı işletim eğrisi (ROC) kullanılarak karşılaştırıldı.
BULGULAR: Çalışma 592 hasta ile tamamlandı. Bu hastaların yaş ortalaması 63.5±19.0 olup bunların %68.6'sı erkekti. Total hastane içi mortalite oranı %5.2 idi. AIMS65 skorunun hastane içi mortaliteyi kestirmedeki ROC analizi sonucunda eğri altında kalan alan (AUC) 0.822 (%95 GA 0.788–0.852), Pre-endoscopy Rockall skorunun hastane içi mortaliteyi kestirmedeki ROC analizi sonucunda AUC 0.777 (%95 GA 0.741–0.810) olarak hesaplandı. Skorlar kendi aralarında karşılaştırıldığında ise skorların hastane içi mortaliteyi kestirmede birbirlerine istatistiksel olarak anlamlı bir üstünlüğü saptanmadı.
TARTIŞMA: AIMS65 ve pre-endoscpy Rockall skorlarının Gİ kanaması olan hastalarda in-hospital mortalite tahmininde kullanılabilir. Ancak AIMS65 skorunun sadece beş değişkenden oluşması ve bu değişkenlerin AS'lerde kolayca hesaplanabilmesi nedeniyle klinik pratikte kullanımını öneriyoruz.
Anahtar sözcükler: AIMS-65 skoru; gastrointestinal kanama; mortalite; Rockall skoru.

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