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Risk Markers for Mortality in Hemodynamically Stable Patients Admitted to the Emergency Department with a Prediagnosis of Upper Gastrointestinal Bleeding

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ABSTRACT

Aim: The aim of this study is to investigate the changes in hemoglobin levels in hemodynamically stable patients admitted to the emergency department with a prediagnosis of upper GI bleeding.

Material and Methods: This study consisted of patients aged over 18 years who applied to the emergency department of Ankara Training and Research Hospital and underwent endoscopy with a prediagnosis of upper GI bleeding between January 1st, 2017, and March 1st, 2020. The patients' demographic data, laboratory parameters, Glasgow-Blatchford and Rockall scores, endoscopy results, and 28-day mortality data were recorded.

Results: The study sample consisted of 120 patients with a mean age of 62.0 ± 20.9 years. No significant difference was detected in the amount or percentage of change in patients' hemoglobin levels between the two measurements performed at admission and within 3-6 hours. ((0.6(-5,6%), 0.4(-5,3%), p>0.05)) The most common endoscopic finding was a peptic ulcer, which was detected in 64 (53.3%) patients. The multivariate regression analysis revealed that age ((Odds Ratio (OR) = 1.13, confidence interval (CI) 95%: 1.03–1.31, p = 0.0031)) and hypertension (OR = 11.45, CI 95%: 1.80–138.88, p = 0.021) were independent risk factors for 28-day mortality.

Conclusion: No significant difference was detected in the amount or percentage of change in hemoglobin levels of hemodynamically stable patients with a prediagnosis of upper GI bleeding between the two measurements performed at admission and within 3-6 hours. Older age and hypertension were determined as the risk factors that predicted 28-day mortality in this patient group.

Keywords: Upper gastrointestinal bleeding; mortality; risk factor; emergency medicine.

Üst GIS Kanama Ön Tanısı ile Acil Servise Başvuran Vital Bulgulari Stabil Olan Hastalarda Mortalite için Risk Belirteçleri

ÖZ

Amaç: Acil servise üst GİS kanama ön tanısı ile başvuran hemodinamik olarak stabil hastalarda hemoglobin düzeylerindeki değişimin araştırılması amaçlandı.

Gereç ve Yöntemler: Bu çalışma, 1 Ocak 2017-1 Mart 2020 tarihleri arasında Ankara Eğitim ve Araştırma Hastanesi acil servise başvuran hastalarda retrospektif olarak yapıldı. Çalışmaya üst GİS kanama ön tanısı ile acil servise başvuran ve endoskopi yapılan 18 yaş üstü erişkinler dahil edildi. Hastaların demografik verileri, laboratuvar parametreleri, Glasgow-Blatchford ve Rockall skorları, endoskopi sonuçları ve 28 günlük mortalite verileri kaydedildi.

Bulgular: Çalışmanın örneklemini yaş ortalaması 62,0 ± 20,9 olan 120 hasta oluşturdu. Hastaların hemoglobin düzeylerinin başvuru sırasında ve 3-6 saat içinde yapılan iki ölçüm arasındaki değişim miktarı veya yüzdesi açısından anlamlı fark saptanmadı. ((0.6(-5,6%), 0.4(-5,3%), p>0,05)) En sık endoskopik bulgu 64 (%53,3) hastada saptanan peptik ülserdi. Çoklu değişkenli regresyon analizi, yaşın (Odds Oranı (OR) = 1,13, güven aralığı (CI) %95: 1,03-1,31, p = 0,0031) ve hipertansiyonun (OR = 1,45, CI %95: 1,80-138,88, p = 0.021) 28 günlük mortalite için bağımsız risk faktörleri olduğu saptandı.

Sonuç: Hemodinamik olarak stabil olan ve üst GİS kanama ön tanısı olan hastaların hemoglobin düzeylerindeki değişimin miktarı veya yüzdesi açısından başvuru sırasında ve 3-6 saat içinde yapılan iki ölçüm arasında anlamlı fark saptanmadı. Bu hasta grubunda 28 günlük mortaliteyi öngören risk faktörleri olarak ileri yaş ve hipertansiyon belirlendi.

Anahtar Kelimeler: Üst gastrointestinal kanama; mortalite; risk belirteçleri; acil tıp.

