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NON-VARICOSE BLEEDING FROM THE UPPER GASTROINTESTINAL TRACT

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Abstract

Introduction. Non-variceal upper gastrointestinal bleeding (NVUGIB) is one of the most critical issues in emergency surgery. This pathology is characterized by a high prevalence and significant mortality rates, especially among elderly patients and individuals with comorbid conditions.

Aim. To study the treatment outcomes of patients with non-variceal upper gastrointestinal bleeding.

Materials and methods. A retrospective study was conducted among n = 667 patients who received inpatient treatment at the surgical department of the City Emergency Hospital in Almaty from January 1, 2019, to December 31, 2023. Mean values (M ± m) and differences between arithmetic means were assessed using Student's *t*-test. The relationship between clinical parameters and outcomes was evaluated using the chi-square (χ^2) test. Risk factors for adverse outcomes (mortality, rebleeding, need for surgical treatment) were analyzed using logistic regression. The impact of factors was assessed by calculating the odds ratio (OR) with a 95% confidence interval (95% CI). A *p*-value < 0.05 was considered statistically significant.

Results. The primary causes of bleeding were acute ulcers (60.4%), Mallory-Weiss syndrome (20.4%), chronic ulcers (13.2%), and bleeding of unknown etiology (6.0%). According to the Forrest classification, the most common form was IIB (54.5%). The overall rebleeding rate was 6.9%, while the total mortality rate was 3.6%. Mortality rates by etiology were as follows: acute ulcers – 2.7%, chronic ulcers – 5.6%, Mallory-Weiss syndrome – 0.7%, and bleeding of unknown etiology – 17.5%. The average surgical intervention rate during the study period was 2.8%.

Conclusions. Thus, non-variceal upper gastrointestinal bleeding remains a pressing issue in gastroenterology and surgery, requiring a comprehensive approach to diagnosis and treatment. The study confirmed the high prevalence of peptic ulcer disease, Mallory-Weiss syndrome, and erosive lesions as leading causes of bleeding. The main risk factors for NVUGIB include the use of anticoagulants, nonsteroidal anti-inflammatory drugs, and cardiovascular diseases, highlighting the necessity of careful medication management in patients at high risk of bleeding.

Keywords: *peptic ulcer disease, gastrointestinal bleeding, endoscopic hemostasis, acute ulcers, non-variceal bleeding.*

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Резюме

НЕВАРИКОЗНЫЕ КРОВОТЕЧЕНИЯ ИЗ ВЕРХНИХ ОТДЕЛОВ ЖЕЛУДОЧНО-КИШЕЧНОГО ТРАКТА

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Введение. Неварикозные кровотечения из верхних отделов желудочно-кишечного тракта (НВК ВОЖКТ) — одна из важнейших проблем в экстренной хирургии. Данная патология характеризуется высокой распространённостью и значительными показателями летальности, особенно среди пациентов старших возрастных групп и лиц с сопутствующими патологиями.

Цель. Изучение результатов лечения пациентов с неварикозными кровотечениями из верхних отделов желудочно-кишечного тракта.

Материалы и методы. Ретроспективное исследование проведено среди n=667 пациентов, получивших стационарное лечение в хирургическом отделении Городской больницы скорой неотложной помощи г. Алматы в период с 1 января 2019 года по 31 декабря 2023 года. Средние значения (M±m) и различия между средними арифметическими величинами оценивались с использованием критерия Стьюдента (t). Для оценки связи между клиническими параметрами и результатами использовался критерий χ^2 (хи-квадрат). Оценка факторов риска развития неблагоприятных исходов (летальности, рецидива кровотечения, потребности в хирургическом лечении) проводилась с использованием логистической регрессии. Влияние факторов оценивалось путем расчета отношения шансов (OR) с 95% доверительным интервалом (95% ДИ). Значение $p<0,05$ считалось статистически значимым.

Результаты. Основными причинами кровотечений были острые язвы (60,4%), синдром Мэллори-Вейса (20,4%), хронические язвы (13,2%) и кровотечения неизвестной этиологии (6,0%). По классификации Forrest наиболее часто встречалась форма IIB (54,5%). Общий уровень рецидив кровотечений составил 6,9%, а общая летальность — 3,6%. Всего летальность составила 3,6%. Из них при острых язвах — 2,7%, хронических язвах — 5,6%, синдроме Мэллори-Вейса — 0,7%, кровотечениях неясной этиологии — 17,5%. Хирургическая активность в исследуемый период составила в среднем 2,8%.

Выводы. Таким образом, неварикозное кровотечение из верхних отделов желудочно-кишечного тракта остается актуальной проблемой гастроэнтерологии и хирургии, требующей комплексного подхода к диагностике и лечению. Проведенное исследование подтвердило высокую распространенность язвенной болезни, синдрома Мэллори-Вейса и эрозивных поражений как ведущих причин кровотечений. Основными факторами риска развития НВК ВОЖКТ остаются прием антикоагулянтов, нестероидных противовоспалительных препаратов, сердечно-сосудистые заболевания, что требует тщательной коррекции медикаментозной терапии у пациентов с высокой предрасположенностью к кровотечениям.

