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The Role of Blood Type in Predicting Clinical Outcomes of Upper Gastrointestinal Bleeding Patients in the Emergency Department

Acil Servise Başvuran Üst Gastrointestinal Kanamalı Hastaların Klinik Sonuçlarını Tahmin Etmede Kan Grubunun Rolü

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Abstract

Background: ABO blood groups have been proposed as potential factors in risk stratification for upper gastrointestinal bleeding (UGIB). This study aimed to compare clinical outcomes in patients presenting to the emergency department with UGIB who underwent endoscopic evaluation, according to their blood groups.

Materials and Methods: This retrospective, single-center study included 502 adult patients with endoscopically confirmed UGIB. Clinical outcomes assessed were the need for hospitalization, intensive care unit (ICU) admission, blood transfusion, endoscopic intervention, and in-hospital mortality.

Results: Of the 502 patients, 162 had blood group O and 340 had non-O blood groups; 390 patients were Rh positive and 112 were Rh negative. The need for blood transfusion was required in 303 patients, the need for hospitalization was required in 293 patients, the need for intensive care was required in 93 patients, and the need for endoscopic intervention was required in 81 patients. The overall in-hospital mortality rate was 5.37% (n=27). The overall in-hospital mortality rate was 5.37% (n=27). There were no statistically significant differences between O and non-O blood groups in terms of the need for blood transfusion, hospitalization, intensive care unit admission, or endoscopic intervention (p=0.966, 0.149, 0.470, and 0.458, respectively). However, in-hospital mortality was significantly higher in Rh-negative patients compared to Rh-positive patients (p=0.018).

Conclusions: The findings of this study indicate that ABO blood groups have limited value in predicting adverse clinical outcomes in patients with UGIB. While no significant difference in mortality was observed between O and non-O blood groups, mortality was significantly higher in Rh-negative patients. Blood group alone should not be considered sufficient for risk stratification in UGIB.

Keywords: Gastrointestinal bleeding, Endoscopy, Blood type, Blood transfusion, Mortality

Öz

Amaç: ABO kan grupları, üst gastrointestinal kanama (UGIB) risk sınıflandırmasında p otansiyel f aktörler o larak önerilmiştir. Bu çalışma, acil servise UGIB ile başvuran ve endoskopik değerlendirme yapılan hastaların klinik sonuçlarını kan gruplarına göre karşılaştırmayı amaçlamıştır.

Materyal ve metod: Bu retrospektif, tek merkezli çalışmaya endoskopik olarak doğrulanmış UGIB tanısı alan 502 yetişkin hasta dahil edilmiştir. Değerlendirilen klinik sonuçlar arasında hastaneye yatış ihtiyacı, yoğun bakım ünitesine (YBÜ) yatış, kan transfüzyonu, endoskopik müdahale ve hastane içi mortalite yer almaktadır.

Bulgular: Beş yüz iki hastanın 162'si O kan grubuna, 340'ı O olmayan kan gruplarına sahipti; 390 hasta Rh pozitif, 112 hasta Rh negatifti. 303 hastada kan transfüzyonu, 293 hastada yatış, 93 hastada yoğun bakım ve 81 hastada endoskopik müdahale gerekliliği ortaya çıkmıştır. Hastane içi mortalite oranı %5,37 (n=27) olarak belirlenmiştir. Kan transfüzyonu, hastaneye yatış, yoğun bakım ünitesine yatış veya endoskopik müdahale ihtiyacı açısından O ve non-O kan grupları arasında istatistiksel olarak anlamlı bir fark yoktu (p değerleri 0,966; 0.149; 0.470; 0,458 sırasıyla). Ancak, Rh negatif hastalarda Rh pozitif hastalara kıyasla hastane içi mortalite anlamlı olarak daha yüksekti (p=0,018).

Sonuç: Bu çalışmanın bulguları, ABO kan gruplarının UGIB hastalarında olumsuz klinik sonuçları öngörmede sınırlı bir değere sahip olduğunu göstermektedir. O ve O olmayan kan grupları arasında mortalite açısından anlamlı bir fark gözlenmemiş olsa da, Rh negatif hastalarda mortalite anlamlı olarak daha yüksekti. Kan grubu tek başına UGIB'de risk sınıflandırması i çin yeterli kabul edilmemelidir.

