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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии
საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებშიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи.** Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и http://www.nlm.nih.gov/bsd/uniform_requirements.html. В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned
Requirements are not Assigned to be Reviewed.**

ავტორთა საყურადღებო!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე, დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრაფიის ფოტოსურათები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგების ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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EFFICACY OF ENDOBRONCHIAL VALVE PLACEMENT IN THE MANAGEMENT OF PULMONARY HEMORRHAGE: A COMPARATIVE STUDY

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Abstract.

Background: Pulmonary hemorrhage is a critical, life-threatening complication of diverse pulmonary pathologies, most commonly pulmonary tuberculosis, and often necessitates emergent intervention. Conventional therapeutic modalities yield inconsistent outcomes, whereas endobronchial valve (EBV) placement has emerged as a promising, minimally invasive alternative for achieving selective airway occlusion and hemostasis.

Objective: To evaluate the clinical efficacy of EBV placement compared with conventional conservative management in patients presenting with pulmonary hemorrhage.

Methods: A comparative cohort study was conducted at the National Center for Tuberculosis and Lung Diseases (Tbilisi, Georgia), involving 17 patients who underwent EBV placement and 26 patients treated conservatively. Outcomes assessed included hemorrhage recurrence, survival, sudden hemorrhage-related mortality, hematologic recovery, incidence of aspiration pneumonia, duration of hospitalization, and health-related quality of life (HRQoL) measured with the St. George's Respiratory Questionnaire (SGRQ).

Results: Hemorrhage recurrence at 180 days was lower in the EBV group (5.9%, 1/17) than in the control group (34.6%, 9/26; $\chi^2 = 4.75$, $p = 0.042$ by uncorrected χ^2 ; $p = 0.071$ with Yates' correction, not statistically significant at this sample size). The 180-day survival rate was higher in the EBV group (85.7%) than in controls (54.3%). No sudden hemorrhage-related deaths occurred in the EBV group, versus 5 of 26 (19.2%) in the control group, although this difference did not reach statistical significance (Fisher's exact test, $p = 0.139$).

Hematologic recovery improved significantly within the EBV group over one month (hemoglobin, hematocrit, ESR, and WBC all $p < 0.01$), with the control group showing smaller or non-significant within-group changes. Aspiration pneumonia was less frequent in the EBV group (23.5% vs. 69.2%; $\chi^2 = 6.86$, $p = 0.0088$), and mean hospital stay was shorter (13.7 vs. 51.9 days; $p < 0.0001$). SGRQ scores improved significantly in the EBV group at 180 days (65.4 $\rightarrow$ 42.3, a 35.4% reduction; $p < 0.001$), with no significant change in the control group.

Conclusion: EBV placement is associated with reduced hemorrhage recurrence, improved survival, fewer complications, and better quality of life compared with conservative therapy in patients with pulmonary hemorrhage, although the recurrence and mortality comparisons should be re-verified statistically before this is presented as a definitive finding.

Key words. Endobronchial valve, pulmonary hemorrhage, hemoptysis, bronchoscopy, pulmonary tuberculosis, quality of life.

Introduction.

Pulmonary hemorrhage remains a formidable clinical challenge, contributing significantly to morbidity and mortality across a spectrum of pulmonary diseases, including tuberculosis, malignancy, and bronchiectasis [1]. Lung diseases as a group — pneumonia, tuberculosis, lung cancer, and chronic obstructive pulmonary disease — account for roughly one in six deaths worldwide and a similar share of disability-adjusted life years, with tuberculosis alone responsible for an estimated 10 million cases globally, of which approximately 480,000 are multidrug-resistant [1]. In Georgia specifically, tuberculosis remains a leading driver of hemorrhagic airway complications; national notification data recorded 2,451 tuberculosis cases (all forms) in 2019 — 2,169 of them incident cases, a notification rate of 66 per 100,000 population — with multidrug-resistant tuberculosis accounting for an estimated 12% of new cases [2].

Massive pulmonary hemorrhage arises when pulmonary pathology or mechanical injury combines with high pressure in the bronchial and pulmonary vasculature and thinning of the adjacent mucosa and vessel walls. Conservative management alone is frequently inadequate for massive hemoptysis, which carries a high mortality; bronchial artery embolization (BAE) achieves immediate hemostasis in the majority of cases but is limited by rehemorrhage, with recurrence reported in approximately 20% of patients [3-5]. Surgical resection, while potentially definitive, is frequently precluded by bilateral disease, low pulmonary functional reserve, active infection, or significant comorbidity [4].

