

# Upper Gastrointestinal Bleeding: A Retrospective, Single-Center Experience on the Role of Endoscopy and Outcomes

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## Abstract

**Background:** Upper gastrointestinal bleeding (UGIB) is a common and potentially fatal medical emergency. This study aimed to investigate the frequency, causes, outcomes, and efficacy of endoscopy in the treatment of UGIB at King Fahad Central Hospital in Jazan, Saudi Arabia.

**Methods:** Between January 2017 and December 2023, a retrospective study was performed including all hospitalized patients with UGIB. This research investigated sociodemographic characteristics, clinical history, endoscopic findings, treatment options, and results using statistical analysis, which included both descriptive and inferential approaches.

**Results:** The study included 483 patients (of which 74.1% men), with a mean age of  $53.9 \pm 19.5$  years. Hematemesis was observed in 67.5% of the patients, whereas melena occurred in 49.7% of the cases. Two-hundred sixty-two (54.2%) patients underwent endoscopy within the first 24 h from presentation. The most frequent endoscopic findings were esophageal varices (52.2%) and duodenal ulcers (21.7%). Bandings accounted for 48.0% of all endoscopic procedures, whereas 36.9% of the patients received epinephrine injections along with endoclips. Medical therapy mostly consisted of a mix of proton pump inhibitors (PPIs) and octreotide. A significant minority (43.5%) of the patients stayed in the hospital for 1 - 3 days, while 59.6% did not need blood transfusions. During the first 3 days, 7% of patients

experienced rebleeding, with a 6% mortality rate. Using multivariate regression analysis, rebleeding was strongly associated with initial presentation with shock ( $P < 0.001$ ), renal disease ( $P = 0.01$ ), and increased transfusion requirement ( $P = 0.001$ ). Mortality was strongly associated with steroid usage ( $P = 0.007$ ), increasing transfusion requirements ( $P < 0.0001$ ), and rebleeding ( $P = 0.002$ ).

**Conclusions:** Timely endoscopy and proper treatment dramatically improved UGIB results. Identifying those who are at high risk and acting swiftly is a critical step in reducing the likelihood of recurrent bleeding and fatality.

**Keywords:** Ulcer; Proton pump inhibitors; Rebleeding; Mortality; Saudi Arabia; Epidemiology

## Introduction

Upper gastrointestinal bleeding (UGIB) is a frequent medical emergency that may be fatal and requires immediate diagnosis and treatment [1]. The phrase “Treitz ligament bleeding” refers to hemorrhage that occurs in the stomach, esophagus, or duodenum before reaching the ligament of Treitz. The incidence of UGIB varies by country, with estimates ranging from 50 to 172 cases per 100,000 people per year [2, 3]. In the United States, UGIB causes approximately 300,000 hospitalizations per year, costing more than \$2.5 billion [4]. Although diagnostic and treatment procedures have improved, UGIB still causes significant morbidity, mortality, and high healthcare costs [5, 6].

UGIB has a complex etiology and can be divided mainly into variceal and non-variceal causes. Variceal bleeding induced by portal hypertension is primarily associated with cirrhosis and accounts for approximately 10-30% of UGIB cases [7, 8]. Esophageal varices are the leading cause of variceal bleeding, and gastric varices are the second most common [9]. The most common causes of UGIB are non-variceal, including peptic ulcer disease, erosive esophagitis, Mallory-Weiss syndrome, and malignancies [10, 11]. Peptic ulcer disease, which includes both gastric and duodenal ulcers, is the leading

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cause of non-variceal UGIB, accounting for 40-50% of cases [12]. Non-steroidal anti-inflammatory drugs (NSAIDs) and *Helicobacter pylori* infections pose a high risk of peptic ulcer bleeding [13, 14]. Identifying the reason is critical for directing treatment and projecting the outcomes [1].

Endoscopy is critical for the detection and treatment of UGIB. It allows for the visualization of the bleeding location, assessment of its severity, and implementation of treatments [15]. Early performance of endoscopy within 24 h of arrival has been linked to enhanced outcomes, reduced hospital stays, and decreased healthcare expenses [16, 17]. The Rockall and Glasgow-Blatchford scores are commonly employed as pre-endoscopic risk assessment tools to predict the requirement for medical intervention and the likelihood of mortality [18, 19]. Endoscopic interventions, such as the administration of injectable substances such as epinephrine, the use of thermal coagulation techniques such as bipolar electrocoagulation, and the application of mechanical hemostasis methods such as hemostatic clips and endoclips, have proven to be successful in achieving hemostasis and reducing the likelihood of rebleeding [20, 21]. The selection of endoscopic therapy was based on the origin, size, and intensity of bleeding lesions [22].

The prognosis of UGIB is influenced by several factors, such as patient demographics, underlying cause of bleeding, intensity of bleeding, and timely administration of medical attention [23]. Elevated mortality rates have been associated with advanced age, presence of many medical conditions, unstable blood circulation, and delayed medical intervention [24, 18]. The mortality rate of UGIB is still considerable, varying from 2% to 15%. Variceal bleeding is associated with a greater risk of death than non-variceal bleeding [25, 26]. Rebleeding, which occurs in 10-20% of patients, is another significant consequence that contributes to increased morbidity and mortality [27]. Proton pump inhibitors (PPIs) and vasoactive medications have been shown to enhance outcomes by preventing rebleeding [28, 29].

