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## ANALYSIS OF TREATMENT OUTCOMES FOR BLEEDING FROM ESOPHAGEAL AND GASTRIC VARICES

**Onlasyn T. Ibekenov<sup>1,2,3</sup>**, <https://orcid.org/0000-0001-6605-6435>**Abylai N. Baymakhanov<sup>1</sup>**, <https://orcid.org/0009-0001-0344-1800>**Aman B. Berkinbay<sup>1</sup>**, <https://orcid.org/0000-0002-3973-7283>**Yermek M. Zheldibaev<sup>1,2</sup>**, <https://orcid.org/0009-0004-0216-1307>**Makhsat K. Duisebekov<sup>1,2</sup>**, <https://orcid.org/0009-0001-6697-8074>**Nurhat B. Esenbekov<sup>2</sup>**, <https://orcid.org/0009-0007-5324-2117>**Sabit K. Iskakov<sup>2</sup>**, <https://orcid.org/0009-0000-2359-9026>**Mazhit K. Abdykadyrov<sup>2,3</sup>**, <https://orcid.org/0000-0002-9518-5292>**Erzhan S. Tulebaev<sup>1</sup>**, <https://orcid.org/0009-0007-6053-787X>**Dias D. Myrzash<sup>1</sup>**, <https://orcid.org/0009-0001-7793-2338><sup>1</sup> NJC “Kazakh National Medical University named after S.D. Asfendiyarov”, Almaty, Republic of Kazakhstan;<sup>2</sup> National Scientific Center of Surgery Named After A.N. Syzganov, Almaty, Republic of Kazakhstan;<sup>3</sup> City Emergency Medical Care Hospital, Almaty, Republic of Kazakhstan.

### Abstract

**Introduction.** Bleeding from esophageal and gastric varices (EGV) is one of the most life-threatening complications of liver cirrhosis and portal hypertension, associated with high mortality, especially in cases of late diagnosis and advanced hepatic insufficiency.

**Aim.** To evaluate the clinical characteristics and treatment outcomes of patients with EGV bleeding treated at the Surgical Department of the Emergency City Hospital in Almaty from 2022 to 2024.

**Materials and Methods.** The study included 162 patients. Clinical parameters, severity of cirrhosis (Child–Pugh score), MELD index, endoscopic classification of varices (JGES), and treatment outcomes were analyzed. Descriptive statistics, Student’s t-test,  $\chi^2$ -test, and one-way ANOVA were used. Odds ratios (OR) with 95% confidence intervals were calculated to assess risk factors for rebleeding. A p-value < 0.05 was considered statistically significant.

**Results.** Among 162 patients, males predominated (55.6%), with a mean age of  $54.3 \pm 11.2$  years. Anemia (<70 g/L) was detected in 62.3%. II–III degree varices were diagnosed in 95.1%, and Child–Pugh classes B and C were present in 69.7%. Early ligation (<24 hours) reduced rebleeding to 2.3%, compared to 12.5% with delayed intervention (OR = 2.32); presence of red color signs (RCS) increased rebleeding risk to 17.9% (OR = 6.51). Overall mortality was 4.32%, postoperative mortality — 1.2%; all fatal outcomes occurred in patients with severe hepatic dysfunction. **Conclusions.** EGV bleeding remains a severe complication of cirrhosis requiring prompt diagnosis and active treatment. Early endoscopic ligation effectively reduces the risk of rebleeding and mortality. The presence of RCS and advanced variceal grade are significant predictors of poor prognosis.

**Keywords:** liver cirrhosis, portal hypertension, esophageal and gastric varices, bleeding, endoscopic ligation.

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### Резюме

## АНАЛИЗ РЕЗУЛЬТАТОВ ЛЕЧЕНИЯ КРОВОТЕЧЕНИЙ ИЗ ВАРИКОЗНО РАСШИРЕННЫХ ВЕН ПИЩЕВОДА И ЖЕЛУДКА

**Онласын Т. Ибекенов<sup>1,2,3</sup>**, <https://orcid.org/0000-0001-6605-6435>**Абылай Н. Баймаханов<sup>1</sup>**, <https://orcid.org/0009-0001-0344-1800>**Аман Б. Беркинбай<sup>1</sup>**, <https://orcid.org/0000-0002-3973-7283>**Ермек М. Желдибаев<sup>1,2</sup>**, <https://orcid.org/0009-0004-0216-1307>**Махсат К. Дуйсебеков<sup>1,2</sup>**, <https://orcid.org/0009-0001-6697-8074>**Нурхат Б. Есенбеков<sup>2</sup>**, <https://orcid.org/0009-0007-5324-2117>

**Сабит И. Искаков<sup>2</sup>**, <https://orcid.org/0009-0000-2359-9026>

**Мажит К. Абдыкадыров<sup>2,3</sup>**, <https://orcid.org/0000-0002-9518-5292>

**Ержан С. Тулебаев<sup>1</sup>**, <https://orcid.org/0009-0007-6053-787X>

**Диас Д. Мырзаш<sup>1</sup>**, <https://orcid.org/0009-0001-7793-2338>

<sup>1</sup> НАО «Казахский национальный медицинский университет имени С. Д. Асфендиярова», г. Алматы, Республика Казахстан;

<sup>2</sup> Национальный научный центр хирургии имени А.Н. Сызганова, г. Алматы, Республика Казахстан;

<sup>3</sup> КГП на ПХВ "Городская больница скорой неотложной помощи", г. Алматы, Республика Казахстан.