Ключевые слова: *язвенная болезнь, желудочно-кишечное кровотечение, эндоскопический гемостаз, острые язвы, неварикозные кровотечения.*

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Түйіндеме

ЖОҒАРҒЫ АСҚАЗАН-ІШЕК ЖОЛДАРЫНАН ВАРИКОЗДЫ ЕМЕС ҚАН КЕТУ

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Кіріспе. Жоғары асқазан-ішек жолдарынан варикозды емес қан кетулер (ЖАІЖ ВЕҚ) жедел хирургиядағы ең маңызды мәселелердің бірі. Бұл патология егде жастағы науқастар мен қосалқы аурулары бар адамдар арасында жоғары таралуымен және өлім-жітім көрсеткіштерінің айтарлықтай деңгейімен сипатталады.

Мақсаты. Жоғарғы асқазан-ішек жолдарының варикозды емес қан кетулері бар науқастардың емдеу нәтижелерін зерттеу.

Материалдар мен тәсілдер. Ретроспективті зерттеу Алматы қаласындағы Жедел жәрдем қалалық ауруханасының хирургия бөлімшесінде 2019 жылғы 1 қаңтар мен 2023 жылғы 31 желтоқсан аралығында стационарлық ем қабылдаған n=667 науқас арасында жүргізілді. Орташа мәндер (M±m) мен орташа

арифметикалық шамалар арасындағы айырмашылықтар Стьюдент критерийі (t) көмегімен бағаланды. Клиникалық параметрлер мен нәтижелер арасындағы байланысты бағалау үшін χ^2 (хи-квадрат) критерийі қолданылды. Қолайсыз нәтижелердің (өлім-жітім, қан кетудің қайталануы, хирургиялық емдеуге қажеттілік) даму қаупі факторларын бағалау логистикалық регрессия әдісі арқылы жүргізілді. Факторлардың әсері шанс қатынасы (OR) және 95% сенімділік интервалын (95% CI) есептеу арқылы бағаланды. $p<0,05$ мәні статистикалық тұрғыдан маңызды деп қабылданды.

Нәтижелер. Қан кетудің негізгі себептері жедел ойық жаралар (60,4%), Мэллори-Вейсс синдромы (20,4%), созылмалы ойық жаралар (13,2%) және этиологиясы белгісіз қан кетулер (6,0%) болды. Forrest жіктемесі бойынша жиі кездесетін түр IIB (54,5%) анықталды. Жалпы қан кетудің қайталану деңгейі 6,9%, ал жалпы өлім-жітім 3,6% құрады. Өлім-жітім көрсеткіші жедел ойық жаралар кезінде — 2,7%, созылмалы ойық жараларда — 5,6%, Мэллори-Вейсс синдромында — 0,7%, этиологиясы белгісіз қан кетулерде — 17,5% деңгейінде тіркелді. Зерттелген кезеңде хирургиялық белсенділік орташа 2,8% жетті.

Қорытындылар. Осылайша, жоғарғы асқазан-ішек жолдарының варикозды емес қан кетулері гастроэнтерология мен хирургиядағы өзекті мәселе болып қала беруде, оның диагностикасы мен емдеуіне кешенді тәсіл қажет. Зерттеу нәтижелері ойық жара ауруының, Мэллори-Вейсс синдромының және эрозиялық зақымданулардың қан кетудің негізгі себептері екенін растады. ЖАІЖ ВЕК дамуының негізгі қауіп факторлары антикоагулянттар мен стероидты емес қабынуға қарсы препараттарды қабылдау, жүрек-қан тамырлары аурулары, бұл қан кетуге жоғары бейімділігі бар науқастарда дәрілік терапияны мұқият түзетуді талап етеді.

Түйінді сөздер: *асқазан мен он екі елі ішектің ойық жарасы, асқазан-ішек қан кетулері, эндоскопиялық гемостаз, жедел ойық жаралар, варикоздық емес қан кетулер.*

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Introduction

Non-Variceal Upper Gastrointestinal Bleeding (NVUGIB) is one of the most severe and life-threatening conditions encountered in surgical practice. According to global statistics, the incidence of NVUGIB ranges from 84 to 160 cases per 100,000 population annually. Mortality among patients with this pathology varies between 5% and 21% [4, 9].

Epidemiological studies indicate that men are significantly more affected by NVUGIB than women, with a male-to-female ratio ranging from 2:1 to 3:1. The highest incidence is observed in individuals aged 40 to 70 years. Mortality associated with NVUGIB remains substantial, reaching 3% to 8%, particularly among elderly patients and those with severe comorbidities. However, over the past 10–15 years, mortality rates have declined due to the widespread adoption of endoscopic hemostasis and advancements in intensive care [10].

A retrospective study encompassing data from 101,703 patients across 254 medical institutions in Kazakhstan between 2014 and 2023 revealed a 24.5% increase in NVUGIB cases, rising from 7,497 to 9,331. Over this period, men accounted for 69.3% of cases, while women represented 30.7%. The mortality rate for NVUGIB decreased from 5.9% to 3.0% [6].

The outcomes of NVUGIB treatment are influenced by multiple factors, including patient age, comorbidities, the source of bleeding, the volume of blood loss, the implementation of endoscopic hemostasis, recurrence of bleeding, and other clinical variables [8].