Anahtar Kelimeler: Gastrointestinal kanama, Endoskopi, Kan grubu, Kan transfüzyonu, Mortalite

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Introduction

Upper gastrointestinal bleeding (UGIB) is a major cause of hospital admissions and is associated with substantial morbidity and mortality. Current clinical guidelines emphasize the importance of risk stratification in the management of patients with UGIB. In this context, the ABO blood group system has attracted increasing interest as a potential factor in risk assessment, as previous studies have demonstrated associations between blood groups and various diseases (1).

Blood group O has been identified as a risk factor for peptic ulcer disease, whereas blood group A has been associated with an increased risk of gastric cancer, both of which represent common etiologies of gastrointestinal bleeding. In addition, individuals with blood group O are known to have lower plasma levels of factor VIII and von Willebrand factor (vWF), which may predispose them to bleeding. Impaired platelet function has also been reported in individuals with blood group O, further contributing to an increased bleeding tendency (2). Moreover, duodenal ulcer disease and Helicobacter pylori infection have been shown to be more prevalent in individuals with blood group O, potentially leading to a higher risk of UGIB and poorer clinical outcomes in this population (3).

The Glasgow-Blatchford Score (GBS) and Rockall score are widely accepted scores in the literature for risk classification in UGIB (4). The Modified GBS (M-GBS) and H3B2 (Hematemesis, Heart rate, Hemoglobin, Blood pressure, Blood urea nitrogen) scores are also recommended scores for predicting clinical outcomes in UGIB. These scores are useful in predicting outcomes such as rebleeding, the need for endoscopic intervention, and mortality, and in assessing the patient's risk for these outcomes prior to endoscopy (5). The Charlson Comorbidity Index (CCI) is an index used in emergency medicine practice to measure patients' comorbidity burden and can facilitate decision-making in many critical illnesses (6).

The aim of this study was to compare clinical outcomes -including the need for hospitalization, intensive care unit admission, endoscopic intervention, blood transfusion, and in-hospital mortality- among patients presenting to the emergency department with UGIB who underwent endoscopic evaluation, according to their ABO blood groups.

Materials and Methods

This retrospective, single-center study included adult patients who presented to the emergency department with symptoms of upper gastrointestinal bleeding (UGIB). Between January 1, 2019, and December 1, 2024, a total of 502 patients aged 18 years or older who presented with hematemesis and/or melena and whose diagnosis of UGIB was confirmed by endoscopy were enrolled.

Patients were excluded if the diagnosis of UGIB could not be confirmed endoscopically, if medical records were incomplete, if the patient was pregnant, had sustained trauma, or had undergone endoscopy for indications other than gastrointestinal bleeding (e.g., ingestion of foreign bodies or corrosive substances).

For all eligible patients, the following data were collected: ABO and Rh blood groups, presenting symptoms, vital signs at admission, comorbidities, CCI, pre-endoscopic risk scores [Rockall score, Glasgow Blatchford Score (GBS), Modified Glasgow Blatchford Score (M-GBS), and H3B2 score], endoscopic findings, need for hospitalization or intensive care unit (ICU) admission, need for blood transfusion, need for endoscopic intervention, and in-hospital mortality.

Patients were categorized into two main groups according to their ABO blood types (blood group O vs. non-O blood groups) and Rh status (Rh-positive vs. Rh-negative). These groups were compared in terms of clinical outcomes.

The primary outcomes of the study were defined as:

- need for hospitalization
- need for ICU admission
- need for blood transfusion
- need for endoscopic intervention
- in-hospital mortality

The GBS is a scoring system that has been widely accepted in the literature for risk stratification in UGIB. It includes laboratory parameters such as hemoglobin and blood urea levels; vital signs including systolic blood pressure and heart rate; clinical history findings such as syncope and melena; and comorbid conditions including liver disease and heart failure. The total score ranges from 0 to 23. In the H3B2 score, the components consist of hematemesis (1 point), heart rate ≥100 bpm (1 point), hemoglobin ≤10 g/dL (1 point), systolic blood pressure ≤100 mmHg (1 point), and blood urea nitrogen ≥22.4 mg/dL (2 points), resulting in a total score ranging from 0 to 6. A score of ≥4 in the H3B2 system has been reported to be an independent predictor of mortality in UGIB, and its performance in predicting mortality has been found to be superior compared with other scoring systems evaluated (7).