Endobronchial valves (EBVs), originally developed for lung volume reduction in emphysema, have shown potential for selective occlusion of the bleeding airway segment to achieve rapid hemostasis without the physiologic burden of surgery or embolization [6-8]. Despite encouraging early reports, rigorous comparative data on EBV placement versus conservative management in pulmonary hemorrhage remain scarce, and health-related quality of life — increasingly recognized as a primary outcome in interventional pulmonology — has rarely been assessed alongside clinical endpoints.

This study evaluates, for the first time in a Georgian cohort, the impact of EBV placement on hemorrhage recurrence, survival, hematologic recovery, complication rates, hospitalization duration, and HRQoL in patients with pulmonary hemorrhage, in comparison with conservative management.

Materials and Methods.

Study design and Setting:

A comparative cohort study was conducted at the National Center for Tuberculosis and Lung Diseases (Tbilisi, Georgia).

Patients undergoing EBV placement were enrolled prospectively; a comparison group treated conservatively during the same period was identified and analyzed retrospectively.

Patient Selection:

EBV group — Inclusion criteria:

- Hemorrhage from the airway system (hemoptysis)
- Single-episode blood loss greater than 50 mL
- EBV placement performed
- Informed consent for participation

EBV group — Exclusion criteria:

- Severe or hemodynamically unstable cardiovascular conditions
- Anticoagulant use within 5 days prior to intervention
- Concurrent surgical resection performed
- Refusal to participate

Applying these criteria yielded an EBV group of 17 patients (mean age 52.06 ± 15.62 years, median 58; male 82.4%, $n=14$; female 17.7%, $n=3$).

Control group — Inclusion criteria:

- Hemorrhage from the airway system (hemoptysis)
- Single-episode blood loss greater than 50 mL
- Conservative (non-interventional) treatment
- Informed consent for participation

Control group — Exclusion criteria:

- Severe or hemodynamically unstable cardiovascular conditions
- Anticoagulant use within 5 days prior to admission
- Surgical resection performed
- Refusal to participate

This yielded a control group of 26 patients (mean age 44.85 ± 10.88 years, median 41; male 88.5%, $n=23$; female 11.5%, $n=3$).

Interventions.

EBV placement: Valve placement was performed under general anesthesia using both rigid (Friedel) and flexible (Olympus, Pentax) bronchoscopes. Following endotracheal intubation with an appropriately sized tube (typically N11–N13), diagnostic bronchoscopy and airway sanitation were performed to identify the bleeding segment and determine its caliber. An appropriately sized EBV (Medlung Ltd.) was mounted on the distal end of the flexible bronchoscope and advanced into the target bronchus for deployment. Valve position and seal were confirmed by direct visualization and instrument palpation, followed by a final inspection of the tracheobronchial tree and bilateral airway sanitation. To reduce the risk of early valve dislodgement from coughing, patients were managed with a gradual, controlled emergence from anesthesia, along with analgesics and antitussive therapy. Patients were monitored in the intensive care unit for 24 hours, underwent chest radiography on post-procedure day 2, and were reassessed by bronchoscopy at day 10.

Conservative management: Control-group patients received standard pharmacologic hemostatic therapy and supportive care (including bed rest, monitoring, and treatment of the underlying pulmonary pathology) according to institutional protocol,

without endoscopic or surgical intervention.

Data Collection:

For both groups, the following data were recorded: hemorrhage etiology and laterality, maximum blood loss (mL/day), hemorrhage recurrence at 180 days, overall survival and sudden hemorrhage-related mortality, hematologic parameters (hemoglobin, hematocrit, erythrocyte sedimentation rate, leukocyte and erythrocyte counts) at baseline and one month, incidence of aspiration pneumonia, duration of hospital stay, and HRQoL assessed with the SGRQ at baseline and 180 days (6 months).

