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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 ВИНИТИ 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 ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

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. Корректура авторам не высылается, 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 compu-ter-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 საყურადღებოდ!

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. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის 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 ფჩხილებში 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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Содержание:

Hua-ting Bi, Wen-Wen Hao.
CORRELATION BETWEEN PREOPERATIVE MACULAR THICKNESS AND POSTOPERATIVE VISUAL PROGNOSIS IN PATIENTS WITH DIABETIC CATARACT…….6-9

Melik-Andreasyan G.G, Tkhruni F.N, Karapetyan K.J, Atoyan S.A, Aleksanyan N.J, Kotsinyan N.Yu, Israyelyan A.L.
COMPARATIVE SUSCEPTIBILITY PROFILES OF CLINICAL AND REFERENCE BACTERIAL STRAINS ACROSS MULTIPLE ANTIBIOTICCLASSES……..10-16

Khramtsov D.M, Chernyshov O.V, Stoyanov O.M, Gryb V.A, Vorokhta Y.M.
COGNITIVE RESERVE IN PATIENTS AFTER CORONAVIRUS INFECTION…….17-22

Egzon Daku, Leon B. Hajdari, Bese R. Morina.
OPTIMIZING SPINAL ANESTHESIA IN URGENT CESAREAN DELIVERY: THE TAYLOR APPROACH IN A PARTURIENT WITH CORRECTED SEVERE SCOLIOSIS AND PULMONARY COMPLICATIONS: A CASE REPORT……..23-28

Ana Maisuradze, Ketevan Kiguradze-Gogilashvili, Flavien Fettak, Ketevan Oghiashvili, Vaja Maisuradze.
CORRELATION BETWEEN RADIATION SAFETY TRAINING AND COMPLIANCE WITH RADIATION PROTECTION PRACTICES: A CROSS-SECTIONAL STUDY……..29-32

Sarmad S. Salih Al Qassar, Omar Hussein Alluazy, Ahmed Khalaf Ali.
A NOVEL NON-INVASIVE MODULATION OF ORTHODONTIC RELAPSE: INSIGHTS FROM A RABBIT MODEL…...33-44

Fitim Alidema, Lirim Mustafa, Egzona Papraniku, Arieta Hasani Alidema, Mirlinda Havolli.
BIOCHEMICAL ABNORMALITIES OF HEPATIC AND RENAL FUNCTION IN HOSPITALIZED PATIENTS RECEIVING PHARMACOLOGICAL THERAPY: A THREE-YEAR RETROSPECTIVE ANALYSIS…….45-49

Sion Jo.
DOUBLE LUMEN TECHNIQUE (DLT) - ENDOTRACHEAL TUBE GUIDED LEVIN TUBE INSERTION TECHNIQUE……50-53

Ellen Safadi, Aparnna Baburaj, Sara Musa Abdalla Elamin, Marwan Ismail.
ASSOCIATION OF DEMOGRAPHIC AND SOCIOECONOMIC VARIABLES WITH PATIENTS' COMPREHENSION AND CONTENTMENT REGARDING INFORMED CONSENT IN A UNIVERSITY HOSPITAL SETTING: A CROSS-SECTIONAL STUDY.54-59

Ostemirkyzy Darika, Kapsalyamova Elmira, Daryono Hadi Tjahjono, Ustenova Gulbaram, Eva Susanty Simaremare.
ISOLATION AND IDENTIFICATION OF β-SITOSTEROL FROM *ZYGOPHYLLUM FABAGO* L. HERB USING SUBCRITICAL CO_2 EXTRACTION…….60-66

Oleg Batiuk, Marharyta Shkabarina, Andrii Manko, Svitlana Cherneta, Iryna Bychuk.
THE DYNAMICS OF PERCEPTIONS AND EVALUATION OF THE COMPONENTS OF THE IMAGE OF AN IDEAL TEACHER DURING THE COVID-19 PANDEMIC…….67-75