The modified Glasgow-Blatchford Score (M-GBS) is a simplified version of the GBS. It is a modified scoring system derived by removing the comorbidity and presenting complaint components from the original GBS and retaining hemoglobin,

blood urea levels, blood pressure, and heart rate parameters. The total score ranges from 0 to 16. It has been reported that patients with a score ≤1 can be identified as low-risk in cases of UGIB (5).

The CCI is an index used to assess the comorbidity burden in patients and has been investigated across many diseases as a predictor of adverse outcomes. In this index, cerebrovascular disease, chronic pulmonary disease, congestive heart failure, myocardial infarction, and peripheral vascular disease are each assigned 1 point. Diabetes, hemiplegia, renal disease, and non-metastatic tumors are assigned 2 points; liver disease is assigned 3 points; and metastatic tumors are assigned 6 points (8).

Blood transfusion was defined as the administration of red blood cell suspension at any time between presentation to the emergency department and hospital discharge or death.

Endoscopic intervention was defined as the application of any therapeutic endoscopic modality, including adrenaline injection therapy, argon plasma coagulation, ethoxysclerol injection, hemoclip placement, or band ligation.

Ethical approval for the study was obtained from the Mersin University Clinical Research Ethics Committee (date: December 11, 2024, approval no: 2024/1231).

Statistical Analysis

Descriptive statistics for continuous variables are presented as mean±standard deviation or median with interquartile range, as appropriate according to data distribution. Categorical variables are expressed as frequencies and percentages.

Comparisons between two groups were performed using the Student's t-test for normally distributed variables and the Mann-Whitney U test for non-normally distributed variables. Associations between categorical variables were evaluated using the Chi-square test. Age, sex, presenting symptoms and clinical findings, vital signs, laboratory parameters, and calculated pre-endoscopic risk scores were initially evaluated using univariate analyses to identify factors associated with mortality. Variables with potential significance were subsequently adjusted for confounding factors, and multivariate binary logistic regression analysis was performed to determine independent predictors of in-hospital mortality.

A p value of <0.05 was considered statistically significant.

All statistical analyses were performed using the demo version of SPSS Statistics for Windows, version 22.

Results

Among the 502 patients included in the study, 162 (32.3%) had blood group O and 340 (67.7%) had non-O blood groups. A total of 390 patients (77.7%) were Rh-positive and 112 (22.3%) were Rh-negative. Blood transfusions were administered to 303 patients (60.4%). Hospitalization was required in 293 patients (58.4%), and 93 patients (18.5%) were admitted to the intensive care unit (ICU). Endoscopic intervention was performed in 81 patients (16.1%). The overall in-hospital mortality rate was 5.37% (n=27).