**Введение.** Кровотечение из варикозно расширенных вен (ВРВ) пищевода и желудка является одним из наиболее опасных осложнений цирроза печени и портальной гипертензии, сопровождающимся высокой летальностью при поздней диагностике и тяжёлой печёночной недостаточности.

**Цель.** Оценить клинические характеристики и результаты лечения пациентов с кровотечением из ВРВ пищевода и желудка, пролеченных в хирургическом отделении ГБСНП г. Алматы в 2022–2024 гг.

**Материалы и методы.** В исследование включены 162 пациента. Изучены клинические данные, тяжесть цирроза по шкале Child–Pugh, уровень MELD, эндоскопическая характеристика ВРВ (по классификации JGES), результатов лечения. Применялись методы описательной статистики, t-критерий Стьюдента,  $\chi^2$ -тест, однофакторный ANOVA. Для оценки факторов риска рецидива кровотечения рассчитывались отношения шансов (OR) с 95% доверительными интервалами. Значение  $p < 0,05$  считалось статистически значимым.

**Результаты.** Среди 162 пациентов с ВРВ пищевода и желудка преобладали мужчины (55,6%), средний возраст —  $54,3 \pm 11,2$  лет. У 62,3% пациентов выявлена анемия ( $<70$  г/л). II–III степень ВРВ диагностирована у 95,1%, классы В и С по Child–Pugh — у 69,7%. Раннее лигирование ( $<24$  ч) снижало рецидив до 2,3%, при  $\geq 24$  ч — до 12,5% ( $OR = 2,32$ ); наличие красных маркеров (RCS) повышало риск рецидива до 17,9% ( $OR = 6,51$ ). Общая летальность составила 4,32%, послеоперационная — 1,2%; все случаи летального исхода зарегистрированы при тяжёлой печёночной недостаточности.

**Выводы:** Кровотечение из ВРВ пищевода и желудка требует своевременной диагностики и активной тактики. Раннее эндоскопическое лигирование эффективно снижает риск рецидива и летальности. Наличие RCS и III степень ВРВ являются значимыми предикторами неблагоприятного течения.

**Ключевые слова:** цирроз печени, портальная гипертензия, варикозное расширение вен пищевода и желудка, кровотечение, эндоскопическое лигирование.

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Түйіндемe

## ӨНЕШ ПЕН АСҚАЗАННЫҢ ВАРИКОЗДЫК КЕҢЕЙГЕН ВЕНАЛАРЫНАН ҚАН КЕТУДІ ЕМДЕУ НӘТИЖЕЛЕРІН ТАЛДАУ

**Оңласын Т. Ибекенов<sup>1,2,3</sup>**, <https://orcid.org/0000-0001-6605-6435>

**Абылай Н. Баймаханов<sup>1</sup>**, <https://orcid.org/0009-0001-0344-1800>

**Аман Б. Беркинбай<sup>1</sup>**, <https://orcid.org/0000-0002-3973-7283>

**Ермек М. Желдібаев<sup>1,2</sup>**, <https://orcid.org/0009-0004-0216-1307>

**Махсат Қ. Дүйсебеков<sup>1,2</sup>**, <https://orcid.org/0009-0001-6697-8074>

**Нұрхат Б. Есенбеков<sup>2</sup>**, <https://orcid.org/0009-0007-5324-2117>

**Сабит И. Искаков<sup>2</sup>**, <https://orcid.org/0009-0000-2359-9026>

**Мажит К. Абдыкадыров<sup>2,3</sup>**, <https://orcid.org/0000-0002-9518-5292>

**Ержан С. Тулебаев<sup>1</sup>**, <https://orcid.org/0009-0007-6053-787X>

**Диас Д. Мырзаш<sup>1</sup>**, <https://orcid.org/0009-0001-7793-2338>

<sup>1</sup> «С. Д. Асфендияров атындағы Қазақ ұлттық медицина университеті» КЕАҚ, Алматы қ., Қазақстан Республикасы;

<sup>2</sup> А.Н. Сызганов атындағы Ұлттық хирургия ғылыми орталығы, Алматы қ., Қазақстан Республикасы;

<sup>3</sup> Жедел жәрдем қалалық ауруханасы, Алматы қ., Қазақстан Республикасы.