Over the past decade, mortality rates from upper gastrointestinal bleeding (UGIB) have significantly declined due to advancements in pharmacotherapy, intraluminal endoscopy, widespread use of endoscopic hemostasis, and improvements in intensive care [4, 6, 11]. Current meta-analyses demonstrate that the efficacy of combined endoscopic hemostatic techniques ranges from 54% to 98% [4, 12].

Despite these advancements, the recurrence rate of bleeding following endoscopic hemostasis for peptic ulcer bleeding remains as high as 18%, with mortality exceeding 7%–9%. Moreover, patients with refractory or recurrent bleeding often require complex surgical interventions [5, 8].

Aim: To evaluate the treatment outcomes of patients with non-variceal upper gastrointestinal bleeding (NVUGIB).

Materials and methods. A retrospective study was conducted among n=667 patients who received inpatient treatment at the Surgical Department of the City Emergency Hospital in Almaty between January 1, 2019, and December 31, 2023, for non-variceal upper gastrointestinal bleeding.

Inclusion criteria:

- Patients aged 18 years and older who were urgently hospitalized due to non-variceal bleeding from the esophagus, stomach, or duodenum.

Exclusion criteria:

- Bleeding from esophageal and gastric varices.
- Bleeding from the lower gastrointestinal tract or pulmonary sources.
- Bleeding from malignant tumors of the upper gastrointestinal tract.

The study analyzed medical records of patients diagnosed with non-variceal UGIB, classified according to the ICD-10 system:

- K25.0 – Acute gastric ulcer with bleeding
- K26.0 – Acute duodenal ulcer with bleeding
- K27.0 – Peptic ulcer of unspecified location, acute with bleeding
- K28.0 – Acute gastrojejunal ulcer with bleeding
- K25.4 – Chronic or unspecified gastric ulcer with bleeding

- K26.4 – Chronic or unspecified duodenal ulcer with bleeding
- K22.6 – Gastroesophageal laceration-hemorrhagic syndrome
- K92.2 – Unspecified gastrointestinal hemorrhage

The study examined bleeding frequency concerning age and sex, length of hospital stay, surgical intervention rates, in-hospital and postoperative mortality, effectiveness of endoscopic hemostasis, and other clinical parameters.

All patients underwent a comprehensive analysis of clinical data, including laboratory and instrumental diagnostic findings. The endoscopic appearance of bleeding was assessed using the Forrest classification, endorsed by the European Society of Gastrointestinal Endoscopy (ESGE).

Statistical methods were employed for data processing. Mean values (M±m) and differences between arithmetic means were evaluated using Student's t-test (t-test). The association between clinical parameters and outcomes was assessed using the chi-square test (χ^2). Differences were considered statistically significant at $p<0.05$.

Data analysis was conducted using SPSS Statistics and Microsoft Office Excel. The normality of variable distribution was verified using the Shapiro–Wilk test. Normally distributed data were presented as means and standard deviations (M±m), and group comparisons were performed using Student's t-test.

For assessing associations between clinical parameters and outcomes, the chi-square test (χ^2) was used. Categorical variables were presented as frequencies (n) and percentages (%).

Risk factors for adverse outcomes (mortality, bleeding recurrence, and the need for surgical intervention) were evaluated using logistic regression. The impact of factors was assessed by calculating the odds ratio (OR) with a 95% confidence interval (95% CI). A p-value <0.05 was considered statistically significant.

Study Results.

Among the total cohort of 667 patients, 153 (22.9%) were hospitalized in 2019, 101 (15.1%) in 2020, 115 (17.2%) in 2021, 154 (23.1%) in 2022, and 144 (21.6%) in 2023 with signs of upper gastrointestinal bleeding. The decrease in the number of treated patients in 2020–2021 was due to the City Emergency Hospital functioning as a COVID-19 facility during the pandemic.

Patients were classified according to the World Health Organization (WHO) age classification. Males accounted for 445 (66.7%) of cases, while females represented 222 (33.3%). The mean patient age was 58.40±14.50 years, with an average of 58.00±14.30 years for men and 59.10±14.70 years for women, showing a statistically significant difference of 1.0±0.4 years ($p<0.01$). The highest incidence of NVUGIB was observed in the 60–74 age group (n=218, 32.7%), followed by the 45–59 age group (n=181, 27.1%) and the 18–44 age group (n=174, 26.1%).

Table 1.

Distribution of patients by gender and age.

Age Group (WHO Classification)		Total (n)	%	Male		Female	
				Total (n)	%	Total (n)	%
18–44 years	young age	174	26,1%	127	19%	47	7,1%
45–59 years	middle age	181	27,1%	123	18,4%	58	8,7%
60–74 years	elderly age	218	32,7%	138	20,7%	80	12%
75–90 years	senile age	89	13,3%	56	8,4%	33	4,9%
90+ years	longevity	5	0,8%	1	0,1%	4	0,7%
Total		667	100%	445	66,7%	222	33,3%

Between 2019 and 2023, an analysis of the etiology of non-variceal upper gastrointestinal bleeding (NVUGIB) among 667 patients revealed that acute ulcers accounted for 60.4% (n=403) of all cases. Chronic ulcers were notably less common, comprising 13,2% (n=88). A striking observation was the increasing prevalence of Mallory-Weiss syndrome, which rose to 20.4% (n=136) of all NVUGIB cases. Meanwhile, bleeding of unknown etiology remained relatively stable at 6.0% (n=40) (Figure 1).