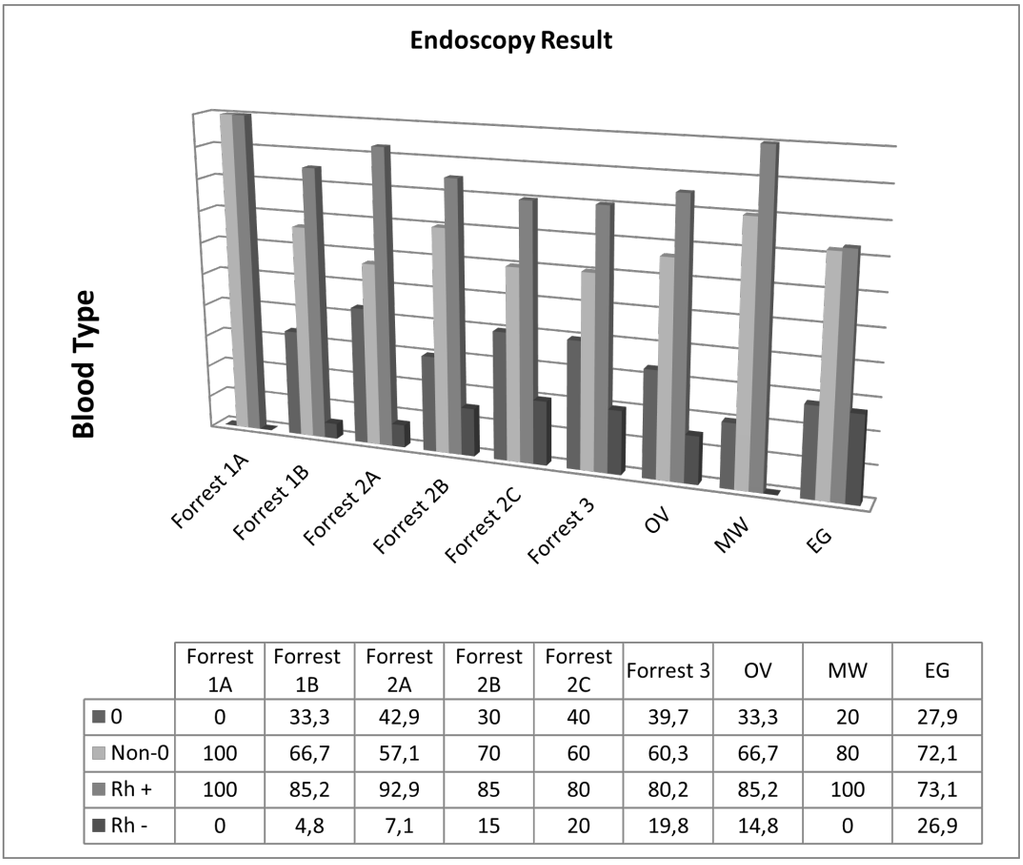
The distribution of patients according to blood groups and study outcomes is summarized in Table 1.

Table 1. Classification of patients according to blood groups and study outcomes

Blood type		N	NBT N (%)	NFH N (%)	EI N (%)	NFICU N (%)	Mortality N (%)
0	Rh +	138	84 (60.9)	85 (61.6)	25 (18.1)	30 (34.9)	5 (3.6)
	Rh -	24	14 (58.3)	17 (70.8)	4 (16.7)	5 (29.4)	3 (12.5)
A	Rh +	146	91 (62.3)	80 (54.8)	22 (15.1)	28 (35)	10 (6.8)
	Rh -	34	18 (52.9)	21 (61.8)	2 (5.9)	3 (13.6)	2 (5.9)
AB	Rh +	39	23 (59)	19 (48.7)	10 (25.6)	9 (45)	0 (0)
	Rh -	26	15 (57.7)	13 (50)	2 (7.7)	2 (14.3)	3 (11.5)
B	Rh +	67	38 (56.7)	37 (55.2)	9 (13.4)	8 (21.6)	1 (1.5)
	Rh -	28	20 (71.4)	21 (75)	7 (25)	8 (31.8)	3 (10.7)
Rh	+	390	236 (60.5)	221 (56.7)	66 (16.9)	75 (33.6)	16 (4.1)
Rh	-	112	67 (59.8)	72 (64.3)	15 (13.4)	18 (24.3)	11 (9.8)
0 group		162	98 (60.5)	102 (63)	29 (17.9)	35 (34)	8 (4.9)
Non-0 group		340	205 (60.3)	191 (56.2)	52 (15.3)	58 (29.9)	19 (5.6)
Total		502	303 (60.4)	293 (58.4)	81 (16.1)	93 (31.3)	27 (5.4)

NBT: Need for blood transfusion, NFH: Need for hospitalization, EI: Endoscopic intervention, NFICU: Need for intensive care unit

Based on endoscopic findings, Forrest 1A ulcers were identified in 1 patient, Forrest 1B ulcers in 27 patients, Forrest 2A ulcers in 14 patients, Forrest 2B ulcers in 20 patients, Forrest 2C ulcers in 20 patients, and Forrest 3 ulcers in 131 patients. Esophageal varices were detected in 27 patients, Mallory-Weiss syndrome in 10 patients, erosive gastritis in 219 patients, and other causes, including newly diagnosed malignancy, esophagitis, and alkaline reflux-in 33 patients. The distribution of endoscopic findings according to blood groups is shown in Figure 1.