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INTRODUCTION

Gastrointestinal (GI) bleeding is one of the most frequent causes of presentations to the emergency department (1). The mortality rate in patients with GI bleeding is approximately 10%, which can exceed 15% in hemodynamically unstable GI bleeding patients (1, 2). It is recommended to use the Glasgow-Blatchford risk score in the initial evaluation of patients with GI bleeding. Accordingly, patients with a Glasgow-Blatchford risk score of <1 are discharged, whereas patients with a Glasgow-Blatchford risk score of>2 are hospitalized and followed up in the observation unit. While in emergency departments, patients should be followed up before endoscopy through hemogram tests conducted at regular intervals. Pre-endoscopic medical treatment and blood transfusions are recommended in patients with hemoglobin levels<7 mg/dl (3).

Endoscopies performed in < 24 and < 12 hours are considered early and very early endoscopies, respectively. The timing of endoscopy is a matter of debate. As a matter of fact, very early endoscopy was recommended in the 2015 version of the European Society of Gastrointestinal Endoscopy Guidelines for high-risk patients who are hemodynamically unstable with in-hospital hematemesis and contraindicated to discontinuation of anticoagulation, but not in the 2021 version since it was concluded that it does not improve patient outcomes (4, 5). The Asia-Pacific Working Group has recommended performing very early endoscopy for hemodynamically unstable patients and those in shock (6). The American Society of Gastroenterology has recommended performing early endoscopy whenever possible for patients with hemodynamic stability and without severe comorbidities to detect and treat low-risk endoscopic findings and to rapidly discharge these patients in order to shorten hospital stays and reduce associated costs (3).

It is essential to ensure the safe discharge of low-risk patients, shorten hospital stays, reduce the unnecessary use of resources, and diagnose and treat high-risk patients as early as possible (3). The primary objective of this study is to investigate the changes in hemoglobin levels in hemodynamically stable patients admitted to the emergency department with a prediagnosis of upper GI bleeding. In addition, the secondary objective of this study is to investigate whether patients' demographic and laboratory characteristics and the scores obtained from the scoring tools can help predict 28-day mortality.

MATERIAL AND METHODS

Study setting and design

The study protocol was approved by the local ethics committee before the conduct of the study (Approval number: E-21-569).

This study was designed retrospectively. Patients with a preliminary diagnosis of upper gastrointestinal bleeding who presented to the emergency department between January 1st, 2017, and March 1st, 2020 were examined. Patients' endoscopy fee codes for the specified years entered into the hospital's automation system were recorded. Patients' anamnesis and physical examination findings obtained within the scope of their emergency service admissions as well as their internal medicine consultation and endoscopy reports, were retrieved from the hospital's automation system.

Participant selection

Inclusion criteria: The population of the study consisted of patients aged over 18 years who applied to the emergency department and underwent endoscopy with a prediagnosis of upper GI bleeding. Exclusion criteria: Patients with unstable vital signs, low GI bleeding, perforation, patients without a control hemoglobin value (3–6 hours), an internal medicine/gastroenterology consultation, and pregnant patients were excluded from the study.

Participant measurements

Patients' vital findings, measured during their initial physical examination while in the emergency department, their comorbid diseases, and the medications they were on were recorded. Results of the laboratory tests performed during patients' initial physical examination while they were in the emergency department and the control hemoglobin values measured within 3 to 6 hours of the first measurement while they were under observation were recorded. The percentage (%) difference between the baseline and control hemoglobin values was calculated for each patient using the following formula: (baseline hemoglobin value – control hemoglobin value) /baseline hemoglobin value * 100. The Glasgow-Blatchford and Rockall scores, endoscopy results, endoscopic treatment data, and 28-day mortality data were recorded for all patients. Glasgow-Blatchford Score (GBS) is calculated based on the patient's heart rate, systolic blood pressure, blood urea nitrogen level, presence of melena, and the presence of heart disease and liver disease. Rockall Score, on the other hand, is calculated based on the patient's age, systolic blood pressure, heart rate, presence of comorbidities, and endoscopic findings (7). Epicrisis in the hospital automation system was reviewed retrospectively, and cases of deceased within 28-days mortality were recorded.