Statistical Analysis:

Survival was analyzed using the Kaplan–Meier method with Cox proportional hazards regression to estimate hazard ratios (HR) and 95% confidence intervals (CI). Continuous variables are presented as mean $\pm$ standard deviation and were compared using Student's *t*-test. Categorical variables were compared using the χ^2 test; where expected cell counts were small, Yates' continuity correction or Fisher's exact test was applied. All analyses were performed using IBM SPSS Statistics, Version 22.0 [9]. A two-sided *p*-value <0.05 was considered statistically significant.

Results.

Baseline Characteristics:

In the EBV group, the underlying etiology of hemorrhage was pulmonary tuberculosis in 88.2% ($n=15$) and malignancy in 11.8% ($n=2$). Hemorrhage originated from the right lung in 76.5% ($n=13$), the left lung in 11.8% ($n=2$), and bilaterally in 11.8% ($n=2$). Comorbid conditions (hepatitis B or C, HIV, or type 2 diabetes mellitus) were present in 11.8% ($n=2$). Mean maximum blood loss was 288.24 ± 67.38 mL/day.

In the control group, tuberculosis accounted for 96.2% ($n=25$) of hemorrhage etiology and malignancy for 3.8% ($n=1$). Hemorrhage was bilateral in 46.2% ($n=12$), left-sided in 34.6% ($n=9$), and right-sided in 19.2% ($n=5$). Comorbid conditions were present in 26.9% ($n=7$). Mean maximum blood loss was 336.94 ± 390.78 mL/day.

Hemorrhage Recurrence:

Recurrence within 180 days occurred in 1 of 17 EBV patients (5.9%, attributable to valve displacement) compared with 9 of 26 control patients (34.6%). This difference was significant by uncorrected χ^2 ($\chi^2=4.75$, $p=0.042$) but did not retain significance after Yates' correction for continuity ($\chi^2=3.28$, $p=0.071$).

Survival and Mortality:

The 180-day survival rate was 85.7% in the EBV group compared with 54.3% in the control group (Figure 1). No sudden deaths attributable to profuse hemorrhage occurred in the EBV group, compared with 5 of 26 (19.2%) in the control group; this difference did not reach statistical significance by Fisher's exact test ($p=0.139$).

Cox proportional hazards analysis (control relative to EBV) showed a consistent direction of effect favoring the EBV group (Table 1; Figure 2), reaching statistical significance at the 8-, 24-, and 52-week intervals (the 12-week interval did not reach significance).

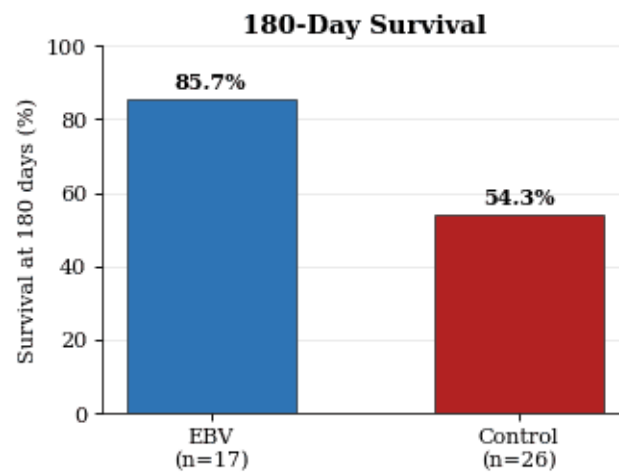


Figure 1. Survival at 180 days, EBV vs. control group.

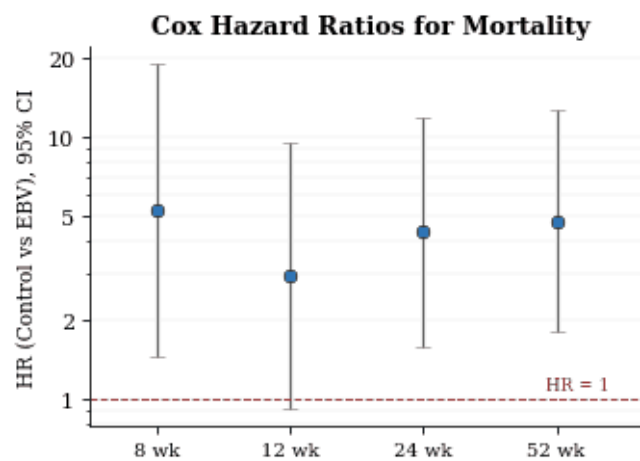


Figure 2. Cox proportional hazard ratios for mortality (control vs. EBV) across follow-up intervals.