Ghaith Wadhah Hamdoon, Aws Hazem Al-Numan, Nawar Yahya Ahmed, Rikan Sulaiman Jumaah, Mazin Mahmoud Fawzi, Banan Burhan Mohammed.
UMBILICAL STUMP CARE IN NEWBORNS: IS BREAST MILK AS EFFECTIVE AS CONVENTIONAL METHODS…….76-80

Sana Khamassi, Emna Bornaz, Nourhène Tayari, Amel Gamoudi, Kamilia Ounaissa, Haifa Abdesselem, Ichraf Ben Ammar, Bahija Riahi, Dorra Bousnina, Henda Jamoussi, Chiraz Amrouche.
OVERWEIGHT AMONG TUNISIAN SCHOOL-AGED CHILDREN: PREVALENCE AND ASSOCIATED FACTORS…….81-86

Tsisana Giorgadze, Tinatin Gognadze, Lasha Dolidze.
CERTAIN PROPERTIES OF β-GLUCOSIDASE FROM YUCCA GLORIOSA FLOWERS…….87-92

Issenova Saule, Rakhimzhanova Adel, Shukirgaliyeva Marzhana.
RISK MANAGEMENT AND HEALTH SUPPORT FOR PREGNANT WOMEN USING INOSITOLS……93-100

Lirim Isufi, Diellza Kelmendi, Adelina Ahmeti Pronaj.
GENDER DIFFERENCES IN EMOTIONAL REGULATION AMONG ADOLESCENTS WITH ELEVATED ADHD SYMPTOMS: A SCHOOL-BASED STUDY…….101-105

Ketevan Omiadze, Alikya Chipurupalli, Tea Abzhandadze.
CHRONIC URTICARIA RELATED TO *HELICOBACTER PYLORI* INFECTION – A CASE REPORT…….106-109

Dinara Aliyeva, Ildar Fakhradiyev, Marat Shoranov.
IDEOLOGICAL FAULT LINES IN PHARMACEUTICAL POLICY OF KAZAKHSTAN: A Q-METHODOLOGICAL APPROACH….110-119

Ahmed Abdalla Jarelnape.
ARTIFICIAL INTELLIGENCE UTILIZATION AND ITS ASSOCIATION WITH NURSING PRACTICE IN CARDIOLOGY AND INTENSIVE CARE UNITS: A CROSS-SECTIONAL STUDY…….120-124

Jiaqi Liu, Yan Pan, Zuliang Yan, Hong Jiang, Hanglin Li, Ying Yu.
GLOBAL, REGIONAL, AND NATIONAL BURDEN OF CHRONIC KIDNEY DISEASE DUE TO TYPE 2 DIABETES MELLITUS, 1990-2021, WITH FORECASTS TO 2035: A FORECASTING STUDY FOR THE GLOBAL BURDEN OF DISEASE STUDY 202……125-135

Ahmed Dallal Bashi, Noor Abdulmonim, Noor Salem, Saleh Nayf, Teba Ammar, Yosif Ismaeel.
THE MOST COMMONLY PRESCRIBED MEDICATIONS BY PEDIATRICIANS IN MOSUL CITY…..……136-142

Lukina Veronika V, Katibgadzhiev Magomed A, Solovyov Andrey A, Kovalenko Polina S, Kuzmich Vitaliy V, Eremeeva Mariia V, Gaevskaya Rinata R, Kuznetsova Anna A, Aleksandrova Iuliia S, Bulia Mariam Z, Sadrutdinov Tatam D, Saitova Atikat S.
COMPARATIVE EFFECTIVENESS OF CONSERVATIVE METHODS FOR ACCELERATING EPITHELIALIZATION IN ACUTE ANAL FISSURE……143-147

Yerzhan Sharapatov, Maida Tusupbekova, Yermek Turgunov, Yuriy Pak, Yersaiyn Zhiyenbayev, Kuandyk Beisenov.
COMPARATIVE EXPERIMENTAL STUDY OF MORPHOLOGICAL CHANGES IN THE KIDNEY IN ACUTE OBSTRUCTIVE PYELONEPHRITIS MODEL: INFLUENCE OF INFECTION ROUTE…….……148-155

