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Evaluation of Rockall and Blatchford Scores and Forrest Staging in Upper Gastrointestinal Bleeding

Üst Gastrointestinal Sistem Kanamalarında Rockall ve Blatchford Skorları ile Forrest Evrelemenin Değerlendirilmesi

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ABSTRACT

Objective: The study aimed to investigate the predictive value of Rockall and Blatchford scores and endoscopic Forrest staging in the need for transfusion and intensive care in upper gastrointestinal bleeding.

Materials and Methods: This retrospective study was conducted on 294 patients with gastrointestinal bleeding who presented to the emergency department between January 1 and June 1, 2013.

Results: The mean age of 294 patients was 58.73±21.30 years. The endoscopic diagnoses of the patients included peptic ulcer (43.5%, n=128), erosive gastritis (17.3%, n=51), and erosive bulbitis (12.6%, n=37). There was no statistically significant relationship between Forrest staging and Rockall and Blatchford scores (p=0.944, p=0.757). The need for blood transfusion was significantly more frequent in patients with a Rockall score of 5 and above and those with a high Blatchford score (p=0.004, p=0.001). Patients with a Rockall score of 5 and above were significantly more common among those referred to the intensive care unit (p=0.003).

Conclusion: Pre-endoscopic Rockall and Blatchford scores and endoscopic Forrest staging can be used safely in predicting transfusion requirement, intensive care requirement, mortality risk, treatment and follow-up of patients with gastrointestinal bleeding, and thus may help to reduce health expenditures.

Keywords: Blatchford score, Forrest staging, Rockall score, upper gastrointestinal bleeding

ÖZ

Amaç: Bu çalışmada Rockall ve Blatchford skorlarının ve endoskopik Forrest evrelemesinin üst gastrointestinal sistem kanamalarında transfüzyon gereksinimi, yoğun bakım gereksinimi ön görmede etkisinin incelenmesi amaçlanmıştır.

Materyal ve Metot: Bu retrospektif çalışma 1 Ocak-1 Haziran 2013 tarihleri arasında acil servise başvuran 294 gastrointestinal kanamalı hasta üzerinde yapılmıştır.

Bulgular: 294 hastanın yaş ortalaması 58,73±21,30'dur. Hastaların endoskopik tanılarına bakıldığında olguların % 43,5'inde (n=128) peptik ülser, %17,3'ünde (n=51) eroziv gastrit ve %12,6'sında (n=37) eroziv bulbit olduğu görülmüştür. Forrest evrelemesi ile Rockall ve Blatchford skorları arasında istatistiksel olarak anlamlı bir ilişki bulunmamaktadır (p=0,944, p=0,757). Rockall skoru 5 ve üzerinde olanların, Blatchford skoru yüksek olanların kan transfüzyon ihtiyacı anlamlı şekilde yüksektir. (p=0,004, p=0,001). Yoğun bakıma sevk olan olguların Rockall skorlarının 5 ve üzerinde olma oranı (%61,5), taburcu olan olgulardan (%22,9) anlamlı şekilde yüksektir (p=0,003).

Sonuç: Endoskopi öncesi Rockall ve Blatchford skorları ile endoskopik Forrest evrelemesi gastrointestinal kanamalı hastaların transfüzyon gereksinimi, yoğun bakım gereksinimi, mortalite riskini ön görmede, hastaların tedavi ve takibinde güvenle kullanılabilir, dolayısıyla sağlık harcamalarının azaltılmasına yardımcı olabilir.

Anahtar Kelimeler: Blatchford skoru, Forrest evrelemesi, Rockall skoru, üst gastrointestinal sistem kanaması

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INTRODUCTION

Upper gastrointestinal bleeding is an important cause of mortality and morbidity. Upper gastrointestinal bleeding occurs in the proximal part of the ligament of Treitz.[1,2] Although up to 80% of the cases recover spontaneously, the mortality rate can reach as high as 10%. It requires very rapid assessment and medical intervention from the moment of presentation to the emergency department. According to a study, the leading causes of cost in gastrointestinal bleeding were hospitalization, endoscopic procedures, and blood transfusion. Over time, many risk scoring systems have been developed to predict the risk of rebleeding and mortality based on clinical parameters, comorbidities, and laboratory and endoscopy findings to reduce patient costs.[3-5] Forrest classification is one of the most widely used classifications based on endoscopic ulcer appearance.[6] The Rockall's score (RS), which includes pre-endoscopic and endoscopic components, is useful in predicting mortality.[7] Another common scoring system is the Glasgow-Blatchford scoring (GBS) system, which uses only clinical and laboratory findings to predict low-risk patients who do not require intervention.[8]

This study aimed to investigate the predictive value of pre-endoscopic Rockall and Blatchford scores and endoscopic Forrest classification on transfusion requirement, intensive care requirement, and follow-up and treatment planning in upper gastrointestinal bleeding.