Research on the epidemiology and management of UGIB in Saudi Arabia is limited. This study aimed to examine the incidence, etiology, outcome, and importance of endoscopy at King Fahad Central Hospital, a specialized medical center in the Jazan region of Saudi Arabia. Gaining a comprehensive understanding of local epidemiology and practice patterns is crucial for delivering the best possible patient care, effectively allocating resources, and developing guidelines supported by scientific data. The findings of this study contribute to the limited body of research on UGIB in Saudi Arabia and offer valuable insights for healthcare professionals and policymakers in the region.

## Materials and Methods

### Study design and setting

This retrospective investigation was conducted at the King Fahad Central Hospital, a tertiary care facility in the Jazan region of Saudi Arabia. The hospital offers the local community a wide range of medical services and acts as a referral center for nearby areas.

### Study period and population

This study analyzed the medical records of individuals admitted to the hospital for UGIB between January 2017 and December 2023. The study involved participants over 18 years of age who were admitted to the hospital for UGIB. Individuals under 18 years of age and those with incomplete records were excluded.

### Data collection

Data were obtained from patients' medical records using a standardized data sheet created to meet the aims of the study. The data gathered included the following: 1) age and gender of patients; 2) hematemesis, melena, hematochezia, various indications of bleeding; 3) past gastrointestinal/liver disease; 4) coexisting problems (cancer, chronic liver, renal, other diseases); 5) antiplatelet, anticoagulant, corticosteroid, NSAID, selective serotonin reuptake inhibitor (SSRI), and other medication history; 6) test results from the lab; 7) time between bleeding and endoscopy (< 24, 24 - 48, > 48 h); 8) endoscopic findings: duodenal ulcer, esophageal varices, gastric ulcer, angiodysplasia, Mallory-Weiss syndrome, esophageal erosion; 9) endoscopic intervention (epinephrine injection with endoclips, heat treatment, banding, sclerotherapy, argon plasma coagulation, and Glubran injection); 10) medical/surgical treatment; 11) required transfusions (0, 1 - 2, > 2); 12) duration of hospital stay: < 1 day, 1 - 3 days, 4 - 5 days, > 5 days; 13) rebleeding rate within 72 h after admission; 14) death causes.

### Statistical analysis

Statistical calculations were conducted using IBM SPSS software version 29. Data from descriptive and inferential statistics were analyzed in this study. Descriptive statistics defined the sociodemographic, clinical, and other categorical attributes of the study population. Frequencies and percentages were calculated for variables such as gender, clinical presentation (hematemesis, melena, hematochezia, other symptoms), presence of shock (systolic blood pressure (SBP) < 90 mm Hg), history of previous UGIB, coexisting medical conditions (cancer, chronic liver disease, renal disease, others), drug history (anti-platelets, anticoagulation, corticosteroids, NSAIDs, SSRIs, others), time interval between the bleeding episodes and endoscopy (< 24 h, 24 - 48 h, > 48 h), endoscopic findings (duodenal ulcer, esophageal varices, gastric ulcer, gastric varices, angiodysplasia, Mallory-Weiss syndrome, esophageal erosion), endoscopic intervention (epinephrine injection + endoclips, epinephrine injection + thermal treatment, banding, sclerotherapy, argon plasma coagulation, Glubran injection), management (yes/no), transfusion requirement (> 2 units, 0 unit, 1 - 2 units), length of the hospital stay (< 1 day, > 5 days, 1 - 3 days, 4 - 5 days), rebleeding in 72 h of hospitalization (yes/no), and discharged disposition (died, discharge/transfer to other facility, dis-

charged home, others).

Uninterrupted numerical data, such as age, were presented using statistical measures, including mean, standard deviation, median, and interquartile range (IQR). Statistical inference was employed to evaluate the relationships between the variables and to establish the statistical significance of the results. The Chi-square test was used to assess the relationships between categorical variables. Fisher's exact test was used in cases where the anticipated cell count was less than 5. Tests were performed to evaluate the associations between sociodemographic variables and the clinical history of discharged patients as well as the endoscopic findings, therapy, and outcomes of these patients. The examinations also assessed the sociodemographic and clinical backgrounds of those who recovered, along with their endoscopic observations, treatment, and outcomes.

The continuous variable "age" normality was assessed using the Shapiro-Wilk test. The test revealed that age did not follow a normal distribution ( $P < 0.05$ ). Due to the absence of a normal distribution in the age variable, non-parametric methods, such as the Mann-Whitney U and Kruskal-Wallis tests, were used to compare the age distribution across several groups, such as discharged disposition and rebleeding status. Statistical significance was determined using a  $P$ -value  $\leq 0.05$ , while the precision of the results was evaluated using a 95% confidence interval. The complete data analysis approach, encompassing both descriptive and inferential statistics, guarantees a meticulous examination of the data and establishes a solid basis for comprehending the findings.

### Ethical considerations

The Institutional Review Board (IRB) of the Jazan Health Ethics Committee, Ministry of Health, Saudi Arabia authorized the study protocol under approval number No. 2406. This study was conducted following the Declaration of Helsinki.