Statistical analysis demonstrated that the proportion of acute ulcers was significantly higher than that of chronic ulcers ($\chi^2=9.45$, $p=0.002$). Moreover, there was a statistically significant upward trend in the incidence of Mallory-Weiss syndrome in recent years ($\chi^2=4.89$, $p=0.027$).

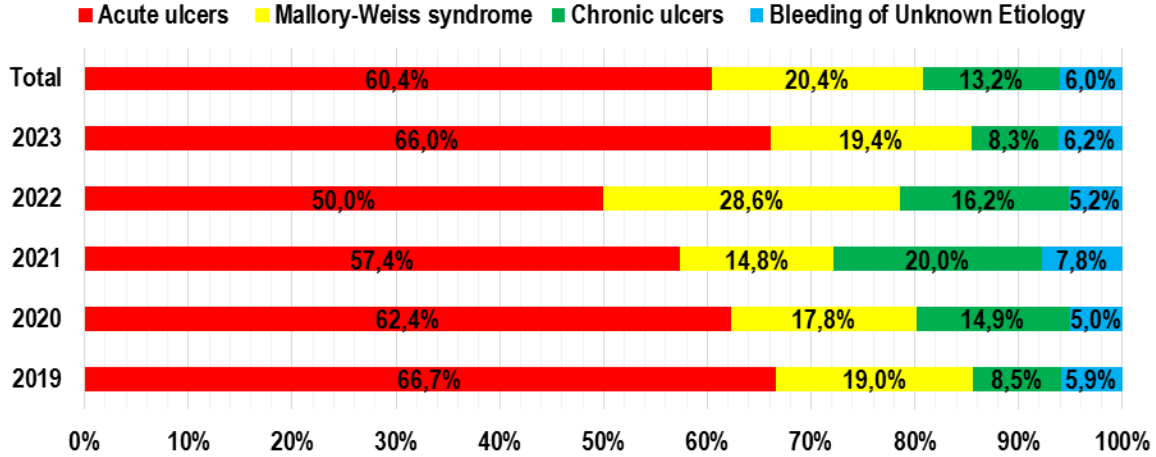

Figure 1. Distribution of patients by etiology of bleeding.

The primary risk factors for gastrointestinal bleeding included frequent use of nonsteroidal anti-inflammatory drugs (NSAIDs), anticoagulants, and antiplatelet agents. Among the 667 patients, 463 had comorbid conditions: 35 (7.5%) had more than five diseases, 52 (11.2%) had five, 81 (17.5%) had four, 129 (27.9%) had three, 108 (23.3%) had two, and 58 (12.5%) had one comorbidity.

Cardiovascular diseases (21.7%) and respiratory conditions, including COVID-19 (13.2%), were the most prevalent comorbidities. Over the five-year study period, the proportion of patients with comorbidities fluctuated between 59% and 88% (Table 2). These findings underscore the impact of multimorbidity on the risk of gastrointestinal bleeding and highlight the necessity of a personalized treatment approach.

Statistical analysis confirmed that the presence of three or more comorbidities significantly increased the risk of gastrointestinal bleeding (χ^2=12.31, p<0.001). Cardiovascular diseases (21.7%) and respiratory disorders, including COVID-19 (13.2%), were the most influential factors. The use of anticoagulants and antiplatelet agents was associated with an elevated risk of gastrointestinal bleeding (OR=2.47, 95% CI: 1.58–3.85, p<0.001), whereas NSAID use increased the likelihood of bleeding by 1.8 times (OR=1.79, 95% CI: 1.02–3.15, p=0.042).

Table 2.

Distribution of Comorbidities in Patients with Non-Variceal Upper Gastrointestinal Bleeding (2019–2023).

№	Comorbidities	Total (n=463)	2019 (n=153)	2020 (n=101)	2021 (n=115)	2022 (n=154)	2023 (n=144)
1	Cardiovascular diseases	145 (21.7%)	28 (18.3%)	22 (21.8%)	25 (21.7%)	40 (26.0%)	30 (20.8%)
2	Respiratory diseases, including COVID-19	88 (13.2%)	32 (20.9%)	33 (32.6%)	6 (5.2%)	10 (6.5%)	7 (4.9%)
3	Renal diseases	80 (12.0%)	14 (9.2%)	12 (11.9%)	15 (13.0%)	22 (14.3%)	17 (11.8%)
4	Diabetes mellitus	70 (10.5%)	12 (7.8%)	11 (10.9%)	14 (12.2%)	18 (11.7%)	15 (10.4%)
5	Liver diseases	72 (10.79%)	20 (13.1%)	9 (8.9%)	12 (10.4%)	18 (11.7%)	13 (9.0%)
6	Musculoskeletal diseases	8 (1.2%)	1 (0.7%)	2 (2.0%)	0 (0.0%)	2 (1.3%)	3 (2.1%)
	Total	463 (69.4%)	107 (69.9%)	89 (88%)	72 (62.6%)	110 (71.4%)	85 (59%)

Drug-induced gastrointestinal (GI) tract lesions, particularly those associated with the use of nonsteroidal anti-inflammatory drugs (NSAIDs), anticoagulants, and antiplatelet agents, represent a significant concern in clinical practice. Despite their proven efficacy, these medications have a broad range of adverse effects, including the development of peptic ulcers, gastritis, and GI bleeding, making their use potentially hazardous, especially in long-term therapy or in patients with comorbid conditions.