**Кіріспе.** Өңеш пен асқазанның варикозды кеңейген веналарынан (ВКВ) туындайтын қан кету — бауыр циррозы мен портальды гипертензияның ең қауіпті асқынуларының бірі. Бұл жағдай, әсіресе диагноздың кеш қойылуында және бауыр қызметінің ауыр жеткіліксіздігі кезінде, жоғары өлім-жітіммен сипатталады.

**Мақсаты.** Алматы қалалық жедел шұғыл көмек көрсету ауруханасы хирургия бөлімінде 2022–2024 жылдар аралығында ВКВ-нан қан кету диагнозымен емделген науқастардың клиникалық сипаттамаларын және емдеу нәтижелерін бағалау.

**Материалдар мен тәсілдер.** Зерттеуге ВКВ-нан қан кеткен 162 науқас енгізілді. Клиникалық деректер, цирроздың ауырлығы (Child–Pugh шкаласы бойынша), MELD индексі, эндоскопиялық жіктеу (JGES), емдеу нәтижелері зерттелді. Деректерге сипаттамалық статистика, Стюденттің t-критерийі,  $\chi^2$ -тест және бір факторлы дисперсиялық талдау (ANOVA) қолданылды. Рецидив қаупін бағалау үшін салыстырмалы қауіп көрсеткіші (OR) және 95% сенімділік аралығы есептелді.  $p < 0,05$  статистикалық мәнділік ретінде қабылданды.

**Нәтижелер.** 162 науқастың ішінде ерлердің үлесі – 55,6%, орташа жасы –  $54,3 \pm 11,2$  жас. Анемия ( $<70$  г/л) 62,3% науқаста анықталды. II–III дәрежелі ВКВ – 95,1%, ал Child–Pugh шкаласы бойынша В және С сыныптары – 69,7%. Ерте эндоскопиялық түйіндерді байлау ( $<24$  сағат) рецидивті 2,3%-ға дейін төмендетті,  $\geq 24$  сағатта – 12,5% (OR = 2,32); қызыл маркерлердің (RCS) болуы рецидив қаупін 17,9%-ға дейін арттырды (OR = 6,51). Жалпы өлім-жітім – 4,32%, отадан кейінгі өлім – 1,2%; барлық өлім жағдайлары ауыр бауыр жеткіліксіздігімен байланысты болды.

**Қорытындылар.** ВКВ-нан қан кету бауыр циррозының ауыр асқынуы ретінде жедел диагноз қоюды және белсенді емдеу тактикасын талап етеді. Ерте эндоскопиялық түйіндерді байлау рецидив пен өлім-жітім қаупін тиімді төмендетеді. RCS және III дәрежелі ВКВ қолайсыз болжам көрсеткіштері болып табылады.

**Түйінді сөздер:** бауыр циррозы, портальды гипертензия, өңеш пен асқазанның варикозды кеңейген веналары, қан кету, эндоскопиялық түйіндерді байлау

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#### Introduction

Esophageal and gastric varices (EGV) represent one of the most life-threatening manifestations of portal hypertension, predominantly arising in the context of liver cirrhosis. According to the World Health Organization (WHO), varices develop in approximately 30–60% of patients with compensated cirrhosis and in 85–95% of those with decompensated disease [3, 10]. The annual risk of a first bleeding episode from EGV is estimated at 12–15%, with mortality from massive hemorrhage reaching up to 50% [12].

The pathogenesis of EGV is driven by the redistribution of portal blood flow through collateral veins due to elevated portal venous pressure (exceeding 12 mmHg). Key predictors of variceal bleeding include high-grade varices according to Paquet and Sarin classifications (grades III–IV), the presence of red signs (red wale markings, cherry red spots), advanced hepatic dysfunction (Child–Pugh class B/C, MELD  $>18$ ), and rapid progression of cirrhosis [6].

Esophagogastroduodenoscopy (EGD) remains the gold standard for diagnosing EGV, enabling both visualization of variceal columns and the implementation of therapeutic interventions such as endoscopic ligation or sclerotherapy. Clinical studies have demonstrated that endoscopic band ligation reduces the 1-year rebleeding rate to 15–20%, compared to 45–50% with pharmacological therapy alone [9].

In emergency settings, during active hemorrhage, in addition to vasoactive drugs (e.g., terlipressin, octreotide), balloon tamponade using a Sengstaken–Blakemore tube is employed, achieving temporary hemostasis in 80–90% of cases. However, this technique carries significant

complication risks, including aspiration pneumonia (up to 25%) and esophageal perforation (up to 10%) [5, 8, 11].

To prevent rebleeding, a combined approach is recommended: non-selective  $\beta$ -blockers (e.g., propranolol) in conjunction with scheduled endoscopic band ligation. This combination therapy reduces the recurrence rate to 10–12% [10]. In cases refractory to medical and endoscopic treatments, placement of a transjugular intrahepatic portosystemic shunt (TIPS) is considered. TIPS achieves up to 90% efficacy in preventing recurrent bleeding but is associated with hepatic encephalopathy in 30–35% of cases and requires advanced technical facilities [10].