### Results

This study included 483 patients. The mean age of the patients was  $53.9 \pm 19.5$  years. There was a notable male preponderance, comprising 358 (74.1%) males and 125 (25.9%) females. Hematemesis was the primary symptom observed in 326 (67.5%) patients. A total of 240 (49.7%) patients had melena and 21 (4.3%) patients had hematochezia. Forty (8.3%) patients presented with additional symptoms. Of the 483 individuals, the majority ( $N = 431$ ; 89.2%) did not exhibit shock, characterized by an SBP  $< 90$  mm Hg. However, 52 (10.8%) patients experienced severe bleeding. One hundred ninety-seven (40.8%) patients had a history of UGIB, whereas 286 (59.2%) did not. Thirteen (2.7%) patients had cancer, 283 (58.6%) had chronic liver disease, 39 (8.1%) had renal disease, and 210 (43.5%) had various medical disorders. Medication history showed that 2.9% of the patients were taking antiplatelet agents, 5.0% were on anticoagulants, 4.1% were on corticosteroids, 8.3% were on NSAIDs, and 1.0% were on SSRIs. A total of 421 patients

(87.2%) used additional drugs. The period between the bleeding episodes and endoscopy was inconsistent. Of the patients, 262 (54.2%) underwent endoscopy within 24 h of bleeding, 146 (30.2%) within 24 - 48 h, and 75 (15.5%) after more than 48 h (Table 1).

Table 2 lists specific endoscopic observations, interventions, and results. The prevalent endoscopic observations included esophageal varices (52.2%), duodenal ulcers (21.7%), and gastric ulcers (16.1%). Less common discoveries included gastric varices (8.5%), esophageal erosions (1.7%), Mallory-Weiss syndrome (1.0%), and angiodysplasia (0.4%). Several endoscopic procedures have been performed for gastrointestinal bleeding. Banding was the most common procedure used in 232 patients (48.0%), followed by epinephrine injection combined with endoclips in 178 patients (36.9%). The less frequently used methods included Glubran injection (36 cases, 7.5%), argon plasma coagulation (29 cases, 6.0%), sclerotherapy (25 cases, 5.2%), and epinephrine injection with thermal treatment (24 cases, 5.0%).

The most common approach was the combination of PPIs and octreotide, used in 143 cases (29.6%), closely followed by triple therapy of intravenous (IV) fluids, PPI, and octreotide in 137 cases (28.4%). PPIs alone were administered in 104 cases (21.5%), while IV fluids with PPI were used in 89 cases (18.4%). Less frequently used treatments included IV fluids alone (seven cases, 1.4%), IV fluids with octreotide (two cases, 0.4%), and octreotide alone (one case, 0.2%). Surgery was necessary in 3.5% of the cases. Most patients (59.6%) did not require blood transfusions, 26.3% received 1 - 2 units, and 14.1% received more than two units. There was a range in the duration of hospital stay: 43.5% stayed for 1 - 3 days, 25.3% stayed for  $> 5$  days, 18.6% stayed for 4 - 5 days, and 12.6% stayed for less than 1 day. Of the patients, 7.0% experienced rebleeding within 72 h of hospitalization. Among the patients, 72.0% were discharged to their homes, 9.7% were discharged or moved to another facility, and 6.0% died during their hospital stay. As shown in Table 2, 12.2% of patients had different discharge dispositions.

Table 3 shows the relationships between sociodemographic characteristics, patients' clinical histories, and the outcome of their discharge. Sociodemographic characteristics and clinical indicators were strongly associated with the discharge status of the patients with UGIB. The study found that age significantly influenced the results, with the group that "died" having a median age of 63, the highest among the groups. The occurrence of melena ( $P = 0.001$ ), shock (SBP  $< 90$  mm Hg;  $P = 0.001$ ), history of UGIB ( $P = 0.001$ ), renal disease ( $P = 0.001$ ), and corticosteroid use ( $P = 0.001$ ) were also strongly associated with discharge.

Patients who died, were released, or transferred to another facility had a more significant proportion of these risk variables than those who were sent to their homes or experienced different outcomes. The mortality rate among patients with shock was 28.8%, although only 40.4% of patients were discharged to their homes. Likewise, 40.0% of the patients receiving corticosteroids succumbed, whereas only 50.0% were released to their homes. Individuals with chronic liver disease and renal illness exhibited a higher mortality rate and a lower discharge rate from their homes than individuals who did not

**Table 1.** Patients' Sociodemographic Features and Clinical History

Sociodemographic features and clinical history	N (%)
Age, years (mean ± SD) <sup>a</sup>	53.9 ± 19.5
Gender	
Female	125 (25.9%)
Male	358 (74.1%)
Clinical presentation	
Hematemesis	326 (67.5%)
Melena	240 (49.7%)
Hematochezia	21 (4.3%)
Other	40 (8.3%)
Shock (SBP < 90 mm Hg)	
No	431 (89.2%)
Yes	52 (10.8%)
History of previous UGIB	
No	286 (59.2%)
Yes	197 (40.8%)
Coexisting medical condition	
Cancer	13 (2.7%)
Chronic liver disease	283 (58.6%)
Renal disease	39 (8.1%)
Others	210 (43.5%)
Drug history	
Anti-platelets	14 (2.9%)
Anticoagulation	24 (5.0%)
Corticosteroids	20 (4.1%)
NSAIDs	40 (8.3%)
SSRI	5 (1.0%)
Others	421 (87.2%)
The time interval between the bleeding episodes and endoscopy	
< 24 h	262 (54.2%)
> 48 h	75 (15.5%)
24 - 48 h	146 (30.2%)

<sup>a</sup>Median age was 54 (interquartile range: 38 - 68 years). N: number; NSAIDs: non-steroidal anti-inflammatory drugs; %: percentage; SBP: systolic blood pressure; SD: standard deviation; SSRI: selective serotonin reuptake inhibitor; UGIB: upper gastrointestinal bleeding.

have these comorbidities.