Among the study population, 25.2% of patients (168 cases) developed GI bleeding due to medication use, leading to drug-induced ulcers. The administration of anticoagulants and antiplatelet agents was associated with a significantly higher risk of GI bleeding compared to NSAID use (χ^2=6.85, p=0.008), emphasizing their role as major risk factors. NSAIDs were used by 55 patients (8.2%), while anticoagulants and antiplatelets were taken by 113 patients (16.9%). The latter group exhibited an increased risk of GI bleeding due to impaired coagulation and a higher probability of hemorrhagic complications (Table 3).

Upon admission, esophagogastroduodenoscopy (EGD) was performed in 95.9% of patients (640 out of 667). In 15 cases, EGD had been conducted at another hospital, while 7 patients were referred after undergoing endoscopic examination at an outpatient clinic. In 5 cases (0.7%), EGD was not performed due to the patients' critical condition.

Table 3.

Frequency of Drug-Induced Gastrointestinal Lesions.

№	Type of Medication	Total (n=667)	2019 (n=153)	2020 (n=101)	2021 (n=115)	2022 (n=154)	2023 (n=144)
1	Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)	55 (8.2%)	5 (0.7%)	12 (1.8%)	10 (1.5%)	15 (2.2%)	13 (1.9%)
2	Anticoagulants, Antiplatelet Agents	113 (16.9%)	19 (2.8%)	18 (2.7%)	22 (3.3%)	30 (4.5%)	24 (3.6%)
	Total	168 (25.2%)	24 (3.6%)	30 (4.5%)	32 (4.8%)	45 (6.7%)	37 (5.5%)

The Forrest classification of gastrointestinal bleeding is instrumental in determining the degree of hemorrhagic activity and guiding further treatment strategies [3, 12]. The majority of patients with hemorrhages fell into the IIB category—364 cases (58.6%). This type remained consistently prevalent across all study years, peaking in 2021 with 76 cases (66.1%). Category IIA accounted for 83 cases (12.4%), most frequently recorded in 2019 (30 cases, 19.6%). Types IA and IB had comparable incidence rates, with 65 (9.7%) and 64 (9.6%) cases, respectively. Type III hemorrhages were diagnosed infrequently, occurring in only 12 cases (1.8%). The highest number of severe hemorrhages (IA and IB) was recorded in 2023, potentially due to an increase in patients with complicated ulcers (Table 4).

Statistical analysis of the distribution of hemorrhage types according to the Forrest classification revealed significant differences in the prevalence of IIA and IIB types (χ^2=10.21, p=0.001). Additionally, in 2023, the proportion of severe hemorrhages (IA and IB) was significantly higher compared to previous years (χ^2=5.78, p=0.016).

According to the Gorbashko classification (1982), patients with mild bleeding accounted for 31.8%, while those with moderate bleeding constituted 55.2%, representing the highest proportion among all groups. Severe bleeding was observed in 13.0% of cases (Table 5).

Table 4.

Distribution of Patients by Forrest Classification.

Forrest Classification	Total	2019 (n=153)	2020 (n=101)	2021 (n=115)	2022 (n=154)	2023 (n=144)
Ia	65 (9.7%)	9 (5.9%)	12 (11.9%)	8 (7.0%)	14 (9.1%)	22 (15.3%)
Ib	64 (9.6%)	13 (8.5%)	9 (8.9%)	6 (5.2%)	17 (11.0%)	19 (13.2%)
IIa	83 (12.4%)	30 (19.6%)	14 (13.9%)	7 (6.1%)	16 (10.4%)	16 (11.1%)
IIb	364 (54.5%)	88 (57.5%)	38 (37.6%)	76 (66.1%)	86 (55.8%)	76 (52.8%)
IIc	52 (7.9%)	5 (3.3%)	17 (16.8%)	11 (9.6%)	13 (8.4%)	6 (4.2%)
III	12 (1.8%)	4 (2.6%)	2 (2.0%)	5 (4.3%)	0 (0.0%)	1 (0.7%)
Total	640 (95.9%)	149 (22.3%)	92 (13.8%)	113 (16.9%)	146 (21.9%)	140 (21%)

Table 5.

Distribution of patients by severity of blood loss according to the Gorbashko classification.

№	Year	Total Number	Severity of Hemorrhage		
			Mild	Moderate	Severe
1	2019	153	37 (24.2%)	96 (62.7%)	20 (13.1%)
2	2020	101	40 (39.6%)	52 (51.5%)	9 (8.9%)
3	2021	115	36 (31.3%)	65 (56.5%)	14 (12.2%)
4	2022	154	52 (33.8%)	79 (51.3%)	23 (14.9%)
5	2023	144	47 (32.6%)	76 (52.8%)	21 (14.6%)
Total		667 (100%)	212 (31.8%)	368 (55.2%)	87 (13.0%)

An analysis of mortality among patients with gastrointestinal bleeding over the period from 2019 to 2023 has revealed the following trends: the overall mortality rate was 3.6% (24 cases out of 667). The highest mortality rate was recorded in 2021 at 7.83% (9 cases out of 115), which was associated with the concentration of COVID-19 pneumonia cases complicated by gastrointestinal bleeding in the surgical department. In 2022, the mortality rate declined to 4.55% (7 cases out of 154). In contrast, the mortality rates in 2019 and 2020 remained relatively low—1.31% and 2.0%, respectively. In 2023, four deaths were recorded (2.8%), indicating a trend toward stabilization compared to the peak observed in 2021 (Figure 2).