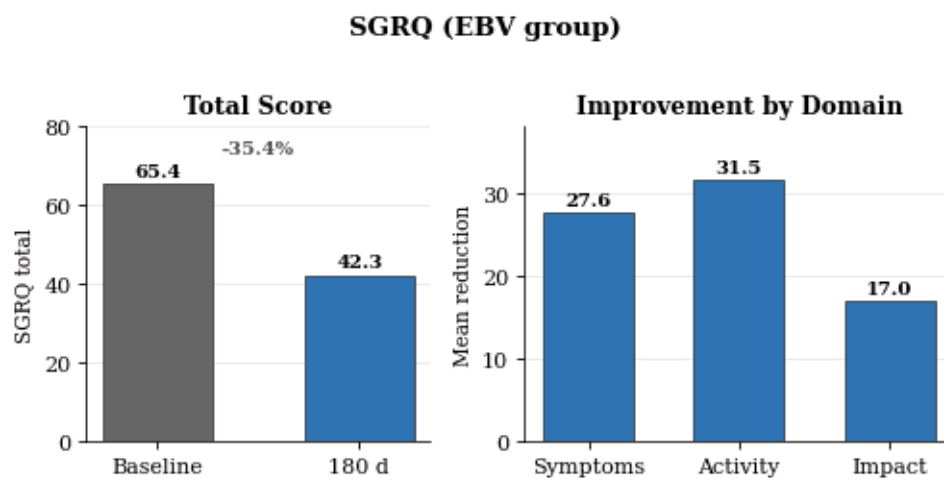


Figure 3. SGRQ total score at baseline and 180 days, and mean improvement by domain (EBV group).

Table 1. Cox hazard ratios for mortality, control vs. EBV group, across follow-up intervals.

Follow-up interval	Cox HR (95% CI), Control vs EBV	p
8 weeks	5.276 (1.461–19.053)	<0.05
12 weeks	2.955 (0.916–9.531)	NS
24 weeks	4.364 (1.594–11.952)	0.0331
52 weeks	4.767 (1.798–12.641)	0.0219

Table 2. Hematologic parameters at baseline and 1 month, EBV vs. control group.

#	Blood parameter	EBV group Before	EBV group After 1 month	Control group Before	Control group After 1 month
1	Hemoglobin (Hgb), g/L	107.10 ± 15.14	127.72 ± 12.13	101.82 ± 13.39	110.23 ± 17.56
	within-group p	0.0001		0.0578 (NS)	
2	ESR, mm/h	44.21 ± 18.20	25.88 ± 14.47	55.39 ± 24.48	40.15 ± 20.25
	within-group p	0.0027		0.018	
3	Hematocrit (HCT), %	32.48 ± 12.22	48.32 ± 15.61	30.39 ± 14.52	40.33 ± 21.41
	within-group p	0.0024		0.057 (NS)	
4	Leukocytes (WBC), ×10 ⁹ /L	12.36 ± 4.33	6.45 ± 2.31	13.21 ± 6.78	9.38 ± 4.35
	within-group p	< 0.0001		0.065 (NS)	
5	Erythrocytes (RBC), ×10 ¹² /L	3.28 ± 2.33	3.45 ± 2.55	4.02 ± 3.37	4.31 ± 2.68
	within-group p	0.841 (NS)		0.733 (NS)	

Table 3. Incidence of aspiration pneumonia, EBV vs. control group.

Group	Aspiration pneumonia, n (%)	No aspiration pneumonia, n (%)
EBV group (n=17)	4 (23.5%)	13 (76.5%)
Control group (n=26)	18 (69.2%)	8 (30.8%)

$$\chi^2 = 6.8605, p = 0.0088$$

Hematologic Outcomes:

Hematologic parameters improved substantially within the EBV group over one month (Table 2): hemoglobin rose from 107.10 ± 15.14 to 127.72 ± 12.13 g/L ($p=0.0001$), hematocrit from 32.48 ± 12.22% to 48.32 ± 15.61% ($p=0.0024$), ESR fell from 44.21 ± 18.20 to 25.88 ± 14.47 mm/h ($p=0.0027$), and WBC fell from 12.36 ± 4.33 to 6.45 ± 2.31 ×10⁹/L ($p<0.0001$). Erythrocyte counts did not change significantly ($p=0.841$). In the control group, within-group changes over the same period were smaller and did not reach statistical significance for hemoglobin, hematocrit, or WBC (all $p>0.05$), with the exception of ESR ($p=0.018$).