Notably, variables such as sex, presence of hematemesis, hematochezia, malignancy, use of antiplatelets, anticoagulants, NSAIDs, SSRIs, and the time gap between bleeding episodes and endoscopy were not significantly correlated with discharge disposition (all  $P > 0.05$ ).

Table 4 shows the association between endoscopic findings, treatment modalities, patient outcomes, and discharge disposition. A significant association was observed between the presence of gastric ulcers and the discharge disposition. Patients with gastric ulcers were less likely to be discharged home (62.8% vs. 73.8%) and less likely to die (5.1% vs. 6.2%)

than those without ulcers. Several endoscopic interventions showed significant associations with discharge disposition: thermal treatment combined with epinephrine injection had a significant association, with fewer patients undergoing this treatment being discharged home (50.0% vs. 73.2%) and a greater number of patients dying (12.5% vs. 5.7%). Those who underwent banding had a significantly greater proportion of patients who died and were discharged than those who did not. Argon plasma coagulation was also significantly associated with discharged disposition, with a lesser proportion of patients undergoing these interventions being discharged home compared to those who did not undergo these interventions.

**Table 2.** Endoscopic Observations, Therapy, and Results of the Patients

Endoscopic findings, treatment, and outcome	N (%)
Endoscopy finding	
Gastric ulcer	78 (16.1%)
Duodenal ulcer	105 (21.7%)
Esophageal varices	252 (52.2%)
Gastric varices	41 (8.5%)
Esophageal erosion	8 (1.7%)
Mallory-Weiss syndrome	5 (1.0%)
Angiodysplasia	2 (0.4%)
Endoscopic intervention	
Epinephrine injection + thermal treatment	24 (5.0%)
Epinephrine injection + endoclips	178 (36.9%)
Banding	232 (48.0%)
Sclerotherapy	25 (5.2%)
Glubran injection	36 (7.5%)
APC	29 (6.0%)
Medical management	
IV fluid	7 (1.4%)
IV fluid, octreotide	2 (0.4%)
IV fluid, PPI	89 (18.4%)
IV fluid, PPI, octreotide	137 (28.4%)
Octreotide	1 (0.2%)
PPI	104 (21.5%)
PPI, octreotide	143 (29.6%)
Surgical management	
No	466 (96.5%)
Yes	17 (3.5%)
Transfusion requirement	
> 2 units	68 (14.1%)
0 unit	288 (59.6%)
1 - 2 units	127 (26.3%)
Length of the hospital stay	
< 1 day	61 (12.6%)
> 5 days	122 (25.3%)
1 - 3 days	210 (43.5%)
4 - 5 days	90 (18.6%)
Rebleeding within 72 h of hospitalization	
No	449 (93.0%)
Yes	34 (7.0%)
Discharged disposition	
Died	29 (6.0%)
Discharge/transfer to another facility	47 (9.7%)
Discharged home	348 (72.0%)
Others	59 (12.2%)

APC: argon plasma coagulation; IV: intravenous; N: number; %: percentage; PPI: proton pump inhibitor.

Transfusion requirement showed a significant association with discharge disposition, with patients requiring more than two units of blood being less likely to be discharged home and more likely to die. The length of hospital stay was significantly associated with the discharge disposition. Patients with longer hospital stay were less likely to be discharged and more likely to die. Rebleeding within 72 h of hospitalization showed a significant association with discharge disposition, with patients experiencing rebleeding being less likely to be discharged home and more likely to die. No significant association was observed between surgical management and discharge disposition.

Table 5 shows the association between various sociodemographic characteristics, clinical history, and the occurrence of rebleeding. There was no significant difference in the median age between the patients who experienced rebleeding and those who did not. Similarly, sex was not significantly associated with rebleeding. Among the clinical presentations, the presence of melena was significantly associated with rebleeding, with a higher proportion of patients with melena experiencing rebleeding than those without.

No significant associations were found for other clinical presentations (hematemesis, hematochezia, or other symptoms) or for rebleeding. The presence of shock (SBP < 90 mm Hg) was significantly associated with rebleeding, with a substantially higher proportion of patients experiencing shock and rebleeding. Patients with a history of UGIB were also more likely to experience rebleeding. Moreover, patients with renal disease had a significantly higher likelihood of rebleeding than those without renal disease. Among drug histories, the use of anticoagulants and corticosteroids was significantly associated with rebleeding, with a higher proportion of users experiencing rebleeding than non-users.

Table 6 presents the association between endoscopic findings, treatments, patient outcomes, and rebleeding within 72 h of hospitalization. Patients with duodenal ulcer and Mallory-Weiss syndrome showed a significant association with rebleeding, with a higher proportion of patients experiencing rebleeding than those without the syndrome. Other endoscopic findings did not show a significant association with rebleeding. The use of epinephrine injections combined with endoclips was significantly associated with rebleeding, with a higher proportion of patients undergoing this intervention experiencing rebleeding.

No significant associations were found between the other endoscopic interventions and rebleeding. None of the medical management approaches were significantly associated with rebleeding. Surgical management was not significantly associated with rebleeding. Patients requiring more than two units of transfusion exhibited a significant association with rebleeding, with a notably higher proportion of patients experiencing rebleeding than those requiring 0 or 1 - 2 units of transfusion. Both length of hospital stay and discharge disposition were significantly associated with rebleeding. Patients with longer hospital stays exhibited a higher proportion of rebleeding than those with shorter stays.