	Forrest 1A	Forrest 1B	Forrest 2A	Forrest 2B	Forrest 2C	Forrest 3	OV	MW	EG
0	0	33,3	42,9	30	40	39,7	33,3	20	27,9
Non-0	100	66,7	57,1	70	60	60,3	66,7	80	72,1
Rh +	100	85,2	92,9	85	80	80,2	85,2	100	73,1
Rh -	0	4,8	7,1	15	20	19,8	14,8	0	26,9

Figure 1. Classification of patients' endoscopy results according to blood groups

OV: Oesophageal varices, MW: Mallory Weiss, EG: Erosive gastritis

* The data in the figure is given as percentages.

The mean age was 63.52±17.89 years in the blood group O cohort and 64.26±18.30 years in the non-O cohort. The mean age of Rh-positive patients was 64.09±18.05 years, compared with 63.78±18.58 years in Rh-negative patients. No statistically significant differences in mean age were observed between the groups (p=0.672 for O vs. non-O; p=0.871 for Rh-positive vs. Rh-negative). Similarly, no significant differences were identified between groups with respect to vital signs or hemoglobin levels at presentation. Pre-endoscopic risk scores also did not differ significantly between the groups (Table 2).

Table 2. Comparison of patients according to groups in terms of age. gender. vital signs. hemoglobin value and preendoscopic risk scores

		0 group (n=162)	Non-0 group (n=340)	p	Rh + (n=390)	Rh - (n=112)	p
Age* (years)		63.52±17.89	64.26±18.30	0.672	64.09±18.05	63.78±18.58	0.871
Gender^	Male	111 (68.5)	210 (61.8)	0.141	249 (63.8)	72 (64.3)	0.932
	Female	51 (31.5)	130 (38.2)		141 (36.2)	40 (35.7)	
SBP* (mmHg)		131.36±23.11	119.19±24.12	0.340	120.96±23.41	116.2 ±24.88	0.062

Table 2. Continued						
RR¥ (rpm)	20 [18-22]	20 [18-22]	0.843	20 [18-22]	20 [18.2-22]	0.445
Fever¥ (°C)	36.5 [36.3-36.7]	36.5 [36.3-36.6]	0.178	36.5 [36.3-36.6]	36.5 [36.3-36.6]	0.501
SPO2¥ (%)	97[95-98]	97[95-98]	0.467	97[95-98]	97[95-98]	0.398
Pulse Rate¥ (bpm)	85 [75-103.2]	85 [75.2-100]	0.991	85 [75-100.2]	85 [75.2-102.2]	0.844
Hgb* (g/dL)	9.76±3.18	9.66±2.90	0.732	9.65 ±2.92	9.83 ±3.22	0.571
Rockall score¥	4[2-6]	4[3-5]	0.896	4[2-6]	4[3-6]	0.791
GBS¥	10 [5.75-12]	9 [5.25-12]	0.980	10 [6-13]	9 [5-12]	0.311
M-GBS¥	9 [4-11]	8 [5-11]	0.734	9 [5-11]	8 [5-11]	0.255
H3B2 score¥	3 [2-4]	3 [2-4]	0.287	3 [2-4]	3 [2-4]	0.424
CCI*	2.04± 2.31	2.06±2.11	0.953	1.95 ±2.12	2.41±2.33	0.046
* (mean ± Sd). ^ number and percentage. ¥ medyan [25-75 percentiles]						
SBP: Systolic blood pressure. RR: Respiratory rate. GBS: Glasgow-Blatchford Score. M-GBS: Modified- Glasgow-Blatchford Score. CCI: Charlson Comorbidity Index. bpm: Beat per minute. rpm: Respirations per minute						

There were no significant differences between the groups in terms of presenting symptoms. Regarding the primary study outcomes, no statistically significant differences were observed between the groups in terms of the need for blood transfusion, hospitalization, ICU admission, or endoscopic intervention. However, a statistically significant difference in in-hospital mortality was observed between Rh-positive and Rh-negative patients, with higher mortality in the Rh-negative group (p=0.018). Comparisons of presenting symptoms and clinical outcomes between groups are presented in Table 3.