A year-by-year mortality analysis identified statistically significant differences, with the highest rate occurring in 2021 (χ^2 = 12.34, p = 0.002). In subsequent years, a declining trend in mortality was noted, potentially attributable to improvements in treatment strategies and a reduction in the impact of COVID-19.

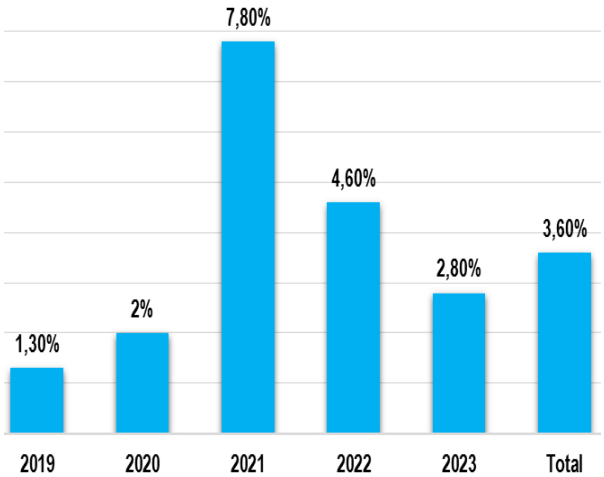

Figure 2. Mortality Rates by Year.

The standard conservative treatment was administered to 374 patients (56.1%). The primary hemostatic and wound-healing agents prescribed included proton pump inhibitors (570 patients, 85.5%), hemostatic agents (635 patients, 95.2%), and antiulcer medications (639 patients, 95.8%).

Endoscopic hemostasis was performed in 274 patients (42.8%). Injection hemostasis was used in 80.2% of cases (n=220), as injection methods are considered the safest and most effective. Hemostatic clipping was performed in 17 patients (6.2%), argon plasma coagulation in 12 patients (4.4%), and combined hemostasis in 25 patients (9.1%), reflecting the complexity of these procedures and potential complications.

Surgical intervention was less frequently required, performed in only 19 patients (2.8%). The most common procedure was gastrotomy with ulcer suturing (17 cases, 89.5%). Gastric resection was necessary in only two patients (10.5%). The low frequency of surgical interventions can be attributed to the effectiveness of conservative and endoscopic treatment methods (Figure 3).

The overall rebleeding rate was 33 patients (12.04%). Emergency procedures in this group included successful repeat endoscopic hemostasis in 28 patients (84.8%) and open surgery in 5 patients (15.2%).

Among 65 patients classified as Forrest Ia, endoscopic hemostasis was performed, but 9 patients (3.3%) required open surgery due to ongoing bleeding. Similarly, 62 patients with Forrest Ib received endoscopic hemostasis, with 7 cases (2.6%) necessitating surgical intervention. Among 76 patients with Forrest IIa, only 3 (1.1%) required surgery. In contrast, none of the 71 patients with Forrest IIb experienced rebleeding (0%).

The overall mortality rate was 3.6%. Among patients with acute ulcers, mortality was 2.7% (11 of 403 cases), while patients with chronic ulcers had a higher mortality rate of 5.6% (5 of 88 cases). Patients with Mallory-Weiss syndrome had a mortality rate of 0.7% (1 of 136), whereas those with gastrointestinal bleeding of unknown etiology had the highest mortality rate of 17.5% (7 of 40). The elevated mortality in this group was associated with severe

initial conditions and significant comorbidities, including decompensated cardiovascular, respiratory, and gastrointestinal diseases, as well as severe hepatic and renal pathology.

In five cases (0.7%), esophagogastroduodenoscopy (EGD) was not performed due to the patient's critical condition, and in two cases (0.3%), the bleeding source remained unidentified.

Patients with bleeding of unknown etiology had the highest risk of mortality (OR=6.89, 95% CI: 2.35–20.20, p<0.001) compared to those with peptic ulcer disease. Additionally, mortality among patients with chronic ulcers was significantly higher than in those with acute ulcers (OR=2.13, 95% CI: 1.01–4.51, p=0.048).

Analysis of treatment efficacy demonstrated that the frequency of surgical interventions was significantly lower than that of endoscopic and conservative treatments (χ^2=18.21, p<0.001). Among patients who underwent endoscopic hemostasis, the highest efficacy was observed in the Forrest IIb group, where no cases of recurrent bleeding were recorded (χ^2=7.89, p=0.019). Conversely, patients classified as Forrest Ia and Ib exhibited a significantly higher risk of requiring surgical intervention compared to Forrest IIa (OR=3.24, 95% CI: 1.41–7.43, p=0.005).