Multivariable logistic regression was performed for the specific outcomes of rebleeding (Table 7) and mortality due to UGIB (Table 8). Rebleeding was strongly associated with

**Table 3.** Association Between Sociodemographic Characteristics and Clinical History of Patients Discharged

Variable	Discharged disposition, N (%)			P-value
	Died	Discharge/transfer to another facility	Discharged home Others	
<b>Sociodemographic characteristics</b>				
Age, median (IQR)	63 (57 - 76)	57 (36 - 67)	52 (38 - 67)	57 (37 - 76) 0.009*
<b>Gender</b>				
Female	7 (5.6%)	11 (8.8%)	90 (72.0%)	17 (13.6%) 0.927
Male	22 (6.1%)	36 (10.1%)	258 (72.1%)	42 (11.7%)
<b>Clinical presentation</b>				
Hematemesis	21 (6.4%)	34 (10.4%)	236 (72.4%)	35 (10.7%) 0.451
Melena	24 (10.0%)	27 (11.3%)	164 (68.3%)	25 (10.4%) 0.001*
Hematochezia	1 (4.8%)	1 (4.8%)	15 (71.4%)	4 (19.0%) 0.715
Other	2 (5.0%)	3 (7.5%)	30 (75.0%)	5 (12.5%) 0.988
Shock (SBP < 90 mm Hg)	15 (28.8%)	3 (5.8%)	21 (40.4%)	13 (25.0%) < 0.001*
History of previous UGIB	20 (10.2%)	20 (10.2%)	126 (64.0%)	31 (15.7%) 0.001*
<b>Coexisting medical condition</b>				
Cancer	2 (15.4%)	1 (7.7%)	8 (61.5%)	2 (15.4%) 0.341
Chronic liver disease	20 (7.1%)	27 (9.5%)	210 (74.2%)	26 (9.2%) 0.076
Renal disease	11 (27.5%)	3 (7.5%)	23 (57.5%)	3 (7.5%) < 0.001*
Others	11 (5.2%)	24 (11.4%)	144 (68.6%)	31 (14.8%) 0.255
<b>Drug history</b>				
Anti-platelets	1 (7.1%)	2 (14.3%)	9 (64.3%)	2 (14.3%) 0.729
Anticoagulation	3 (12.5%)	0 (0.0%)	16 (66.7%)	5 (20.8%) 0.079
Corticosteroids	8 (40.0%)	2 (10.0%)	10 (50.0%)	0 (0.0%) < 0.001*
NSAIDs	3 (7.5%)	1 (2.5%)	29 (72.5%)	7 (17.5%) 0.265
SSRI	0 (0.0%)	1 (20.0%)	3 (60.0%)	1 (20.0%) 0.511
Others	24 (5.7%)	45 (10.7%)	305 (72.4%)	47 (11.2%) 0.071
<b>The time interval between the bleeding episodes and endoscopy</b>				
< 24 h	14 (5.3%)	21 (8.0%)	193 (73.7%)	34 (13.0%) 0.671
> 48 h	4 (5.3%)	11 (14.7%)	52 (69.3%)	8 (10.7%)
24 - 48 h	11 (7.5%)	15 (10.3%)	103 (70.5%)	17 (11.6%)

\*Statistical significance. IQR: interquartile range; N: number; NSAIDs: non-steroidal anti-inflammatory drugs; %: percentage; SBP: systolic blood pressure; SSRI: selective serotonin reuptake inhibitor; UGIB: upper gastrointestinal bleeding.

**Table 4.** Association of Endoscopic Findings, Treatment, and Outcome of the Patients With Discharge Disposition

	Discharged disposition, N (%)				P-value
	Died	Discharge/transfer to other facility	Discharged home	Others	
<b>Endoscopy finding</b>					
Gastric ulcer	4 (5.1%)	6 (7.7%)	49 (62.8%)	19 (24.4%)	0.010*
Duodenal ulcer	8 (7.6%)	11 (10.5%)	72 (68.6%)	14 (13.3%)	0.796
Esophageal varices	14 (5.6%)	25 (9.9%)	191 (75.8%)	22 (8.7%)	0.091
Gastric varices	2 (4.9%)	6 (14.6%)	29 (70.7%)	4 (9.8%)	0.697
Esophageal erosion	0 (0.0%)	2 (25.0%)	5 (62.5%)	1 (12.5%)	0.351
Mallory-Weiss syndrome	1 (20.0%)	0 (0.0%)	4 (80.0%)	0 (0.0%)	0.421
Angiodysplasia	1 (50.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)	0.054
<b>Endoscopic intervention</b>					
Epinephrine injection + thermal treatment	3 (12.5%)	1 (4.2%)	12 (50.0%)	8 (33.3%)	0.006*
Epinephrine injection + endoclips	11 (6.2%)	21 (11.8%)	120 (67.4%)	26 (14.6%)	0.320
Banding	15 (6.5%)	22 (9.5%)	178 (76.7%)	17 (7.3%)	0.016*
<b>Sclerotherapy</b>					
Yes	0 (0.0%)	2 (8.0%)	18 (72.0%)	5 (20.0%)	0.465
No	29 (6.3%)	45 (9.8%)	330 (72.1%)	54 (11.8%)	
Glubran injection	1 (2.8%)	3 (8.3%)	28 (77.8%)	4 (11.1%)	0.961
APC	0 (0.0%)	2 (6.9%)	14 (48.3%)	13 (44.8%)	< 0.001*
<b>Medical management</b>					
IV fluid	0 (0.0%)	1 (14.3%)	6 (85.7%)	0 (0.0%)	0.060
IV fluid, octreotide	0 (0.0%)	0 (0.0%)	2 (100.0%)	0 (0.0%)	
IV fluid, PPI	6 (6.7%)	6 (6.7%)	55 (61.8%)	22 (24.7%)	
IV fluid, PPI, octreotide	5 (3.6%)	9 (6.6%)	112 (81.8%)	11 (8.0%)	
Octreotide	0 (0.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	
PPI	6 (5.8%)	12 (11.5%)	74 (71.2%)	12 (11.5%)	
PPI, octreotide	12 (8.4%)	19 (13.3%)	98 (68.5%)	14 (9.8%)	
Surgical management	0 (0.0%)	2 (11.8%)	10 (58.8%)	5 (29.4%)	0.128
<b>Transfusion requirement</b>					
> 2 units	24 (35.3%)	9 (13.2%)	31 (45.6%)	4 (5.9%)	< 0.001*
0 unit	4 (1.4%)	21 (7.3%)	230 (79.9%)	33 (11.5%)	
1 - 2 units	1 (0.8%)	17 (13.4%)	87 (68.5%)	22 (17.3%)	
<b>Length of the hospital stay</b>					
< 1 day	0 (0.0%)	15 (24.6%)	45 (73.8%)	1 (1.6%)	< 0.001*
> 5 days	23 (18.9%)	13 (10.7%)	71 (58.2%)	15 (12.3%)	
1 - 3 days	3 (1.4%)	17 (8.1%)	168 (80.0%)	22 (10.5%)	
4 - 5 days	3 (3.3%)	2 (2.2%)	64 (71.1%)	21 (23.3%)	
Rebleeding in 72 h of hospitalization	14 (41.2%)	1 (2.9%)	13 (38.2%)	6 (17.6%)	< 0.001*