Statistical Analysis

Jamovi project 2.2.5.0 and JASP 0.16.1 software packages were used in the statistical analyses. Descriptive statistics for numerical variables are provided as mean ± standard deviation, median and minimum-maximum. For categorical variables, descriptive statistics are given in terms of count and percentage (%). Shapiro Wilk test was used for normality analysis.Mann-Whitney-U test was used to compare numerical variables. For the analysis of categorical data; Pearson's chi-squared, Fisher's exact tests and Fisher–Freeman–Halton tests were used. Logistic regression analysis was performed to identify risk factors for 28-day mortality. The probability (p) statistics of ≤ 0.05 were deemed to indicate statistical significance.

RESULTS

The study sample consisted of 120 patients with a mean age of 62.0 ± 20.9 years. The demographic characteristics of the patients are given in Table 1. Additionally, the demographic characteristics of the patients in terms of 28-day mortality are shown in Table 2.

Table 1. Demographic and clinical characteristics of the patients

Variables	n (%) / Mean ±	Median [Min-
Age (year)	62.0 ± 20.9	65.5 [19.0- 95.0]
Sex		
Female	39 (32.5)	
Male	81 (67.5)	
Symptoms at admission		
Bloody feces	37 (30.8)	
Hematemesis	34 (28.3)	
Nausea/vomiting	10 (8.3)	
Syncope	6 (5.0)	
Lightheadedness	6 (5.0)	
Abdominal pain	5 (4.2)	
Fatigue	2 (1.7)	
Others	20 (16.7)	
Rectal examination findings		
Melena	47 (39.2)	
Hematochezia	7 (5.8)	
Normal feces	39 (32.5)	
Others	27 (22.5)	
Comorbidity		
Hypertension	31 (25.8)	
Cardiac diseases	28 (23.3)	
Diabetes mellitus	11 (9.2)	
Respiratory diseases	8 (6.7)	
Chronic renal failure	6 (5.0)	
Cerebrovascular diseases	6 (5.0)	
Previous gastrointestinal	6 (5.0)	
Atrial fibrillation	5 (4.2)	
Chronic liver diseases	2 (1.7)	
Medications		
Anti-hypertensive drugs	21 (17.5)	
Acetylsalicylic acid	15 (12.5)	
Nonsteroid anti-inflammatory	12 (10.0)	
Warfarin	8 (6.7)	
New oral anticoagulant drugs	4 (3.3)	
Clopidogrel	3 (2.5)	
Enoxaparin sodium	1 (0.8)	
Systolic blood pressure (mmHg)	114.8 ± 20.5	112.0 [90.0-
Diastolic blood pressure	66.5 ± 9.9	64.0 [60.0- 140.0]
Heart rate (pulse/min)	82.9 ± 10.9	82.5 [61.0- 100.0]
Shock index	0.7 ± 0.2	0.7 [0.4- 1.1]
Endoscopic findings		
Varices		1 (0.8)
Forrest classification		
1a	4 (3.3)	
1b	13 (10.8)	
2a	5 (4.2)	
2b	11 (9.2)	
2c	7 (5.8)	
3	24 (20.0)	
Gastritis	38 (31.7)	
Malignant ulcer	2 (1.7)	
Mallory-Weis tear	2 (1.7)	
Normal endoscopy	13 (10.8)	
Rockall score	1.9 ± 2.1	1.5 [0.0- 9.0]
Glasgow-Blatchford Bleeding	9.7 ± 4.1	10.0 [1.0- 19.0]
Clinical follow-up		
Discharge	75 (62.5)	
Hospitalization to clinical wards	27 (22.5)	
Intensive care unit	18 (15.0)	

Table 2. Comparison of the patients with mortality in the 28 day follow-up intervals