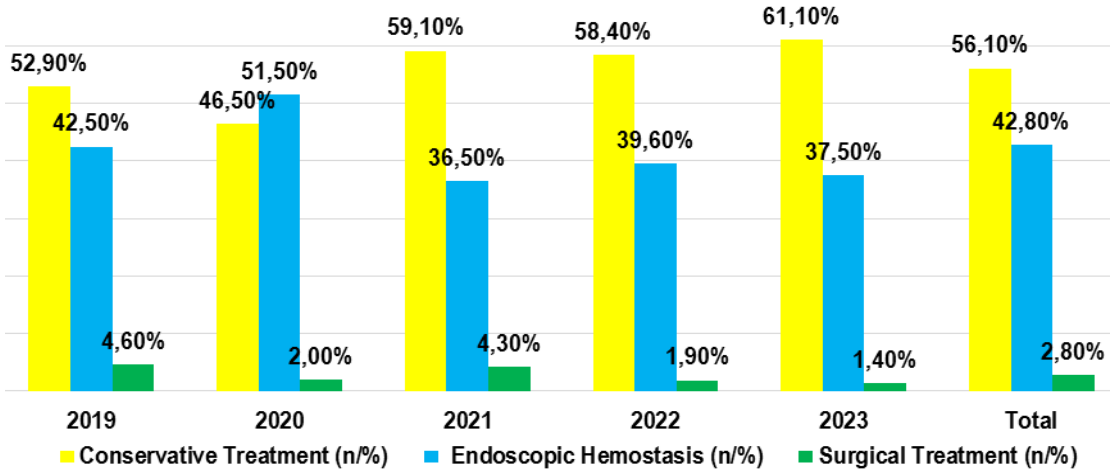

Figure 3. Treatment Outcome Indicators.

Despite significant advancements in medical technologies and improvements in treatment methods, the overall surgical activity during the study period averaged 2.8%. Notably, postoperative mortality was absent in 2019, 2020, and 2023, highlighting the high level of safety associated with the performed procedures. However, in 2021, the postoperative mortality rate reached 40.0% (2 out of 5 patients), while in 2022, it was 33.3% (1 out of 3 patients). Analysis of postoperative mortality rates revealed statistically significant differences between the years (χ^2=8.94, p=0.011) (Figure 4).

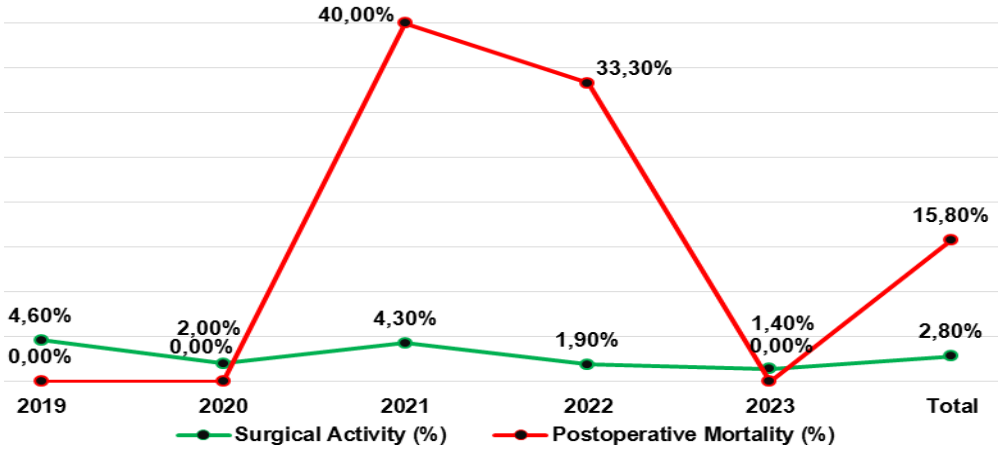

Figure 4. Surgical Activity Indicators.

Discussion

Non-variceal upper gastrointestinal bleeding (NVUGIB) remains a serious medical challenge requiring a comprehensive approach to diagnosis and treatment. As demonstrated in our study, the primary causes of NVUGIB include peptic ulcer disease and Mallory-Weiss syndrome, which align with findings from other studies, such as the research by *Joon S.K. et al.* (2020), confirming the high prevalence of these conditions among NVUGIB patients [9]. Upper gastrointestinal tract diseases are characterized not only by their high incidence but also by a significant risk of severe complications, including massive hemorrhage and mortality, particularly in elderly patients and those with comorbidities [4].

Our results, based on 667 patients, confirmed that endoscopy remains the principal method for both diagnosing and treating NVUGIB. This is consistent with the recommendations of the European Society of Gastrointestinal Endoscopy (ESGE), which asserts that endoscopic hemostasis is the cornerstone of NVUGIB

management [3]. Specifically, injection therapy and argon plasma coagulation have been identified as highly effective techniques for bleeding control. These findings are further supported by *Iulia R. et al.* (2022), who emphasized the importance of employing various endoscopic methods to achieve hemostasis in NVUGIB cases [8].

At the same time, surgical interventions, such as gastrotomy or subtotal gastrectomy, remain relevant in cases where conservative or endoscopic treatments prove ineffective. This necessity is corroborated by the study of *Blatchford O. et al.* (2000) [3].