\*Statistical significance. APC: argon plasma coagulation; IV: intravenous; N: number; %: percentage; PPI: proton pump inhibitor.

**Table 5.** Association Between Sociodemographic Characteristics and Clinical History of Patients With Rebleeding

	Rebleeding in 72 h of hospitalization, N (%)		P value
	Yes	No	
Age, median (IQR)	58 (40 - 74)	54 (38 - 68)	0.234
Gender			
Female	9 (7.2%)	116 (92.8%)	0.935
Male	25 (7.0%)	333 (93.0%)	
Clinical presentation			
Hematemesis	26 (8.0%)	300 (92.0%)	0.246
Melena	23 (9.6%)	217 (90.4%)	0.030*
Hematochezia	1 (4.8%)	20 (95.2%)	1.000
Other	3 (7.5%)	37 (92.5%)	0.754
Shock (SBP < 90 mm Hg)	18 (34.6%)	34 (65.4%)	< 0.001*
History of previous UGIB	21 (10.7%)	176 (89.3%)	0.010*
Coexisting medical condition			
Chronic liver disease	19 (6.7%)	264 (93.3%)	0.739
Renal disease	12 (30.8%)	27 (69.2%)	< 0.001*
Cancer	2 (15.4%)	11 (84.6%)	0.231
Others	15 (7.1%)	195 (92.9%)	0.938
Drug history			
Anti-platelets	2 (14.3%)	12 (85.7%)	0.258
Anticoagulation	7 (29.2%)	17 (70.8%)	< 0.001*
Corticosteroids	4 (20.0%)	16 (80.0%)	0.044*
NSAIDs	3 (7.5%)	37 (92.5%)	0.754
SSRI	0 (0.0%)	5 (100.0%)	1.000
Others	27 (6.4%)	394 (93.6%)	0.180
Time interval between the bleeding episodes and endoscopy			
< 24 h	13 (5.0%)	249 (95.0%)	0.151
> 48 h	7 (9.3%)	68 (90.7%)	
24 - 48 h	14 (9.6%)	132 (90.4%)	

\*Statistical significance. IQR: interquartile range; N: number; NSAIDs: non-steroidal anti-inflammatory drugs; %: percentage; SBP: systolic blood pressure; SSRI: selective serotonin reuptake inhibitor; UGIB: upper gastrointestinal bleeding.

presentation with shock (odds ratio (OR) 6.638,  $P < 0.0001$ ), pre-existing renal disease (OR 4.155,  $P = 0.010$ ) and increasing transfusion requirements (OR 2.702,  $P = 0.001$ ). Mortality was strongly associated with pre-existing steroid usage (OR 7.099,  $P = 0.007$ ), increasing transfusion requirements (4.996,  $P < 0.0001$ ), and rebleeding (OR 7.936,  $P = 0.002$ ).

## Discussion

This study provides critical information on the prevalence, causation, outcomes, and use of endoscopy in the management of UGIB. Hematemesis (67.5%) and melena (49.7%) were the most common clinical signs, consistent with previous research findings [30, 31]. Notably, esophageal varices (52.2%) and duodenal ulcers (21.7%) were the most common endoscopic find-

ings, underscoring the high prevalence of chronic liver disease (58.6%) in this region. According to a previous study, variceal bleeding accounted for 18.2% of UGIB cases, whereas peptic ulcer disease accounted for 69.7% [32]. The high occurrence of esophageal varices in our study group was linked to the high frequency of chronic liver illness in the Jazan region, primarily caused by chronic hepatitis B and C infections [33, 34].