MATERIALS AND METHODS

Ethics Committee Approval: The study was approved by the Ümraniye Training and Research Hospital Ethics Committee (Date: 05/07/2013, decision no: 2013-9563). The study was planned under the Helsinki Principles.

Study Design:

Subjects: The study enrolled 296 patients with upper gastrointestinal bleeding admitted to the gastroenterology clinic at Ümraniye Training and Research Hospital between January 1 and June 1, 2013.

Data Collecting: Detailed information was collected for each patient, including demographic data, vital signs, comorbidities, medication usage, physical examination findings, laboratory parameters, need for blood transfusion, intensive care requirement, surgical or endoscopic interventions, and in-hospital mortality.

Evaluation of Data: The Blatchford's score was determined for every patient using eight clinical or laboratory variables, including systolic blood pressure, heart rate, blood urea nitrogen level, hemoglobin level, presentation with melena, presentation with syncope, presence of liver disease, and heart failure. In the Blatchford scoring system, the maximum score that a patient can receive is 23 points and is accordingly defined as low/high risk (6 and above high).[8] The pre-endoscopic Rockall's score was determined for patients without endoscopic findings, considering age at presentation, heart rate, systolic blood pressure, and comorbid diseases. The Rockall's score was then determined by incorporating the endoscopic findings (endoscopic diagnosis and signs of recent bleeding) into these parameters. Pre-endoscopic Rockall score is calculated according to age, tachycardia, hypotension, and presence of comorbidities (renal failure, liver failure, malignancy). In Rockall scoring, 0-2 is defined as low risk, 3-4 as moderate risk and above 5 as high risk.[7] Endoscopically, Forrest classification includes active oozing (Forrest IA), active leaking (Forrest IB) and non-bleeding visible vessel (Forrest IIA), peptic ulcers with adhesive clots (Forrest IIB lesion), red-stained (Forrest IIC), or clear-bottomed (Forrest IIB) ulcers. Forrest III) in the form of ulcers.[6] All patients underwent endoscopy, and the Forrest classification was applied.

Statistical Analysis: The IBM SPSS Statistics 22.0 program was used for statistical analysis. In addition to descriptive statistical methods (mean, standard deviation, frequency), the Kruskal-Wallis test was used to compare quantitative variables between groups. The Mann-Whitney U test was used to determine the group that caused the difference. The Mann-Whitney U test was used to compare variables between the two groups. Chi-square and Continuity Correction (Yates) tests were used to compare qualitative data. Spearman's rho correlation analysis was used to examine the relationships between the parameters. $P<0.05$ was accepted as statistically significant in all analyses.

RESULTS

Patients were between 18-94 years of age, with a mean age of 58.73±21.30 years. Of the patients, 70% (n=206) were male and 30% (n=88) were female. The duration of hospitalization ranged between 1 day and 20 days, with a mean of 5.10±3.28 days. While 95.2% (n=280) of the patients were discharged, 4.4% (n=13) were referred to the intensive care unit, and one patient died. The endoscopic diagnoses of the patients included peptic ulcer (43.5%, n=128), erosive gastritis (17.3%, n=51), and erosive bulbitis (12.6%, n=37). The general characteristics and endoscopic diagnosis distribution of the patients are shown in Table 1.

When the Forrest classification of the patients was examined, it was seen that 85.7% of them were grade 3, 7.4% were grade 2B, 5.4% were grade 2C, 3.7% were grade 1A, and 2.7% were grade 2A. Rockall scores of the patients ranged between 0 and

Table 1. General characteristics of patients and distribution of endoscopic diagnosis.

Characteristics		**Data**
Age, Mean ± SD (Min-Max)		58.73±21.30(18-94)
Length of stay in hospital (day), Mean ± SD (Min-Max)		5.10±3.28 (1-20)
Transfer to intensive care		13 (4.4)
Gender, n (%)	Male	88(30)
	Female	206 (70)
Endoscopic diagnosis, n (%)	Peptic ulcer	128 (43.5)
	Erosive gastritis	51 (17.3)
	Malignant	18 (6.1)
	Esophageal varices	11 (3.7)
	Esophagitis	25 (8.6)
	Mallory-Weiss	8 (2.8)
	Polypoid lesion	6 (2)
	Angiodysplasia	10 (3.4)
	Erosive bulbitis	37 (12.6)

SD: Standard Deviation; Min: Minimum; Max: Maximum.