Aymar Kassa Boukat, Massine El Hamoummi, Yassine Sarboute, Beaouiss Mohamed, Andemey Leyoubou Emilie, Edderai Meryem, El Hassane Kabiri.
POST-CT-GUIDED BIOPSY PNEUMOTHORAX, ACCORDING TO THE COAXIAL TECHNIQUE WITH AN 18-GAUGE NEEDLE: EPIDEMIOLOGICAL, DIAGNOSTIC AND THERAPEUTIC ASPECTS…….……156-161

Azamat K. Kairgali, Raisa A. Aringazina, Murat K. Jakanov, Abdolreza Haghpanah, Marat N. Sarkulov.
THE EFFECT OF TRIVALENT CHROMIUM ON METABOLIC SYNDROME: A NARRATIVE REVIEW……162-169

Mohammed K.M Madi, Hannan Awad, Marwan Ismail, Maxmudjon Butaboyev, Jamoliddin Bobokalonzoda, Gaybiev Akmaljon Axmadjonovich, Elryah I Ali, Husham O. Elzein, Rasha Babiker, Amin SI Banaga, Salah Eldin Omar Hussein, Ayman H. Alfeel, Ahmed L. Osman, Asaad Babker.
RETICULOCYTE SUBPOPULATION ANALYSIS AND ITS CORRELATION WITH IRON DEFICIENCY ANEMIA: A RETROSPECTIVE STUDY IN A PREDOMINANTLY FEMALE POPULATION…….……170-176

Zena S. Tawffiq, Inas H. Ahmed, Luma M. Al-Obaidy.
PHYTOCHEMICAL SCREENING AND LIPID LOWERING EFFECTS OF *TERMINALIA CHEBULA* FRUIT EXTRACTS IN ALBINO WISTAR RATS…….……177-181

Azamat Shamsiev, Abdiqodir Shakhriev, Botir Yuldashev, Leyla Khakimova, Fariza Khalimova, Sagirayev Nodir Zhumakulovich.
CLINICAL EFFECTIVENESS OF TRADITIONAL TREATMENT METHODS FOR GRADE III CHEMICAL ESOPHAGEAL BURNS IN CHILDREN…….……182-186

Plaurat Krasniqi, Leon B. Hajdari, Fatos Sada, Egzon Daku.
POSTOPERATIVE MORPHINE USE IN ABDOMINAL SURGERY: CLINICAL INSIGHTS FROM A ONE-YEAR SINGLE-CENTER RETROSPECTIVESTUDY…….……187-193

Bashayr Z. Alamri, Reem F. Alnemari, Abduljawad S. Alharbi.
UNDERSTANDING FACTORS CONTRIBUTING TO PATIENTS' NON-ADHERENCE TO A LIFESTYLE MODIFICATION PLAN: A CROSS-SECTIONAL STUDY AMONG VISITORS OF LIFESTYLE CLINICS IN KING ABDUL-AZIZ MEDICAL CITY, JEDDAH…….……194-201

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CLINICAL EFFECTIVENESS OF TRADITIONAL TREATMENT METHODS FOR GRADE III CHEMICAL ESOPHAGEAL BURNS IN CHILDREN

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Abstract.

Introduction: Chemical esophageal burns in children, especially grade III injuries, frequently lead to cicatricial strictures, persistent dysphagia, and prolonged hospitalization, creating a high risk of complications and disability. Traditional dilation methods (blind bougienage and gastrostomy with string-guided bougienage) remain widely used; however, they are associated with limited effectiveness and a risk of perforation. This study aimed to evaluate real-world outcomes of these traditional approaches and to define their main clinical limitations.

Materials and Methods: A retrospective analysis was performed in 115 children (aged 1-14 years) with chemical esophageal burns treated in a hospital setting. Grade III esophageal burns with subsequent cicatricial stricture formation were diagnosed in 46 patients. The severity of stenosis was assessed using the Yu.I. Gallinger classification. Treatment selection was determined by the severity of deformity: direct bougienage was performed when luminal passage was possible, while gastrostomy with string-guided bougienage was used in cases of severe stenosis, inability to safely pass a bougie, or after ineffective blind bougienage. Final clinical outcomes were assessed during hospitalization (at discharge). Because treatment selection depended on stenosis severity and technical feasibility, between-method comparisons were interpreted descriptively in view of confounding by indication.