Endoscopic interventions, including banding (48.0%) and epinephrine with endoclips (36.9%), were commonly employed. These results align with international guidelines that emphasize the significance of endoscopic therapy in treating UGIB [1, 10]. Prompt application of endoscopic treatment has been proven to enhance results, lower rebleeding rates, and minimize death in patients with UGIB [20, 21].

Most patients underwent endoscopy within 24 h after the bleeding event, aligning with guidelines advocating for early

**Table 6.** Association of Endoscopic Findings, Treatment, and Outcome of Patients With Rebleeding

	Rebleeding in 72 h of hospitalization, N (%)		P value
	Yes	No	
<b>Endoscopic findings</b>			
Gastric ulcer	5 (6.4%)	73 (93.6%)	0.521
Duodenal ulcer	12 (11.4%)	93 (88.6%)	0.047*
Esophageal varices	13 (5.2%)	239 (94.8%)	0.092
Gastric varices	3 (7.3%)	38 (92.7%)	1.000
Esophageal erosion	2 (25.0%)	6 (75.0%)	0.103
Mallory-Weiss syndrome	3 (60.0%)	2 (40.0%)	0.003*
Angiodysplasia	1 (50.0%)	1 (50.0%)	0.136
<b>Endoscopic intervention</b>			
Epinephrine injection + thermal treatment	2 (8.3%)	22 (91.7%)	1.000
Epinephrine injection + endoclips	19 (10.7%)	159 (89.3%)	0.017*
Banding	13 (5.6%)	219 (94.4%)	0.236
Sclerotherapy	0 (0.0%)	25 (100.0%)	0.178
Glubran injection	1 (2.8%)	35 (97.2%)	0.355
APC	2 (6.9%)	27 (93.1%)	1.000
<b>Medical management</b>			
IV fluid	1 (14.3%)	6 (85.7%)	0.438
IV fluid, octreotide	0 (0.0%)	2 (100.0%)	
IV fluid, PPI	10 (11.2%)	79 (88.8%)	
IV fluid, PPI, octreotide	9 (6.6%)	128 (93.4%)	
Octreotide	0 (0.0%)	1 (100.0%)	
PPI	7 (6.7%)	97 (93.3%)	
PPI, octreotide	7 (4.9%)	136 (95.1%)	
Surgical management	2 (11.8%)	15 (88.2%)	0.622
<b>Transfusion requirement</b>			
> 2 units	19 (27.9%)	49 (72.1%)	< 0.001*
0 unit	6 (2.1%)	282 (97.9%)	
1 - 2 units	9 (7.1%)	118 (92.9%)	
<b>Length of the hospital stay</b>			
< 1 day	0 (0.0%)	61 (100.0%)	< 0.001*
> 5 days	23 (18.9%)	99 (81.1%)	
1 - 3 days	5 (2.4%)	205 (97.6%)	
4 - 5 days	6 (6.7%)	84 (93.3%)	

\*Statistical significance. APC: argon plasma coagulation; IV: intravenous; N: number; %: percentage; PPI: proton pump inhibitor.

endoscopy (within 24 h) for patients with UGIB [35, 36]. Early endoscopy is associated with better results, reduced hospital stays, and decreased healthcare expenses [16, 17].

The study found that older age, presence of melena, shock, renal disease, and corticosteroid use were associated with adverse outcomes. Most of these factors held their ground even when logistic regression analysis was performed. Previous studies have identified comparable risk factors for worse outcomes in individuals with UGIB; therefore, these findings were

consistent with previous researches [18, 24]. Identifying these risk indicators is critical for categorizing patients according to their risk and implementing appropriate therapeutic measures.

The total mortality rate was 6.0%, which is consistent with the 2-15% range reported in the literature [25, 26]. The likelihood of rebleeding within 72 h of admission was 7.0%, underscoring the significance of vigilant monitoring and prompt care in patients with UGIB. To manage UGIB, a multidisciplinary approach is required that may involve endoscopic, phar-

**Table 7.** OR for Development of Rebleed With Regard to Multiple Potential Risk Factors

Factors that may predispose for rebleeding within 72 h	OR (95% confidence interval)	P-value
Age	0.988 (0.966 - 1.010)	0.293
Presentation with shock	6.638 (2.456 - 17.945)	< 0.0001*
History of UGIB	1.502 (0.621 - 3.636)	0.367
Renal disease	4.155 (1.405 - 12.285)	0.010*
Liver disease	2.146 (0.493 - 9.341)	0.309
Cancer	1.722 (0.280 - 10.586)	0.558
Blood thinners <sup>a</sup>	1.395 (0.454 - 4.287)	0.561
NSAID excluding ASA	1.080 (0.235 - 4.960)	0.921
Steroids	0.635 (0.145 - 2.793)	0.548
Time to endoscopy <sup>b</sup>	1.627 (0.945 - 2.800)	0.079
Esophageal varices	0.493 (0.041 - 5.966)	0.578
Gastric varices	0.603 (0.023 - 15.548)	0.760
Non-variceal gastroduodenal bleed	2.014 (0.246 - 16.463)	0.514
Non-variceal esophageal bleed	9.347 (0.663 - 131.769)	0.098
Transfusion requirement <sup>c</sup>	2.702 (1.470 - 4.967)	0.001*

\*Statistical significance. <sup>a</sup>Including platelet inhibitors and anticoagulants. <sup>b</sup>< 24 h, 24 - 48 h and > 48 h. <sup>c</sup>0 units, 1 - 2 units and > 2 units. ASA: acetylsalicylic acid; NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio; UGIB: upper gastrointestinal bleeding.

macological, and surgical procedures as needed.