According to official statistics from the Ministry of Health of the Republic of Kazakhstan, the incidence of liver cirrhosis in 2021 was 53.1 per 100,000 population, representing a 3.77% increase compared to 2020 (51.2 per 100,000) [8]. More than 49,000 individuals are under dispensary observation for viral hepatitis in Kazakhstan, including 23,500 with hepatitis C, over 22,000 with hepatitis B, and 1,250 with hepatitis D. Cirrhosis has been confirmed in 5,948 patients [5, 8].

Variceal bleeding occurs annually in 5–15% of patients with cirrhosis. Multicenter studies have shown that 25–30% of patients with newly diagnosed EGV experience bleeding within two years. Overall, up to 70% of upper gastrointestinal bleeding episodes in cirrhotic patients are attributable to esophageal and gastric varices [7].

Despite the adoption of contemporary clinical protocols, early mortality following variceal bleeding remains high, ranging from 15% to 24%. A population-based study conducted in the United States demonstrated a decline in in-hospital mortality from 18% in 2010 to 11.5% in 2016

[3,9]. However, in resource-limited settings, mortality rates remain consistently high, largely due to delayed hospital presentation, decompensated liver function, and high incidence of infectious complications [4, 11].

Therefore, bleeding from esophageal and gastric varices remains one of the leading causes of mortality in patients with liver cirrhosis, necessitating a comprehensive approach to treatment and prevention. The present study is a retrospective analysis of clinical cases of EGV-related bleeding recorded at the City Emergency Hospital in Almaty between 2022 and 2024, aimed at evaluating the clinical course, therapeutic strategies, and outcomes of these patients.

**The objective of this study** was to analyze the clinical and laboratory characteristics, diagnostic approaches, and therapeutic strategies for esophageal and gastric variceal bleeding in patients admitted to the City Emergency Medical Care Hospital in Almaty over the past three years.

# Materials and Methods

A retrospective analysis was conducted based on medical records of patients who received treatment for bleeding from esophageal and gastric varices at the City Emergency Medical Care Hospital in Almaty between 2022 and 2024. A total of 162 patients aged 20 to 80 years (mean age  $54.3 \pm 11.8$  years) were included, comprising 90 males (55.6%) and 72 females (44.4%).

**Inclusion criteria** were as follows: age  $\geq 18$  years; a confirmed diagnosis of liver cirrhosis; evidence of acute upper gastrointestinal bleeding endoscopically verified as originating from esophageal or gastric varices; and the availability of complete medical documentation (hospital records, diagnostic and treatment protocols).

**Exclusion criteria** included non-variceal sources of bleeding (e.g., peptic ulcer disease, erosive gastritis, Mallory–Weiss syndrome, neoplasms), insufficient clinical or endoscopic data, and coagulopathies unrelated to hepatic pathology.

The diagnostic workup comprised assessment of presenting complaints, physical examination, and laboratory testing, including complete blood count and biochemical panel (hemoglobin, platelet count, bilirubin, ALT, AST, albumin, INR), coagulation profile, Child–Pugh classification, and MELD score calculation. Abdominal ultrasound and mandatory esophagogastroduodenoscopy (EGD) were performed in all cases.

Endoscopic evaluation of esophageal varices was performed in accordance with the Japanese JGES classification, which includes assessment of variceal form (F0–F3), color (Cb/Cr), presence of red color signs (e.g., red wale markings, cherry red spots), and extent of variceal involvement (Ls, Lm, Lg).

The therapeutic protocol included fluid resuscitation, blood transfusions, vasoactive pharmacologic agents, and endoscopic interventions such as variceal band ligation or sclerotherapy of esophageal and gastric varices. In severe cases, balloon tamponade using a Sengstaken–Blakemore tube was employed as a temporary hemostatic measure prior to definitive endoscopic therapy. All patients received antibiotic prophylaxis. Patients with hemodynamic instability were transferred to the intensive care unit. Upon stabilization, secondary prophylaxis with non-selective  $\beta$ -blockers was initiated.

The following parameters were analyzed: demographic data (age, sex), hemostatic and liver function indices upon admission, volume and effectiveness of hemostatic interventions, rebleeding rate, mortality and its correlation with cirrhosis severity, duration of hospitalization, and overall clinical outcomes.

Statistical analysis was performed using Microsoft Excel and SPSS Statistics version 25.0. Continuous variables were expressed as mean  $\pm$  standard deviation ( $M \pm SD$ ). Group comparisons were conducted using the Student's *t*-test for normally distributed variables, the  $\chi^2$  test for categorical variables, and one-way analysis of variance (ANOVA). A *p*-value of  $<0.05$  was considered statistically significant.

**Ethical Considerations:** The study was reviewed and discussed at the Department of Surgical Diseases No. 1 of the Kazakh National Medical University named after S.D. Asfendiyarov. Given the retrospective design and the use of fully anonymized patient data, formal approval from the local ethics committee was not required. The conduct of the study complied with applicable national regulations and international ethical standards.