	28-day mortality		
	Absent (n=109)	**Present (n=10)**	**p**
Age (year) ‡	61.0 [19.0- 90.0]	85.0 [74.0- 95.0]	**<0.001***
Sex †			
Female	32 (29.4)	6 (60.0)	0.073**
Male	77 (70.6)	4 (40.0)	
Symptoms at admission †			
Syncope	6 (5.5)	0 (0.0)	0.981**
Hematemesis	29 (26.6)	4 (40.0)	
Bloody feces	33 (30.3)	4 (40.0)	
Fatigue	2 (1.8)	0 (0.0)	
Lightheadedness	6 (5.5)	0 (0.0)	
Nausea/vomiting	10 (9.2)	0 (0.0)	
Abdominal pain	5 (4.6)	0 (0.0)	
Others	18 (16.5)	2 (20.0)	
Rectal examination findings †			
Melena	41 (37.6)	6 (60.0)	0.673**
Hematochesia	7 (6.4)	0 (0.0)	
Normal feces	36 (33.0)	2 (20.0)	
Others	25 (22.9)	2 (20.0)	
Comorbidity †			
Cardiac diseases	26 (23.9)	2 (20.0)	0.999**
Chronic liver diseases	1 (0.9)	1 (10.0)	0.162**
Chronic renal failure	5 (4.6)	1 (10.0)	0.416**
Hypertension	22 (20.2)	8 (80.0)	**<0.001***
Diabetes mellitus	8 (7.3)	3 (30.0)	0.050**
Respiratory diseases	8 (7.3)	0 (0.0)	0.999**
Cerebrovascular diseases	3 (2.8)	2 (20.0)	0.056**
Atrial fibrillation	4 (3.7)	0 (0.0)	0.999**
Previous gastrointestinal bleeding	6 (5.5)	0 (0.0)	0.999**
Medications †			
Nonsteroid anti-inflammatory drugs	11 (10.1)	1 (10.0)	0.999**
Acetylsalicylic acid	14 (12.8)	1 (10.0)	0.999**
Warfarin	7 (6.4)	1 (10.0)	0.516**
Clopidogrel	2 (1.8)	1 (10.0)	0.233**
New oral anticoagulant drugs	2 (1.8)	1 (10.0)	0.233**
Anti-hypertensive drugs	17 (15.6)	4 (40.0)	0.074**
Enoxaparin sodium	0 (0.0)	1 (10.0)	0.084**
Systolic blood pressure (mmHg) ‡	112.0 [90.0- 210.0]	98.0 [90.0- 140.0]	0.055*
Diastolic blood pressure (mmHg) ‡	64.0 [60.0- 140.0]	64.0 [60.0- 74.0]	0.779*
Heart rate (pulse/min) ‡	81.0 [61.0- 100.0]	89.0 [63.0- 95.0]	0.302*
Shock index ‡	0.7 [0.4- 1.1]	0.8 [0.6- 1.1]	0.051*
Clinical follow-up †			
Discharge	70 (64.2)	4 (40.0)	0.185**
Hospitalization to clinical wards	24 (22.0)	3 (30.0)	
Intensive care unit	15 (13.8)	3 (30.0)	

†: n (%), ‡: median [min-max]*. Mann Whitney test
**. Pearson Chi-Square/Fisher Exact/Fisher Freeman Halton test
Expressions written in bold are significant (p<0.05)

The laboratory test results of the patients are summarized in Table 3. The mean baseline (at admission) and control (within 3-6 hours of admission) hemoglobin levels were 10.7 ± 3.2 g/dL and 10.0 ± 3.0 g/dL, respectively. The median percent decrease in hemoglobin level was 0.6%. The median baseline and control hemoglobin levels were significantly lower among the deceased patients than surviving patients (p values are 0.003,0.004 respectively). However, there were no significant differences between the groups in the amount or percentage of change in hemoglobin levels. Among the parameters measured in the hemogram, hematocrit (%), mean corpuscular volume (MCV), mean cell hemoglobin concentration (MCHC), Red cell distribution width (%), Immature granulocyte (IG)% were significantly different between the two groups. (p values are 0.006, 0.045, 0.003, 0.019 respectively). On the other hand, there were significant differences between the groups in blood urea nitrogen, urea, creatinine, albumin levels, alanine aminotransferase, prothrombin time, and international normalized ratio (INR) values (p values are 0.017, 0.017, 0.002, 0.001, 0.013, 0.007, 0.005 respectively)(Table 3).

Table 3. Comparison of the laboratory investigations in the 28 day follow-up intervals