This study is robust owing to its large sample size and rigorous data collection. However, the retrospective nature of the study and its single-center design may limit the generalizability of the findings. Additional prospective multicenter trials are needed to validate these findings and to provide more data for

UGIB care in Saudi Arabia. Another limitation is the absence of detailed underlying medical conditions, especially those assessed by the Blatchford score (20), given their cumulative presence being detrimental to UGIB outcomes. However, the detailed survey of used medications may act as a surrogate to estimate the disease burden which these patients have. A po-

**Table 8.** OR for Mortality With Regard to Multiple Potential Risk Factors

Factors that may predispose for mortality	OR (95% confidence interval)	P-value
Age	1.020 (0.991 - 1.051)	0.174
Presentation with shock	1.355 (0.384 - 4.780)	0.636
History of UGIB	2.245 (0.729 - 6.914)	0.159
Renal disease	3.460 (0.821 - 14.586)	0.091
Liver disease	5.060 (0.862 - 29.713)	0.073
Cancer	0.354 (0.023 - 5.415)	0.455
Blood thinners <sup>a</sup>	0.219 (0.034 - 1.408)	0.110
NSAID excluding ASA	1.076 (0.196 - 5.905)	0.933
Steroids	7.099 (1.718 - 29.330)	0.007*
Time to endoscopy <sup>b</sup>	0.894 (0.451 - 1.770)	0.748
Esophageal varices	0.076 (0.006 - 1.004)	0.051
Gastric varices	0.061 (0.001 - 3.004)	0.160
Non-variceal gastroduodenal bleed	0.183 (0.019 - 1.749)	0.140
Non-variceal esophageal bleed	0.048 (0.001 - 2.148)	0.118
Transfusion requirement <sup>c</sup>	4.996 (2.165 - 11.528)	< 0.0001*
Rebleeding	7.936 (2.100 - 29.995)	0.002*

\*Statistical significance. <sup>a</sup>Including platelet inhibitors and anticoagulants. <sup>b</sup>< 24 h, 24 - 48 h and > 48 h. <sup>c</sup>0 units, 1 - 2 units and > 2 units. ASA: acetylsalicylic acid; NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio; UGIB: upper gastrointestinal bleeding.

tential improvement would have been to perform a retrospective Blatchford score for each patient and adjust for confounding in the regression analysis based on the Blatchford score. Yet another limitation is the heterogeneous composition of the included patients, given that both variceal and non-variceal UGIB was included. This made some parts of the data analysis appear somewhat superficial. However, given the initial aim of the study, this broad inclusion was appropriate.

This study emphasizes the considerable impact of UGIB in the Jazan region, citing esophageal varices and peptic ulcer disease as the primary causes. Endoscopy and endoscopic treatment should be performed as soon as possible to address UGIB. Identifying risk factors associated with unfavorable outcomes can help categorize patients and provide appropriate treatment. This study stresses the necessity of a multidisciplinary approach for managing UGIB and offers valuable information to help with clinical decision-making and resource allocation in the field.

## Conclusion

These results emphasize the considerable impact of UGIB, with esophageal varices and peptic ulcer disease as the leading causes. This study highlights the importance of endoscopy for the diagnosis and treatment of UGIB. Most patients receive endoscopic treatments, such as banding, epinephrine injection with endoclips, and Glubran injection. Early endoscopy within 24 h is associated with a lower risk of rebleeding and death. This highlights the need for timely interventions. The research findings revealed significant connections between the patients' sociodemographic characteristics, clinical histories, and outcomes. There was a significant correlation between poor outcomes, such as mortality and transfer to other hospitals, and factors such as advanced age, melena, shock, history of urinary tract infection (UGIB), renal disease, and use of corticosteroids. These findings underscore the significance of classifying risks and implementing targeted interventions for high-risk individuals.

The fatality rate was 6.0%, which aligns with the range reported in the literature. This underscores the ongoing difficulties associated with UGIB despite advancements in diagnosis and therapy. Given that 7.0% of patients experience rebleeding within 72 h of being admitted to the hospital admission, it is imperative to closely monitor and promptly address this issue to prevent negative consequences. This study provides critical evidence to guide UGIB therapy and resource distribution in Saudi Arabia. These findings emphasize the need for prompt endoscopic evaluation and treatment, especially in high-risk patients. Multidisciplinary UGIB treatment using endoscopic, pharmacological, and surgical procedures was performed. Further prospective studies are needed to corroborate these findings and to provide evidence-based guidelines for the management of UGIB.

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## Financial Disclosure

None to declare.

## Conflict of Interest

The authors declare no conflict of interest.

## Informed Consent

As this study was conducted retrospectively using medical data, obtaining informed consent from the patients was not required. Patient data were protected and de-identified to guarantee confidentiality.

## Author Contributions

Study conception and design: Ali Someili and Sarah Mobarki. Data collection: Sarah Mobarki, Razan Moafa, Roaa Shadad, Shroog Fathi, Leena Alsury, Amnah Hamrani, and Afnan Darisi. Analysis and interpretation of results: Ali Someili, Mostafa Mohrag, Mohammed Abdulrasak, and Amal H. Mohamed. Draft manuscript preparation: Ali Someili, Sarah Mobarki, Mostafa Mohrag, Mohammed Abdulrasak, and Sameer Alqasimi. All authors edited the manuscript and approved the final version. All authors have read and agreed to the published version of the manuscript.

## Data Availability

The authors declare that data supporting the findings of this study are available within the article.

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