Results: All patients with grade III burns had cicatricial stenoses of grades II-IV: grade II - 45.6%, grade III - 43.5%, and grade IV - 10.9%. Direct bougienage was feasible as the primary method in 45.7% of cases, whereas gastrostomy with string-guided bougienage was used in 54.3%; this distribution should be interpreted with caution because gastrostomy was preferentially selected for more severe deformity or after failed blind bougienage. Esophageal perforation was recorded in 6.9% of patients. In alkali burns, a 1.6-fold higher need for gastrostomy was observed than in acid burns (73.3% vs 45.2%), but the difference did not reach statistical significance ($p = 0.115$). The mean length of hospital stay was 41.1 ± 2.9 bed-days. Final in-hospital clinical outcomes were: good - 67.4%, satisfactory - 19.6%, and unsatisfactory - 13.0%.

Conclusion: Traditional treatment methods for grade III chemical esophageal burns in children demonstrate important clinical limitations, including a risk of perforation and a frequent need for gastrostomy in severe cases. Given the retrospective design, selection by indication, and the absence of a direct comparison with visually controlled techniques, further comparative studies are needed to determine whether safer dilation under visual or guidewire control improves outcomes.

Key words. Esophageal burn, children, cicatricial stricture, blind bougienage, gastrostomy, alkali burns.

Introduction.

Chemical burns of the esophagus in children remain one of the challenging problems in pediatric surgery and burn medicine. The most common etiological agents are household chemicals - acids and alkalis - that are readily accessible in the home environment [1-4]. Alkali solutions have a high penetrating capacity and cause liquefaction necrosis, resulting in deep injury to the esophageal wall and the formation of severe cicatricial strictures [5-7]. This is associated with prolonged nutritional impairment, repeated hospitalizations, and the need for multistage treatment.

The traditional approach to the management of established strictures includes direct (blind) bougienage or gastrostomy followed by string-guided bougienage [8-10]. However, the effectiveness of blind bougienage is limited by the lack of visual control and the high risk of complications, primarily esophageal perforation and mediastinitis, which is particularly relevant in grade III-IV stenoses [11,12].

Aim of the study: To evaluate the outcomes of traditional treatment methods for grade III chemical esophageal burns in children and to identify the key clinical limitations of these techniques.

Materials and Methods.

The study was conducted as a retrospective analytical observational study at a specialized pediatric surgical hospital. The observation period corresponded to the time of treatment and in-hospital outcome assessment during 2020-2025. A total of 115 children (aged 1-14 years) with a diagnosis of chemical esophageal burn who received inpatient treatment were included. Among them, patients with confirmed grade III esophageal burns and cicatricial stricture formation were identified - 46 cases, which constituted the main analytical group. Final treatment outcomes were evaluated at discharge; post-discharge long-term follow-up data were not included in the primary endpoint assessment.

Within the grade III group, stratification was performed by: time to admission (1 week / 2-3 weeks / >=4-6 weeks); stenosis grade according to the Yu.I. Gallinger classification (II-IV); type of chemical agent (acid/alkali); treatment method (blind bougienage / gastrostomy with string-guided bougienage); treatment outcomes; and complications.

The analysis was based on the medical records of children hospitalized for chemical esophageal burns. Data sources included medical charts, discharge summaries, endoscopy reports, radiology reports (contrast esophagography, when available), and operative records in cases where gastrostomy and/or urgent surgical interventions were performed. A retrospective design was chosen to evaluate real-world clinical practice of traditional approaches - direct ("blind") bougienage and gastrostomy with string-guided bougienage. Because treatment selection depended on stenosis severity, technical feasibility, and prior failure of blind bougienage, comparisons between methods were considered descriptive and potentially affected by confounding by indication. Procedural details such as the exact number of bougienage sessions and intervals between sessions were not consistently documented in all charts and therefore could not be analyzed as standardized quantitative endpoints.