Table 3. Comparison of groups in terms of presenting complaints and study outcomes						
	0			**Rh Group**		
	0 group (n=162)	**Non-0 group (n=340)**	**p**	**Rh + (n=390)**	**Rh - (n=112)**	**p**
Melena	88 (54.3)	156 (45.9)	0.106	190 (48.7)	54 (48.2)	0.597
Hematemesis	78 (48.1)	155 (45.6)	0.591	180 (46.2)	53 (47.3)	0.827
Hematochezia	16 (9.9)	51 (15)	0.115	47 (12.1)	20 (17.9)	0.111
NBT	98 (60.5)	205(60.3)	0.966	67(59.9)	236(60.5)	0.895
EI	29 (17.9)	52 (15.3)	0.458	66 (16.9)	15 (13.4)	0.371
NFH	102 (63)	191 (56.2)	0.149	221 (56.7)	72 (64.3)	0.149
NFICU	35 (34)	58 (29.9)	0.470	75 (33.6)	18 (24.3)	0.135
Mortality	8 (4.9)	19 (5.6)	0.763	16 (4.1)	11 (9.8)	0.018
NBT: Need for blood transfusion, EI: Endoscopic intervention, NFH: Need for hospitalization, NFICU: Need for intensive care unit						
*The values in the table are given as numbers and percentages.						

In the binary logistic regression analysis, the CCI was identified as an independent factor associated with in-hospital mortality. In addition, Rh-negative status was associated with a 2.78-fold increase in the risk of in-hospital mortality compared with Rh-positive status. The results of the logistic regression analysis for factors associated with mortality are shown in Table 4.

Table 4. Multivariate binary logistic regression analysis of independent predictors of in-hospital mortality			
Variable	**Odds ratio**	**95% CI**	**p**
GCS	0.706	0.492-1.013	0.058
SPO_2	0.793	0.684-0.918	0.002
CCI	1.264	1.049-1.523	0.014
Blood transfusion	5.044	1.066-23.877	0.041

Table 4. Continued			
Altered consciousness	5.493	1.658-18.205	0.005
Rh - status	2.786	1.04-7.467	0.042
H3B2 score	1.880	1.230-2.875	0.004
GCS: Glasgow Coma Scale, SPO_2: Peripheral Capillary Oxygen Saturation, CCI: Charlson Comorbidity Index			

Discussion

In this study, we demonstrated that ABO blood groups had a limited impact on clinical outcomes in patients presenting with UGIB. No statistically significant differences were observed between blood groups with respect to the need for blood transfusion, hospitalization, ICU admission, or endoscopic intervention. Although in-hospital mortality did not differ significantly between the O and non-O blood group cohorts, mortality was significantly higher among Rh-negative patients compared with Rh-positive patients.

More recently, attention has been directed toward additional biological factors, including blood group, that may influence both the development and clinical course of UGIB. Several studies have suggested that blood group O may represent a genetic risk factor due to its association with duodenal ulcer disease, increased susceptibility to Helicobacter pylori infection, and a greater propensity for bleeding (9). Blood transfusion remains a cornerstone of UGIB management, particularly in patients presenting with hemodynamic instability. Although restrictive transfusion strategies are increasingly recommended, transfusion may be lifesaving in cases of ongoing or severe hemorrhage (10,11). Accurate prediction of transfusion requirements is therefore of clinical importance. In the present study, however, no significant association was identified between blood group and the need for blood transfusion, suggesting that blood group alone may not be a reliable predictor of transfusion requirement in UGIB.

Previous studies have reported that blood group O is associated with an increased risk of bleeding, with some authors suggesting up to a 60% higher bleeding risk compared with other blood groups. Moreover, blood group O has been described as an independent predictor of severe bleeding in UGIB, leading to recommendations that blood group be considered in bleeding risk assessment models (3). In this context, early identification of patients requiring critical care -such as hospitalization or ICU admission- is essential. Despite these reports, our findings did not demonstrate a significant association between blood group and the need for hospitalization or ICU admission, indicating that blood group may have limited utility in predicting the need for critical care in UGIB.