# Results:

Over the three-year observation period (2022–2024), a total of 162 patients with bleeding from esophageal and gastric varices (EGV) were admitted to the City Emergency Medical Care Hospital in Almaty. The highest number of cases was recorded in 2024, with 64 patients (39.5%), followed by 50 patients (30.9%) in 2023, and 48 patients (29.6%) in 2022.

An analysis of the gender and age distribution of patients with EGV-related bleeding over the study period (Table 1) revealed a moderate predominance of males, who accounted for 55.6% ( $n = 90$ ) of the total cohort ( $n = 162$ ). The gender distribution remained relatively stable across the years, with minor fluctuations ranging from 54.7% to 56.3% among male patients. The overall mean age of patients was  $54.3 \pm 11.2$  years. Age dynamics were also consistent over time:  $53.8 \pm 10.9$  years in 2022,  $54.5 \pm 11.5$  years in 2023, and  $54.7 \pm 11.2$  years in 2024. The age range across all years extended from 20 to 80 years (Table 1).

Table 1.

**Distribution of patients with esophageal and gastric variceal bleeding by sex and age, 2022–2024.**

Year	Number of Patients	Male (n, %)	Female (n, %)	Mean Age (years)	Age Range (years)
2022	48	27 (56.3%)	21 (43.7%)	$53.8 \pm 10.9$	20–78
2023	50	28 (56.0%)	22 (44.0%)	$54.5 \pm 11.5$	22–80
2024	64	35 (54.7%)	29 (45.3%)	$54.7 \pm 11.2$	21–80



In 101 cases (62.3%), severe posthemorrhagic anemia was identified, with hemoglobin levels below 70 g/L, necessitating urgent transfusion therapy. The mean hemoglobin level at admission was  $72.6 \pm 14.8$  g/L. In 15 patients (9.3%), variceal bleeding was the first clinical manifestation of previously undiagnosed liver cirrhosis, complicating timely initiation of prophylactic measures against portal hypertension-related complications.

All patients underwent endoscopic evaluation of esophageal and gastric varices upon admission, utilizing the Japanese JGES classification, which assesses variceal morphology, the presence of red color signs (RCS), and the extent of variceal involvement. According to esophagogastroduodenoscopy (EGD) findings, 145 patients (89.5%) were diagnosed with grade II or III esophageal varices. Gastric varices were detected in 17 patients (10.5%), including 10 cases (6.2%) in combination with esophageal varices. Additionally, signs of portal hypertensive gastropathy were identified in 4 female patients (2.5%).

Based on endoscopic grading, the majority of patients ( $n = 154$ ; 95.1%) presented with grade II or III esophageal varices according to the JGES classification. Grade II varices were observed in 70 patients (43.2%), while grade III varices were noted in 84 patients (51.9%). Only 8 patients (4.9%) had grade I varices, underscoring the predominance of advanced portal hypertension in the study cohort. The average variceal grade was  $2.47 \pm 0.55$ .

Assessment of hepatic functional status using the Child–Pugh score revealed a predominance of classes B and C, corresponding to subcompensated and decompensated cirrhosis, respectively. Class A was documented in 49 patients (30.2%), class B in 89 patients (54.9%), and class C in 24 patients (14.8%). The mean Child–Pugh score was  $7.97 \pm 1.6$ , indicating moderate hepatic dysfunction. The additionally calculated MELD score averaged  $15.2 \pm 3.4$  (Table 2).

Table 2.

**Distribution of patients by esophageal variceal grade (JGES classification) and Child–Pugh class across the study years (2022–2024).**

Criterion	2022 (n = 48)	2023 (n = 50)	2024 (n = 64)	Total (n = 162)
Grade I (JGES)	3 (6.3%)	2 (4.0%)	3 (4.7%)	8 (4.9%)
Grade II (JGES)	20 (41.7%)	22 (44.0%)	28 (43.8%)	70 (43.2%)
Grade III (JGES)	25 (52.1%)	26 (52.0%)	33 (51.6%)	84 (51.9%)
Mean JGES grade	$2.46 \pm 0.58$	$2.48 \pm 0.52$	$2.48 \pm 0.54$	$2.47 \pm 0.55$
Child–Pugh Class A	16 (33.3%)	15 (30.0%)	18 (28.1%)	49 (30.2%)
Child–Pugh Class B	26 (54.2%)	27 (54.0%)	36 (56.3%)	89 (54.9%)
Child–Pugh Class C	6 (12.5%)	8 (16.0%)	10 (15.6%)	24 (14.8%)
Mean Child–Pugh score	$7.8 \pm 1.5$	$8.0 \pm 1.6$	$8.1 \pm 1.7$	$7.97 \pm 1.6$

#### Therapeutic Interventions and Outcomes.

Patients with bleeding from esophageal and gastric varices ( $n = 162$ ) received stepwise treatment aimed at hemodynamic stabilization, bleeding control, and prevention of recurrence. Management included pharmacological, transfusion, and endoscopic interventions, selected based on the severity of the patient's condition and the nature of the bleeding episode.