7 with a mean of 3.05±1.67. Rockall score was 0-2 in 42.2% (n=124), 3-4 in 33.3% (n=98), and 5 and above in 24.5% (n=72) of the patients. The Blatchford's score of the patients ranged between 3 and 17 with a mean of 11.37±2.72. 55.1% (n=162) of the patients had a low Blatchford's score, whereas 44.9% (n=132) had a high score. The distribution of Forrest classification, Rockall and Blatchford scores of the patients is shown in Table 2.

There was no statistically significant relationship between the Forrest classification and Rockall's score (p=0.900). There was no statistically significant relationship between the Forrest classification and Blatchford's score (p=0.510). Correlation analysis results are shown in Table 3.

Table 2. Distribution of Patients' Forrest classification, Rockall and Blatchford scores.

Scores and Classification		**n (%)**
Forrest Classification (grade)	1 A	11 (3.7)
	2 A	8 (2.7)
	2 B	7 (7.4)
	2 C	16 (5.4)
	3	252 (85.7)
Rockall Score	0-2	124 (42.2)
	3-4	98 (33.3)
	≥ 5	72 (24.5)
Blatchford Score	Low	162 (55.1)
	High	132 (44.9)

Table 3. Relationship between Forrest classification and Rockall and Blatchford scores.

Scores		**Forrest Classification**					**p***
		1A	**2A**	**2B**	**2C**	**3**	
		n (%)	**n (%)**	**n (%)**	**n (%)**	**n (%)**	
Rockall's Score	**0-2**	3 (27.3)	5 (62.5)	3 (42.9)	7 (43.8)	106 (42.1)	0.900
	3-4	4 (36.4)	1 (12.5)	2 (28.6)	6 (37.5)	85 (33.7)	
	≥ 5	4 (36.4)	2 (25)	2 (28.6)	3 (18.8)	61 (24.2)	
Blatchford's Score	**Low**	4 (36.4)	6 (75)	3 (42.9)	9 (56.3)	140 (55.6)	0.510
	High	7 (63.6)	2 (25)	4 (57.1)	7 (43.8)	112 (44.4)	

*: Chi-Square test.

A statistically significant difference was found in duration of hospitalization according to Rockall's score (p=0.009). Length of hospitalization was significantly longer for patients with a Rockall's score of 5 and above compared to patients with a Rockall's score of 0-2 (p:0.003; p<0.01) and 3-4 (p:0.030; p<0.05). Regarding length of hospitalization, no significant difference was found between patients with a Rockall's score of 0-2 and patients with a Rockall's score of 3-4 (p:0.306; p>0.05). No significant relationship was found between the length of hospitalization and Blatchford's score (p=0.062). Similarly, no significant relationship was found between the length of hospitalization and the Forrest classification (p=0.156). However, there was a statistically significant relationship between the need for blood transfusion and Rockall's score (p<0.05). A significantly higher ratio of patients needing blood transfusion had a Rockall's score of 5 and above (28.5%) compared to patients who did not need blood transfusion (18.3%). There was a statistically significant relationship between the need for blood transfusion and Blatchford's score (p<0.01). A significantly higher ratio of patients needing blood transfusion had a higher Blatchford's score (56.4%) than patients who did not need blood transfusion (27%). Analysis results for the relationship between the need for blood transfusion and length of hospitalization with Rockall and Blatchford scores are shown in Table 4.

A statistically significant relationship existed between referral to the intensive care unit or discharge status and Rockall's score (p=0.003). A significantly higher ratio of patients referred to the intensive care unit had a Rockall's score of 5 and above (61.5%) compared to those discharged (22.9%). No statistically significant relationship existed between referral to the intensive care unit or discharge and Blatchford's score (p=0.055). Analysis results for the relationship between intensive care unit referral and discharge status and patient scores are shown in Table 5.

Table 4. Relationship between blood requirement, duration of hospitalization and Forrest classification, Rockall and Blatchford scores.

Scores and Classification		**Blood transfusion requirement**		**Duration of hospitalization (day) Mean±SD (median)**
		No n (%)	**Yes** n (%)	
Rockall's Score	**0-2**	60 (52.2)	64 (35.8)	4.52±2.86 (4)
	3-4	34 (29.6)	64 (35.8)	4.85±2.77 (4)
	≥ 5	21 (18.3)	51 (28.5)	6.44±4.18 (5)
P value		**[1] 0.016***		**[2]0.009***
Blatchford's Score	**Low**	84 (73.0)	78 (43.6)	4.82±3.21 (4)
	High	31 (27.0)	101 (56.4)	5.44±3.37 (5)
P value		**[1]0 .001***		**[3]0.062**
Forrest Classification (grade)	**1 A**	0 (0)	11(6.1)	5.45±3.78 (5)
	2 A	0(0)	8 (4.4)	3.38±1.50 (3.5)
	2 B	0 (0)	7 (3.9)	7.57±4.89 (7)
	2 C	0 (0)	16 (8.8)	5.19±2.66 (5)
	3	115(100)	137 (76.8)	5.06±3.27 (4)
P value		**[1] 0.001***		**[2]0.156**

[1]: Ki-kare test; *: p<0.05; [2]: Kruskal Wallis Test; [3]: Mann Whitney U test.