Several studies have also suggested that individuals with blood group O have a higher prevalence of H. pylori infection, gastritis, and peptic ulcer disease, potentially increasing the risk of peptic ulcer-related UGIB and the subsequent need for endoscopic intervention. Conversely, blood group A has been associated with an increased risk of gastric cancer (12,13). Additionally, a study involving patients undergoing colorectal endoscopic resection reported a higher bleeding tendency among individuals with blood group O, suggesting a potential increased requirement for endoscopic intervention (14). However, despite the well-documented association between blood group O and peptic ulcer disease, other studies have failed to demonstrate a significant relationship between ABO blood groups and ulcer development. One such study highlighted the importance of secretor status and its interaction with H. pylori colonization as potentially more influential factors (15). Consistent with these findings, our study did not reveal a significant difference between blood groups regarding the need for endoscopic intervention.

Given the broad clinical spectrum of UGIB, reliable mortality predictors are essential (16). The existing literature presents conflicting evidence regarding the association between blood groups and mortality in UGIB. Akışkan et al. reported higher mortality rates among patients with blood group O compared with other blood groups, whereas Bayan et al. observed no significant differences in rebleeding or mortality between patients with blood group O and those with non-O blood groups (2,17). Similarly, a study evaluating the impact of blood groups on esophageal variceal bleeding found no significant differences between blood group O and other blood groups with respect to the volume of blood transfused within the first 24 hours, the need for endoscopic intervention, bleeding rates at 7 and 30 days, or mortality (18). In line with these findings, our study demonstrated no statistically significant difference in mortality between patients with blood group O and those with non-O blood groups.

Some studies have suggested that bleeding-related mortality may be higher among individuals with Rh-negative blood type; however, this association may not be directly attributable to Rh status itself. Rather, it has been proposed that the relative scarcity of Rh-negative blood compared with Rh-positive blood may contribute to delays in transfusion, potentially

affecting outcomes (18,20). In studies conducted in Türkiye, the prevalence of Rh-negative blood type has been reported to range between 10.1% and 11.3%, indicating that approximately 1 in 10 individuals in the population is Rh-negative (21,22).

Although our study did not identify a significant difference between Rh-positive and Rh-negative patients with respect to transfusion requirements, data regarding the timing of blood transfusion were not available. Rh-negative blood products are frequently utilized in emergency settings, particularly in patients requiring massive transfusion, which may further complicate their availability. Therefore, the higher mortality observed among Rh-negative patients in our study may be related to delays in the initiation of blood transfusion among patients requiring transfusion, rather than to Rh status itself.

Study Limitations

This study has several limitations. First, its retrospective and single-center design may limit the generalizability of the findings. The inclusion of patients with oesophageal variceal bleeding in the study may have affected the results. Data on endoscopy timing were unavailable and therefore could not be included. In addition, the distribution of blood groups within the study population warrants cautious interpretation when extrapolating the results to broader populations. Furthermore, the absence of data regarding the timing of blood transfusions precluded evaluation of the potential impact of transfusion delays on clinical outcomes. Therefore, multicenter, prospective studies incorporating detailed transfusion timing data, transfusion requirements, and mortality outcomes are needed to further clarify the relationship between blood groups and clinical outcomes in UGIB.

Conclusion

The findings of this study suggest that the impact of ABO blood groups on adverse clinical outcomes in patients with upper gastrointestinal bleeding (UGIB) is limited. Accordingly, blood group alone does not appear to be sufficient for risk stratification or clinical decision-making in this patient population. Although higher mortality was observed among Rh-negative patients, this finding may be related to factors such as delays in blood transfusion rather than to Rh status itself, given the relative rarity of Rh-negative blood in the general population.

Ethical Approval: *Ethical approval for the study was obtained from the Mersin University Clinical Research Ethics Committee (date: December 11, 2024, approval no: 2024/1231).*

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Literature search: A.H.G., Ç.S.B., A.Y.
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Manuscript preparation: A.Y., S.B., G.T.
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