Inclusion criteria: age 1-14 years; confirmed diagnosis of chemical esophageal burn; availability of documentation on injury severity and treatment course; for the main group (n=46): confirmed grade III esophageal burn and the presence of cicatricial stricture requiring bougienage and/or gastrostomy.

Exclusion criteria: absence of key data in the medical records (incomplete endoscopic/clinical documentation, inability to verify burn grade or outcome); severe concomitant conditions significantly affecting treatment selection and prognosis.

Ethical aspects. The study protocol was approved by the Local Ethics Committee (Protocol No. 10 dated 06.02.2023). The study was performed in accordance with the Declaration of Helsinki (2013) and the applicable regulations of the Ministry of Health of the Republic of Uzbekistan. Patient data were de-identified and analyzed in aggregated form. Personal data were anonymized and handled confidentially.

Diagnostic verification and stenosis assessment:

Burn severity and the presence of cicatricial deformity were assessed based on the clinical presentation (dysphagia, impaired food passage) and instrumental findings documented in the medical records (endoscopy and/or contrast studies, when performed). The severity of cicatricial stenosis was standardized using the Yu.I. Gallinger classification: grade II - esophageal lumen 6-8 mm; grade III - lumen 3-5 mm; grade IV - lumen 1-2 mm. This classification was used to unify stricture severity assessment and to justify treatment selection.

Therapeutic Strategy (Traditional Methods).

Direct (blind) bougienage:

This method was used when esophageal patency was preserved sufficiently to allow dilation. It involved mechanical expansion of the stenotic segment using bougies without mandatory visual control at each stage of dilation. Clinical and technical indications included preserved patency, the ability to initiate dilation in the absence of marked gross deformity, and no documented contraindications to bougienage.

Gastrostomy with string-guided bougienage:

This method was selected in cases of severe deformity and inability to safely pass a bougie through the stricture, as well as in patients with insufficient effectiveness and/or failed attempts of blind bougienage. Gastrostomy provided both nutritional support and a technical route for staged guide-assisted dilation ("over a string"). Indications included Gallinger grade III-IV stenosis, inability to pass a bougie through the stricture, failure of blind bougienage, and the need for prolonged nutritional support.

Outcomes and efficacy criteria.

Clinical outcomes were assessed at the time of hospital discharge using a three-level scale:

- **Good outcome:** restoration of adequate food passage (substantial reduction in dysphagia), no need for emergency surgical intervention, and no severe complications;
- **Satisfactory outcome:** partial improvement in clinical patency, need for longer staged treatment and/or repeated interventions, but without severe complications;
- **Unsatisfactory outcome:** no clinically significant effect, persistence/progression of marked dysphagia, need to switch to a more invasive strategy (transition to gastrostomy after ineffective blind bougienage), and/or development of severe complications.

Because objective post-treatment endoscopic or radiologic measurements of esophageal lumen patency were not consistently available in the retrospective records, outcome categories were based primarily on clinical dysphagia dynamics and the need for additional interventions.

Safety and complications:

Safety endpoints included esophageal perforation during dilation, the need for emergency surgical intervention due to a complication, and cases in which the method was deemed ineffective with subsequent crossover to an alternative strategy (gastrostomy after failed blind bougienage).

Statistical analysis:

Statistical analysis was performed using SPSS version 13. Categorical variables were presented as absolute numbers and percentages. Between-group comparisons were performed using Pearson's chi-square test; Fisher's exact test was used when expected cell counts were small. Differences in length of hospitalization were assessed by comparison of mean values (with a t-test or a nonparametric test, as appropriate, depending on distribution normality). Statistical significance was set at $p < 0.05$. When comparing frequencies, relative risk (RR) and, where appropriate, 95% confidence intervals (95% CI) were reported. Given the non-randomized treatment allocation, comparisons between treatment strategies were regarded as exploratory/descriptive rather than causal.

Results.

Disease duration and timing of admission (n = 115).