The Forrest classification, utilized in our study, demonstrated high accuracy in assessing the severity of bleeding and selecting the optimal treatment strategy. According to *Joseph J.S. et al.* (2018), this scale effectively stratifies patients and guides therapeutic decisions [10]. Additionally, key risk factors such as ischemic heart disease, anticoagulant therapy, and nonsteroidal anti-inflammatory drug (NSAID) use significantly increase the likelihood of recurrent bleeding episodes, as highlighted in the study by Sun G.L. (2022) [13].

In our study, the overall mortality rate among NVUGIB patients was 3.6%, which falls within the range reported by Carolina P. et al. (2020), where NVUGIB-related mortality was associated with patient age, comorbid conditions, and bleeding severity [4]. These findings underscore the critical importance of early diagnosis and timely intervention to mitigate mortality risks.

Additionally, our findings were compared with Russian studies. *Tarasov E.E. et al.* (2019) reported an NVUGIB mortality rate of 9.9%, identifying key risk factors such as severe blood loss, high Charlson comorbidity index, and the necessity for open surgery [2]. Notably, recurrent bleeding significantly increased the risk of unfavorable outcomes (51.6% among deceased patients vs. 8.2% among survivors, $p<0.001$), emphasizing the need for close monitoring and timely intervention.

Furthermore, the study by *Khitaryan A.G. et al.* (2020) revealed that NVUGIB-related mortality ranges from 5.0% to 19.0%, reaching 40.0% in patients with severe recurrent hemorrhage. Key predictors of recurrent bleeding included severe Forrest Ia hemorrhage, high comorbidity index, Rockall score ≥8, systolic blood pressure ≤100 mmHg, heart rate ≥100 bpm, low total protein levels, and anemia (Hb ≤100 g/L) [12]. Our study corroborates the significance of these factors, particularly in patients with recurrent bleeding, highlighting the necessity for thorough preoperative assessment and timely surgical decision-making [2].

Despite significant advancements in diagnostic and therapeutic methods, mortality and recurrence rates remain high, emphasizing the need for further research and refinement of NVUGIB management strategies. The study results reinforce the importance of an integrated approach encompassing pharmacotherapy, endoscopic interventions, and, when necessary, surgical treatment. Future developments may require the enhancement of existing risk prediction models to improve prognostication and optimize treatment strategies [3, 6].

Our study possesses several key features, including a lower mortality rate (3.6%) compared to Russian studies, high efficacy of endoscopic hemostasis—particularly argon plasma coagulation, and a detailed analysis of risk factors such as anticoagulant use and comorbid conditions. Additionally, the use of the Forrest classification ensured precise treatment stratification, while a comprehensive approach integrating pharmacotherapy, endoscopy, and surgical intervention when necessary further optimized patient outcomes. These findings underscore the ongoing need for multidisciplinary management and continuous advancements in NVUGIB treatment protocols.

Thus, non-variceal upper gastrointestinal bleeding (NVUGIB) remains a pressing issue in gastroenterology and surgery, necessitating a comprehensive approach to diagnosis and treatment. The present study confirmed the high prevalence of peptic ulcer disease, Mallory-Weiss syndrome, and erosive lesions as the leading causes of hemorrhage. The primary risk factors for NVUGIB include the use of anticoagulants, nonsteroidal anti-inflammatory drugs (NSAIDs), and cardiovascular and pulmonary comorbidities, underscoring the need for meticulous adjustment of pharmacotherapy in patients with a high predisposition to bleeding.

The application of endoscopic hemostasis, particularly argon plasma coagulation, demonstrated high efficacy in controlling hemorrhage and reducing the need for surgical intervention. The use of the Forrest classification facilitated timely risk stratification and the selection of optimal treatment strategies. Despite significant advancements, the recurrence of bleeding remains a major concern, highlighting the need for further investigation into risk factors and the refinement of therapeutic approaches.

Conclusions:

1. The proportion of patients of working age (18–60 years) was 53.2%, with the most frequently affected age group being 60–74 years (32.7%).

2. Males accounted for 66.7% and females for 33.3%. The mean patient age was 58.40±14.50 years, with a gender-based age difference of 1.0±0.4 years.

3. The leading causes of hemorrhage were acute ulcers (60.4%), Mallory-Weiss syndrome (20.4%), chronic ulcers (13.2%), and bleeding of unknown etiology (6.0%).

4. According to the Forrest classification, type IIB lesions were the most common (54.5%).

5. The predominant comorbid conditions included cardiovascular diseases (21.7%) and respiratory disorders, including COVID-19 (14.7%). The primary cause of drug-induced ulcers was NSAID use (8.2%), followed by anticoagulant and antiplatelet therapy (16.9%).

6. The overall rebleeding rate was 6.9%, while the total mortality rate reached 3.6%. Specifically, mortality was 2.7% in acute ulcers, 5.6% in chronic ulcers, 0.7% in Mallory-Weiss syndrome, and 17.5% in cases of bleeding of unknown etiology. The average surgical intervention rate during the study period was 2.8%.

7. Endoscopic hemostasis was performed in 274 patients (42.8%) and proved highly effective, significantly reducing the need for surgical procedures and lowering the risk of complications. Repeat endoscopic hemostasis was successfully performed in 84.8% of cases.

Study Limitations: *The single-center nature of the study may limit its generalizability, and the absence of long-term follow-up data restricts the assessment of post-discharge outcomes.*

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