Pharmacological therapy was administered to all patients and consisted of vasoactive agents (terlipressin or octreotide), proton pump inhibitors, hemostatic agents, and prophylactic antibiotics—primarily third-generation cephalosporins—to prevent infectious complications. Treatment was initiated within the first hours of hospital admission.

Transfusion therapy was performed in 106 patients (65.4%) using packed red blood cells (PRBC) and fresh frozen plasma (FFP). The mean transfused volume was  $2.1 \pm 1.4$  units of PRBC and  $2.6 \pm 1.9$  units of FFP. Indications included hemoglobin levels  $<70$  g/L, signs of hypovolemia, and reduced prothrombin index.

Endoscopic variceal ligation (EVL) was performed in 89 patients (54.9%), including 78 patients (48.1%) with esophageal varices and 12 patients (7.4%) with gastric varices. Of these, 65 patients (73.0%) underwent EVL within the first 24 hours of hospitalization (mean time:  $16.4 \pm 4.7$  hours), while 24 patients (27.0%) underwent the procedure on the second day. In cases of ongoing active bleeding, the procedure was performed under intravenous

anesthesia in the intensive care unit (ICU) to ensure hemodynamic stabilization, reduce the risk of aspiration, improve visualization, and enhance procedural safety.

The ligation procedure was conducted using a multiband ligator (Wilson-Cook) with a 10-ring latex cartridge, allowing for effective ligation of multiple variceal columns in a single session.

Sclerotherapy, as an alternative endoscopic hemostatic technique, was employed in 17 patients (10.5%) beginning in April 2023, primarily in cases where ligation was technically unfeasible—such as with highly tortuous varices, massive bleeding, limited endoscopic visibility, or gastric varices, which are often more challenging to manage via ligation.

Balloon tamponade using a Sengstaken–Blakemore tube was utilized in 29 patients (17.9%) for massive ongoing hemorrhage when endoscopic hemostasis was not feasible or technically limited. The mean duration of tamponade was  $12.5 \pm 3.2$  hours.

Due to the severity of their condition, 54 patients (33.3%) were immediately transferred from the emergency department to the ICU. Indications for ICU admission included hemodynamic instability, significant hypovolemia, severe anemia, and coagulopathy. In the ICU, patients received intensive fluid and transfusion therapy, vasopressor support, correction of coagulopathies, and continuous monitoring of vital parameters. The mean ICU stay was  $2.9 \pm 1.7$  days.

Over the three-year study period (2022–2024), complications, rebleeding rates, and survival outcomes were analyzed among the 162 patients. The in-hospital rebleeding rate was 2.5% ( $n = 4$ ). Within 12 months, recurrent bleeding occurred in 11 patients (6.8%), all of whom underwent repeated EVL, while an additional 18 patients (11.1%) received conservative pharmacologic therapy.

The overall mortality rate was 4.32% ( $n = 7$ ), with all deaths occurring in patients with advanced decompensation (Child–Pugh class B/C), elevated MELD scores, and ICU admission. The primary causes of death were progressive hepatic-renal failure, hepatorenal syndrome, and infectious complications. Annual mortality

distribution was as follows: 2 of 48 patients (4.2%) in 2022, 4 of 50 patients (8.0%) in 2023, and 1 of 64 patients (1.56%) in 2024. No statistically significant upward trend in mortality was observed ( $p > 0.05$ ).

Post-endoscopic procedural mortality—defined as death following EVL or sclerotherapy—was 1.2% ( $n = 2$ ), with one case each in 2022 and 2023. No procedure-related deaths were recorded in 2024.

The overall procedural intervention rate was 65.4% ( $n = 106$ ), including endoscopic variceal ligation in 89 patients (54.9%) and sclerotherapy in 17 patients (10.5%) (Table 3).

Table 3.

**Distribution of complications among patients with esophageal and gastric variceal bleeding by year of observation (2022–2024).**

Complication	2022 ( $n = 48$ )	2023 ( $n = 50$ )	2024 ( $n = 64$ )	Total ( $n = 162$ )
Rebleeding within 12 months	4 (8.3%)	4 (8.0%)	3 (4.7%)	11 (6.8%)
Overall mortality	2 (4.2%)	4 (8.0%)	1 (1.56%)	7 (4.32%)
Post-procedural mortality	1 (2.1%)	1 (2.0%)	0 (0.0%)	2 (1.2%)

**Risk Factor Analysis for Rebleeding from Esophageal and Gastric Varices.** An analysis of risk factors for rebleeding among patients with esophageal and gastric variceal hemorrhage ( $n = 162$ ) revealed the significant prognostic impact of endoscopic findings and timing of intervention. The presence of red color signs (RCS) was associated with the highest risk of rebleeding, observed in 17.9% of patients, with an odds ratio (OR) of 6.51. Among patients with grade III esophageal or gastric varices, the rebleeding rate was 7.7% (OR = 1.32). Delayed endoscopic intervention (ligation performed  $\geq 24$  hours after

admission) was also associated with an increased risk of recurrence—12.5% of such cases experienced rebleeding (OR = 2.32). A higher MELD score ( $\geq 15$ ) was linked to rebleeding in 8.2% of cases (OR = 1.50).