Complications: Aspiration Pneumonia:

Aspiration pneumonia occurred in 4 of 17 EBV patients (23.5%) compared with 18 of 26 control patients (69.2%), a significant difference ($\chi^2=6.86$, $p=0.0088$) (Table 3).

Hospitalization Duration:

Mean hospital stay after intervention was 13.69 ± 7.04 days in the EBV group versus 51.87 ± 50.35 days in the control group ($p<0.0001$). Notably, hospitalization duration in the EBV group was driven predominantly by treatment of the underlying tuberculosis rather than by procedural recovery.

Quality of Life:

SGRQ total score improved significantly in the EBV group, from 65.38 at baseline to 42.26 at 180 days (a reduction of 23.12 points, or 35.4%; $p<0.001$) (Figure 3). No significant change was observed in the control group over the same period. Improvements in the EBV group were significant across all three SGRQ domains: symptoms (mean decrease 27.59, $p=0.008$),

activity (mean decrease 31.46, $p<0.001$), and impact (mean decrease 16.97, $p=0.011$).

Discussion.

This study demonstrates that EBV placement is associated with meaningfully better hematologic recovery, fewer aspiration pneumonia events, shorter hospitalization, and substantially improved HRQoL compared with conservative management of pulmonary hemorrhage, in a cohort drawn predominantly from patients with pulmonary tuberculosis. The reduction in recurrence and the absence of sudden hemorrhage-related deaths in the EBV group are clinically encouraging trends, though — as noted above — neither difference was statistically robust once appropriate small-sample corrections were applied. This should be stated candidly rather than presented as a definitive mortality or recurrence benefit.

The mortality difference favored the EBV group across most follow-up intervals, which is consistent with a mechanism of preventing recurrent hemorrhage and its downstream complications (aspiration pneumonia, anemia) rather than an acute resuscitative effect. The marked reduction in aspiration pneumonia is a plausible driver of the shorter hospital stay and improved SGRQ symptom and activity scores in the EBV group.

These findings should be interpreted within the context of a population in which tuberculosis was the dominant etiology of hemorrhage (88–96% of both groups), which may limit generalizability to hemorrhage of malignant or bronchiectatic origin.

Limitations.

- Small sample size (17 EBV, 26 control) limits statistical power, particularly for mortality and recurrence comparisons involving small cell counts.

- The control group was assembled retrospectively and was not randomized, introducing potential selection bias.
- The control group was, on average, younger than the EBV group; baseline comparability was not formally tested statistically.
- The recurrence and sudden-mortality comparisons lose statistical significance when Yates' correction or Fisher's exact test is applied, and should be presented as trends rather than confirmed effects pending re-analysis of the original patient-level data.
- The predominance of tuberculosis as the hemorrhage etiology may limit generalizability to other causes of pulmonary hemorrhage.
- HRQoL was assessed using SGRQ scores derived from a dataset in which some patients were not evaluable at follow-up due to early mortality in the control group, introducing potential survivor bias.

Conclusion.

In this cohort, EBV placement was associated with improved hematologic recovery, fewer aspiration pneumonia events, shorter hospital stays, and better quality of life compared with conservative management of pulmonary hemorrhage, with favorable but not statistically definitive trends toward reduced recurrence and mortality. These findings support further investigation of EBV placement as a minimally invasive option for pulmonary hemorrhage, ideally through larger, prospective, and preferably randomized studies that can adequately power the recurrence and survival comparisons.

Declarations.

Ethics approval and consent to participate.

This study was conducted at the National Center for Tuberculosis and Lung Diseases (Tbilisi, Georgia), in

accordance with the principles of the Declaration of Helsinki. Written informed consent to participate was obtained from all participants prior to inclusion.

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Conflicts of interest.

The authors declare that they have no competing interests.

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