			28 day mortality		
Laboratory variables ‡	**n (%) / Mean ± SD**	**Median [Min- Max]**	**Absent (n=109)**	**Present (n=10)**	**p**
Hemoglobin at admission (g/dL)	10.7 ± 3.2	10.9 [3.7- 17.4]	11.2 [4.4- 17.4]	7.9 [3.7- 12.1]	**0.003**
Hemoglobin at follow-up (3-6 hrs) (g/dL)	10.0 ± 3.0	10.1 [3.5- 16.1]	10.4 [3.9- 16.1]	7.0 [3.5- 11.3]	**0.004**
Δ Hemoglobin (%)	-6.6 ± 7.6	-5.6 [-35.8- 17.5]	-5.6 [-35.8- 11.9]	-5.3 [-25.6- 17.5]	0.867
Difference in hemoglobin (g/dL)	0.7 ± 0.8	0.6 [-1.0- 3.9]	0.6 [-0.9- 3.9]	0.4 [-1.0- 2.2]	0.333
White blood cell count (/µL)	11062.8 ± 4906.4	10500.0 [2300.0- 29000.0]	10500.0 [2670.0- 29000.0]	11640.0 [2300.0- 19800.0]	0.886
Hematocrit (%)	33.1 ± 8.9	33.6 [12.3- 51.0]	34.4 [15.3- 51.0]	26.1 [12.3- 38.9]	**0.006**
Mean corpuscular volume (MCV) (fL)	87.0 ± 7.9	86.5 [57.0- 129.5]	86.3 [57.0- 109.2]	89.9 [74.8- 129.5]	**0.045**
Mean cell hemoglobin (MCH) (pg)	28.2 ± 3.0	28.4 [15.1- 38.9]	28.5 [15.1- 34.2]	27.7 [22.3- 38.9]	0.962
Mean cell hemoglobin concentration (MCHC) (g/dL)	32.3 ± 1.7	32.5 [26.5- 36.1]	32.6 [26.5- 36.1]	31.0 [28.6- 32.8]	**0.001**
Platelet count (/µL)	269083.3 ± 90191.5	256500.0 [22000.0- 524000.0]	257000.0 [84000.0- 524000.0]	241500.0 [22000.0- 448000.0]	0.569
Red cell distribution width (%)	44.4 ± 11.5	43.1 [0.0- 102.5]	42.5 [12.8- 81.1]	50.2 [0.0- 102.5]	**0.003**
Immature granulocyte (IG)	0.1 ± 0.2	0.0 [0.0- 0.1]	0.0 [0.0- 0.1]	0.1 [0.0- 0.1]	0.353
Immature granulocyte (IG)%	0.8 ± 0.9	0.5 [0.4- 0.9]	0.5 [0.4- 0.8]	0.9 [0.7- 1.1]	**0.019**
Blood urea nitrogen (mg/dL)	36.5 ± 21.1	32.2 [4.2- 109.8]	31.8 [4.2- 109.8]	59.8 [14.5- 79.9]	**0.017**
Urea (mmol/L)	78.1 ± 45.2	69.0 [9.0- 235.0]	68.0 [9.0- 235.0]	128.0 [31.0- 171.0]	**0.017**
Creatinine (mg/dL)	1.3 ± 0.9	1.0 [0.3- 6.8]	1.0 [0.3- 6.8]	1.7 [0.6- 3.8]	**0.002**
Albumin (mg/dL)	7.5 ± 11.2	3.9 [0.0- 46.2]	3.9 [0.0- 46.2]	3.1 [2.4- 3.6]	**0.001**
Aspartate amino transferase (IU/mL)	21.9 ± 32.2	16.0 [0.0- 352.0]	16.0 [0.0- 352.0]	15.0 [12.0- 37.0]	0.935
Alanine aminotransferase (IU/mL)	19.9 ± 29.0	13.5 [4.0- 270.0]	14.0 [4.0- 270.0]	9.5 [5.0- 21.0]	**0.013**
Activated partial thromboplastin time (sec)	30.5 ± 34.4	27.6 [0.0- 379.0]	27.9 [0.0- 180.0]	33.8 [20.5- 379.0]	0.153
Prothrombin time (sec)	16.1 ± 11.2	14.9 [0.0- 85.0]	15.0 [0.0- 180.0]	17.1 [15.1- 180.0]	**0.007**
International normalized ratio (INR)	1.2 ± 0.8	1.1 [0.0- 6.6]	1.1 [0.0- 12.0]	1.3 [1.2- 12.0]	**0.005**
Troponin (ng/mL)	8.9 ± 27.1	0.0 [0.0- 184.3]	0.0 [0.0- 184.3]	0.0 [0.0- 77.0]	0.275
Creatinine kinase-myocardial band (CK-MB) (IU/mL)	0.9 ± 1.8	0.0 [0.0- 10.2]	0.0 [0.0- 10.2]	0.0 [0.0- 3.4]	0.179

‡: median [min-max]Mann Whitney test Expressions written in bold are significant (p<0.05)

There was no significant correlation between 28-day mortality and active bleeding, endoscopic diagnosis, endoscopic therapeutic interventions, or intervention modality (Table 4). Rockall score and GBS score were statistically significantly higher in patients who died on the 28th day. (p values are 0.003,0.006 respectively).