In contrast, patients with Child–Pugh class B/C had a lower recurrence rate of 6.0%, and those who did not undergo ligation had a recurrence rate of 6.8%, both with lower predictive value (OR  $< 2$ ). These findings emphasize the need for close monitoring of patients with unfavorable endoscopic features and advanced liver dysfunction (Table 4).

Table 4.

**Risk Factors for Rebleeding from Esophageal and Gastric Varices.**

Risk Factor	Rebleeding ( $n$ , %)	No Rebleeding ( $n$ , %)	OR (Odds Ratio)
Grade III esophageal/gastric varices	6 (7.7%)	72 (92.3%)	1.32
Presence of red color signs (RCS)	7 (17.9%)	32 (82.1%)	6.51
Child–Pugh class B/C	5 (6.0%)	79 (94.0%)	0.76
MELD score $\geq 15$	6 (8.2%)	67 (91.8%)	1.50
Ligation performed $\geq 24$ hours	3 (12.5%)	21 (87.5%)	2.32
No ligation performed	5 (6.8%)	68 (93.2%)	1.29

## Discussion

The results of our study highlight the critical importance of timely diagnosis and intervention in the management of variceal bleeding among patients with liver cirrhosis. The data show that the vast majority of patients (95.1%) were admitted with advanced grade II–III esophageal and gastric varices, as classified by the Japanese JGES system.

A pivotal prognostic factor identified in our cohort was the timing of endoscopic hemostasis. Early ligation performed within the first 24 hours was associated with the lowest risk of rebleeding (2.3%) and zero postprocedural mortality, whereas delayed intervention ( $\geq 24$  hours) was linked to a twofold increase in rebleeding risk (12.5%; OR = 2.32). These findings align with current recommendations from the JGES and Baveno VII consensus, both of which emphasize the

necessity of performing endoscopic therapy within the first 24 hours following presentation [10, 11].

The presence of red color signs (RCS) warrants particular attention as a marker of high bleeding risk. In our study, patients with RCS exhibited a rebleeding rate of 17.9% (OR = 6.51), markedly higher than in those without such signs. This finding is consistent with the results reported by Trofimov et al. and Liu et al. [6, 12], which also emphasized the high prognostic value of endoscopic features, particularly RCS, in predicting adverse outcomes.

Assessment of hepatic function revealed that the most unfavorable clinical outcomes—including an overall mortality rate of 4.32%—were primarily observed in patients with decompensated cirrhosis (Child–Pugh classes B/C and MELD  $\geq 15$ ). These results are corroborated by studies conducted by Mandal et al. and

Danpanichkul et al. [4, 7], which also identified hepatic decompensation as the principal predictor of mortality in cases of variceal hemorrhage.

Of note, in 9.3% of cases, the bleeding episode represented the first clinical manifestation of previously undiagnosed cirrhosis, underscoring a significant gap in early detection of liver disease in Kazakhstan. According to data from the World Health Organization (WHO) [5] and the Ministry of Health of the Republic of Kazakhstan [8], the prevalence of chronic liver diseases remains high in the region—particularly among working-age men—a trend that is reflected in our study cohort (male proportion: 55.6%).

The overall mortality rate of 4.32%, including a postprocedural mortality of 1.2%, appears acceptable when compared to international benchmarks, which range from 3% to 7% depending on the severity of cirrhosis and the presence of complications [4, 11].

In summary, the principal factors associated with rebleeding and mortality in this study were the presence of red color signs (OR = 6.51), grade III varices (OR = 1.32), delayed endoscopic intervention ( $\geq 24$  hours; OR = 2.32), and MELD score  $\geq 15$  (OR = 1.50). These findings underscore the necessity for an individualized management strategy for variceal hemorrhage, including early endoscopic diagnosis, proactive use of variceal ligation for grade II–III varices, and rigorous control of risk factors in patients with advanced cirrhosis.

This study has several limitations, including its retrospective and single-center design, potential gaps in medical documentation, the absence of a standardized treatment protocol, limited sample sizes in certain subgroups (e.g., patients with grade I varices), and the lack of long-term survival data beyond one year. Nevertheless, the study possesses substantial strengths, including a robust sample size ( $n = 162$ ) over a three-year period, use of validated scoring systems (Child–Pugh, MELD, JGES), comprehensive evaluation of endoscopic intervention effectiveness in real-world clinical settings, and reliable statistical analysis with odds ratio (OR) calculations and significance testing, thereby enhancing the scientific and clinical relevance of the findings.

### Conclusions

1. Among the 162 patients with esophageal and gastric varices, males predominated (55.6%), with a mean age of  $54.3 \pm 11.2$  years; anemia with hemoglobin levels  $< 70$  g/L was detected in 62.3% of cases.