Table 5. Relationship between transfer to intensive care unit and Forrest classification, Rockall and Blatchford scores.

Scores and Classification		**Transfer to intensive care unit n (%)**	**p-value**
Rockall's Score	**0-2**	1 (7.7)	**[1]0.003****
	3-4	4 (30.8)	
	≥ 5	8 (61.5)	
Blatchford's Score	**Low**	6 (46.2)	[2]0.714
	High	7 (53.8)	
Forrest Classification (grade)	**1 A**	11(84.6)	**[1]0.001****
	2 A	2(15.4)	
	2 B	0(0)	
	2 C	0(0)	
	3	0(0)	

[1]: Kruskal Wallis Test; [2]: Mann Whitney U test; **: p<0.01.

DISCUSSION AND CONCLUSION

Upper gastrointestinal bleeding is life-threatening and requires rapid intervention. Various risk scores have been developed that can help in rapid decision-making to determine bleeding severity, determine the urgency of endoscopy, identify the need for blood transfusion, and control bleeding. Studies have reported that the incidence of upper gastrointestinal bleeding in men is approximately twice that of women.[9-11] Similarly, males constituted 70% of the patients in our study.

In our study, no statistically significant difference was found in the length of hospitalization concerning Blatchford's score and Forrest's classification. A statistically significant difference was found in duration of hospitalization according to Rockall's score ($p=0.009$). Length of hospitalization was significantly longer for patients with a Rockall's score of 5 and above compared to patients with a Rockall's score of 0-2 ($p:0.003$; $p<0.01$) and 3-4 ($p:0.030$; $p<0.05$). In terms of length of hospitalization, no significant difference was found between patients with a Rockall's score of 0-2 and patients with a Rockall's score of 3-4 ($p:0.306$; $p>0.05$). In several studies, high Rockall and Blatchford scores were found to be associated with length of hospitalization.[11-13] In contrast, two studies concluded that Rockall and Blatchford scores were not associated with length of hospital stay.[14,15] In another study, a high Rockall's score was found to be associated with the length of hospitalisation.[16] These results are consistent with our study.[16] The high Rockall's score was more successful than Blatchford's score and Forrest's classification in predicting the length of hospitalization.

In different studies, a high Rockall's score was found to be associated with the need for blood transfusion.[17,18] In three other studies, high Rockall and Blatchford scores were found to be associated with the need for blood transfusion.[10,11,15,19] In another study comparing risk scores and shock indices, Glasgow-Blatchford's score was found to be the most successful predictor of major transfusion and endoscopic treatment needs.[20-22] In our study, a significantly higher ratio of patients requiring blood transfusion had a Rockall's score of 5 and above. Similarly, Blatchford's score was significantly higher in patients requiring blood transfusion. Our results are consistent with the literature.[10,11,17-19]

In a previous study, a significant relationship was shown between high Rockall and Blatchford scores and referral to the intensive care unit.[23] In our study, the referral rate to the intensive care unit was significantly higher in patients with a Rockall's score of 5 and above. There was no significant correlation between Blatchford's score and referral to the intensive care unit.

Similarly, no significant correlation was found between the Forrest classification and Rockall and Blatchford scores. There is no study in literature, which evaluates the relationship between these three scoring systems.

In conclusion, the combined use of the Rockall and Blatchford scores, and Forrest classification in follow-up and treatment planning may increase the success of treatment in patients with upper gastrointestinal bleeding. Therefore, it can help reduce healthcare expenses. The limitations of this study include its retrospective design and the fact that it was conducted in a single center. Prospective studies are needed to confirm the applicability of these scores in upper gastrointestinal bleeding.

Ethics Committee Approval: This study was planned following the Helsinki Principles, and ethical approval was obtained from Ümraniye Training and Research Hospital Ethics Committee (Date: 05/07/2013, Decision no: 2013-9563).

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept – SK, SÖÖ; Supervision – SK, SÖÖ; Materials – SK; Data Collection and/or Processing – SK; Analysis and/or Interpretation – SK, SÖÖ; Writing –SÖÖ.

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