The results of multivariate regression analyses are given in Table 5. One-unit age increase in mortality due to upper gastrointestinal bleeding increases 1.13 times (95% CI 1.03-1.31).Mortality due to upper gastrointestinal bleeding increases 11.45 (95%: 1.80–138.88) times in patients with hypertension. Further analysis of these variables with multivariate regression analysis revealed that only age ((Odds Ratio (OR) = 1.13, confidence interval (CI) 95%: 1.03–1.31, p = 0.0031)) and hypertension 1 (OR = 11.45, CI 95%: 1.80–138.88, p = 0.021) were independent risk factors for 28-day mortality.

Table 4. Comparison of the patients with mortality in the 28 day follow-up intervals

	28 day mortality		
	Absent (n=109)	**Present (n=10)**	**p**
Bleeding †	52 (47.7)	8 (80.0)	0,095
Diagnosis based on endoscopic findings †			
Varices	0 (0.0)	1 (10.0)	0.057
Gastritis	35 (32.1)	2 (20.0)	
Malignant ulser	1 (0.9)	1 (10.0)	
Mallory-Weiss tear	2 (1.8)	0 (0.0)	
Normal findigs	13 (11.9)	0 (0.0)	
Peptic ulcer disease	58 (53.2)	6 (60.0)	
Endoscopic therapeutic interventions †	31 (28.4)	3 (30.0)	0.999
Sclerotherapy †	10 (9.2)	1 (10.0)	0.999
Clipping †	10 (9.2)	1 (10.0)	0.999
Adrenalin injection †	12 (11.0)	2 (20.0)	0.333
Argon plasma coagulation †	8 (7.3)	0 (0.0)	0.999
Rockall score ‡	1.0 [0.0- 9.0]	3.5 [2.0- 8.0]	**0.003**
Glasgow-Blatchford Bleeding score ‡	9.0 [1.0- 19.0]	13.0 [8.0- 18.0]	**0.006**

†: n (%), ‡: median [min-max]
*. Mann Whitney test
**. Pearson Chi-Square/Fisher Exact/Fisher Freeman Halton test
Expressions written in bold are significant (p<0.05)

Table 5. Univariate and multivariate regression analysis of the 28 day mortality.

	Univariate analysis OR [CI 95%, p]	**Multivariate analysis OR [CI 95%, p]**
Age	1.16 [1.07-1.31, p=0.005]	1.13 [1.03-1.31, **p=0.031**]
Hypertension	15.82 [3.66-109.91, p=0.001]	11.45 [1.80-138.88, **p=0.021**]
Hemoglobin at admission	0.70 [0.52-0.88, p=0.006]	0.64 [0.30-1.20, p=0.176]
Blood urea nitrogen	1.03 [1.00-1.06, p=0.021]	1.00 [0.95-1.05, p=0.930]
Creatinine	1.57 [0.96-2.49, p=0.050]	1.23 [0.47-3.12, p=0.656]
Albumin	0.65 [0.38-0.99, p=0.116]	0.48 [0.10-0.92, p=0.371]
INR	1.09 [0.84-1.30, p=0.424]	-
Rockall score	1.42 [1.09-1.89, p=0.010]	0.99 [0.44-2.00, p=0.987]
Glasgow-Blatchford Bleeding score	1.32 [1.09-1.68, p=0.009]	0.95 [0.56-1.62, p=0.846]

OR: Odds ratio, CI: confidence interval, INR: International normalized ratio
Expressions written in bold are significant (p<0.05)

DISCUSSION

The findings of this study did not reveal a significant correlation between the decrease in the amount or percentage of hemoglobin value and 28-day mortality in patients with upper GI bleeding and stable vital signs. There were significant differences between the patients who survived and deceased in 28 days of admission in age, baseline and control hemoglobin values, immature granulocyte (%), BUN, creatinine, alanine aminotransferase, albumin, and INR values, prothrombin times, and the Rockall and Glasgow-Blatchford bleeding scores.