2. Grade II–III varices were diagnosed in 95.1% of patients; Child–Pugh classes B and C accounted for 69.7%, and the mean MELD score was  $15.2 \pm 3.4$ .

3. Early ligation ( $< 24$  hours) reduced the rebleeding rate to 2.3%, while delayed ligation ( $\geq 24$  hours) was associated with a higher recurrence rate of 12.5% (OR = 2.32); the presence of red color signs (RCS) increased the risk of rebleeding to 17.9% (OR = 6.51).

4. The overall mortality rate was 4.32%, and postprocedural mortality was 1.2%; all fatal outcomes occurred in patients with severe hepatic decompensation.

Bleeding from esophageal and gastric varices remains a life-threatening complication of liver cirrhosis,

carrying a significant risk of mortality. The present analysis demonstrates that most patients present with advanced portal hypertension and impaired hepatic function. Early endoscopic variceal ligation ( $< 24$  hours) was identified as the most effective method for achieving hemostasis and preventing rebleeding. The presence of red color signs and higher variceal grade per JGES classification were significantly associated with an increased risk of rebleeding. These findings underscore the importance of timely diagnosis, early intervention, and risk stratification in patients with variceal bleeding in the setting of liver cirrhosis.

**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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#### Information about authors:

**Onlasyn Ibekenov** - Candidate of Medical Sciences, Highest Category Surgeon, Head of the Strategic Block at the National Scientific Center of Surgery Named After A.N. Syzganov, Almaty, Republic of Kazakhstan; E-mail: onlasin72@mail.ru; Tel.: 8 707 740 8039, ORCID: 0000-0001-6605-6435

**Abylai Baymakhanov** - Candidate of Medical Sciences, Associate Professor, Dean of the Faculty of Postgraduate Education at NJC "Kazakh National Medical University named after S.D. Asfendiyarov, Professor of the Department of Surgical Diseases №1, Almaty, Republic of Kazakhstan; E-mail: baimakhanov.a@kaznmu.kz; Tel.: 8 701 759 4017, ORCID: 0009-0001-0344-1800

**Aman Berkinbay** - Surgical Resident (2nd year), NJC "Kazakh National Medical University named after S.D. Asfendiyarov, Almaty, Republic of Kazakhstan; E-mail: aman\_98e@mail.ru; Tel.: 8 708 172 1280, ORCID: 0000-0002-3973-7283

**Yermek Zheldibaev** - Deputy Director for Surgery at the City Emergency Medical Care Hospital, Highest Category Surgeon, Almaty, Republic of Kazakhstan; E-mail: er.med@mail.ru; Tel.: 8 707 527 7792, ORCID: 0009-0004-0216-1307

**Makhsat Duisebekov** - Head of the Surgery Department, Hepatobiliary Surgeon at the City Emergency Medical Care Hospital, Almaty, Republic of Kazakhstan; E-mail: makhsatduisebekov@yandex.kz; Tel.: 8 701 745 2616, ORCID: 0009-0001-6697-8074

**Nurhat Esenbekov** - Highest Category Surgeon at the City Emergency Medical Care Hospital, Almaty, Republic of Kazakhstan; E-mail: esenbekovnurhat4@gmail.com; Tel.: 8 747 171 7273, ORCID: 0009-0007-5324-2117

**Sabit Iskakov** - Endoscopic surgeon, at the City Emergency Medical Care Hospital, Almaty, Republic of Kazakhstan; E-mail: sabit.iskakov@mail.ru; Tel.: 8 707 787 8045, ORCID: 0009-0000-2359-9026

**Mazhit Abdykadyrov** - Endoscopic surgeon, at the City Emergency Medical Care Hospital, Almaty, Republic of Kazakhstan; E-mail: abdykadyrov.m@gmail.com, Tel.: 8 707 105 0100, ORCID: 0000-0002-9518-5292

**Erzhan Tulebaev** - Surgical Resident (2nd year), NJC "Kazakh National Medical University named after S.D. Asfendiyarov, Almaty, Republic of Kazakhstan; E-mail: 1995\_erzhan@mail.ru; Tel.: 8 747 222 0213, ORCID: 0009-0007-6053-787X

**Dias Myrzash** - Surgical Resident (2nd year), NJC "Kazakh National Medical University named after S.D. Asfendiyarov, Almaty, Republic of Kazakhstan; E-mail: diasmyrzash@gmail.com; Tel.: 8 705 857 4858, ORCID: 0009-0001-7793-2338

#### Corresponding author:

**Onlasyn Ibekenov** - Candidate of Medical Sciences, Highest Category Surgeon, Head of the Strategic Block at the National Scientific Center of Surgery Named After A.N. Syzganov, Almaty, Republic of Kazakhstan; ORCID: 0000-0001-6605-6435

**E-mail:** onlasin72@mail.ru;

**Phone number:** +7 701 740 80 39