Studies comparing the risk scores of patients with upper GI bleeding have determined that the AIMS65 (albumin, INR, mental status, systolic blood pressure, and age >65 years) scoring system was superior to the Glasgow-Blatchford bleeding scoring system(GBS), and that both systems predicted mortality better than the pre-Rockall and pre-Taylor scoring systems (1). The International Consensus Group and the American Society of Gastroenterology have recommended using GBS as a predictive tool (8). GBS scores of 0–1 reportedly predicted mortality with 99% sensitivity and 33% specificity (3). In comparison, the pre-endoscopy Rockall scoring system predicted mortality with high sensitivity yet misclassified 4–7% of high-risk patients (8). Notably, the mortality rate was higher among patients with high GBS and Rockall scores in this study.

Laboratory parameters may also be important in predicting the mortality of patients with upper GI bleeding. Accordingly, the relationships between 28-day mortality and laboratory parameters, including BUN, creatinine, alanine aminotransferase, albumin, INR, and prothrombin time, were investigated in this study. Urea absorption in the kidneys increases due to dehydration and albumin is indirectly affected by the nutritional status of a patient with GI bleeding (2). BUN is included in the GBS, and albumin is in the AIMS65 system. Past reports show that hypovolemia develops in patients with severe GI bleeding, leading to possible acute renal failure, and that increased serum creatinine levels are associated with mortality and rebleeding (9). Furthermore, increased INR values above 1.5 reportedly increase mortality, even though they are not associated with an increased risk of rebleeding (10). In comparison, INR values and prothrombin times were both found to be significantly correlated with mortality in the univariate analysis.

The significant correlation between hemoglobin level and mortality in patients with GI bleeding was reported in the literature. Hemoglobin level is one of the parameters included in the GBS scoring system (11,12).

Immature granulocytes (IG) have been reported as predictors of mortality in cases of severe infection and inflammation. IG count and IG% have been reported to predict 30-day mortality in patients with GI bleeding (13, 14). In parallel, significant differences were found in this study between the surviving and deceased patients in baseline hemoglobin values and IG%. The findings of normochromic normocytic anemia in acute blood loss include decreased hemoglobin and hematocrit levels while MCV and MCHC values remain normal (15). These laboratory results are consistent with our study. In patients with upper gastrointestinal bleeding, higher RDW values have been reported along with low hemoglobin and hematocrit levels, and it has been stated that elevated RDW predicts mortality (16). In our study, a higher RDW value was found in patients with mortality, and it was found to be statistically significant.

Among the risk factors for gastrointestinal bleeding reported in the literature are comorbidities, chronic renal failure, hypertension, diabetes mellitus, liver cirrhosis, and hypertension (17-19). A study reported that 30-day mortality was significantly correlated with age, hemodynamic instability, comorbidities, and uncontrollable bleeding (20). Another study reported significant correlations between 30-day mortality and age > 65 years, BUN > 40 mg/dl, hemodynamic instability, active bleeding during emergency services, comorbidities, transfusion, and rebleeding (21). It has been reported that age > 65 years increased 30-day mortality by 5.06 times (95% CI; 1.79–32.60) (22).

The findings of this study did not reveal a significant correlation between the decrease in the amount or percentage of hemoglobin value and 28-day mortality in patients with upper GI bleeding, which might be attributed to rebleeding status of the patients, the success of endoscopic treatments, or the comorbidities of the patients which act as a risk factor in mortality as reported in the literature (20). The multivariate regression analysis revealed that age and hypertension were independent risk factors for 28-day mortality in patients with upper GI bleeding. Elderly patients tend to have various diseases and are more sensitive to physiological changes in the hemorrhagic state than younger people (19). Therefore normal blood pressure values and the medications these patients use for hypertension may help prevent tachycardia. Accordingly, young age and lack of hypertension might indicate reduced mortality risk in this patient population.

The primary limitation of this study was its retrospective, single-center design. Vital parameters were stable while assessing the GBS and Rockall scores; thus, the respective evaluations of scores should be made considering the said fact. Other scoring systems, such as AIMS65 and Taylor scoring systems, were not used in the study. Additionally, the data pertaining to the timing of the endoscopy, whether it was performed on the 6^{th} or 12^{th} hour, for example, and to the rebleeding statuses of the patients were lacking.

CONCLUSION

The study's findings revealed that the amount or percentage of decrease in hemoglobin levels did not predict 28-day mortality in patients with upper GI bleeding and stable vital signs. Instead, older age and hypertension were determined as the risk factors that predicted 28-day mortality in this patient group.

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