As shown in Table 1, most children were admitted to the hospital at an early stage: 81 of 115 patients (70.4%) were

hospitalized within the first week. Among them, grade II-III burns predominated - 51 cases (44.3%), whereas grade I burns accounted for 30 cases (26.1%). Grade III burns comprised 34 cases (29.6%); of these, 10 patients (8.7%) were admitted during weeks 2-3, and 24 patients (20.9%) were admitted after 4-6 weeks or later. This reflects a tendency toward delayed hospitalization in a subset of children with the most severe injuries and, consequently, a potentially higher risk of cicatricial complications. Differences in patient distribution by admission timing and burn severity were statistically significant (chi-square test, $p < 0.05$), indicating non-uniform healthcare-seeking/admission patterns depending on injury severity.

Timing of admission in grade III burns (n = 46).

In children with grade III esophageal burns (Table 2), late admission predominated: more than half of the patients were hospitalized after 4-6 weeks or later - 24 of 46 (52.2%), whereas only 12 (26.1%) were admitted within the first week and 10 (21.7%) during weeks 2-3. Thus, the proportion of late hospitalizations was 2.0 times higher than early hospitalizations (52.2% vs 26.1%), which was statistically significant (chi-square test, $p < 0.05$). This indicates a clinically unfavourable pattern: in severe burns, a substantial proportion of patients are admitted at the stage of established cicatricial changes, which may reduce the effectiveness of conservative approaches and increase the need for invasive methods to restore esophageal patency.

Degree of cicatricial stenosis (n = 46).

As shown in Table 3, children with grade III esophageal burns predominantly had severe cicatricial strictures (grades II-III): grade II stenosis (lumen 6-8 mm) was identified in 21 of 46 patients (45.6%), and grade III stenosis (lumen 3-5 mm) in 20 patients (43.5%). The most pronounced grade IV narrowing (lumen 1-2 mm) was found in 5 patients (10.9%). Overall, grades II-III stenoses accounted for 89.1%, which was statistically significantly higher than the frequency of grade IV stenosis (chi-square test, $p < 0.001$). This pattern reflects the predominance of clinically severe strictures requiring staged treatment and indicates the limited technical reserve of blind dilation in many patients.

Treatment methods.

In clinical practice, gastrostomy followed by string-guided bougienage was used in 25 of 46 children (54.3%), whereas direct (blind) bougienage was feasible as the primary method in 21 patients (45.7%). This distribution should not be interpreted as a direct comparison of treatment efficacy, because gastrostomy was preferentially selected for children with more severe deformity or after failed blind bougienage. Accordingly, the higher frequency of gastrostomy reflects case severity and selection by indication rather than superiority or inferiority of one method.

Esophageal perforation was recorded in 2 children (6.9%), requiring emergency surgical intervention. In 8 of 29 patients, attempts at blind bougienage were ineffective and necessitated conversion to gastrostomy. Quantitative procedural burden (mean number of bougienage sessions per patient and interval between sessions) could not be summarized reliably because these details were not consistently documented in the retrospective records.

Results by type of chemical agent.

As shown in Table 5, a clinically notable but statistically non-significant trend toward a more invasive treatment strategy was observed in alkali burns. In acid-related injuries, direct (blind) bougienage was performed in 17 of 31 children (54.8%), whereas gastrostomy followed by string-guided bougienage was required in 14 patients (45.2%). In contrast, in alkali burns, gastrostomy was used in 11 of 15 patients (73.3%), while direct bougienage was feasible in only 4 patients (26.7%).

Thus, the need for gastrostomy in alkali burns was 1.62 times higher than in acid injuries (RR = 1.62; 95% CI 0.99-2.66); however, the difference did not reach statistical significance at the $p < 0.05$ threshold (Fisher's exact test: $p = 0.115$).

Length of hospital stay.

As shown in Table 6, the duration of hospitalization was substantially longer in alkali burns: 45.2 ± 3.9 bed-days versus 39.06 ± 3.8 bed-days in acid-related injuries (difference, +6.14 days). The difference was statistically significant (Welch's t-test, $p < 0.001$; 95% CI for the difference, 3.64-8.64), which supports the interpretation of a more severe clinical course and a longer recovery/dilation phase in alkali esophageal injuries.

Overall treatment outcomes in grade III esophageal burns.

In the group of children with grade III esophageal burns (n = 46) (Table 7), good final in-hospital clinical outcomes predominated - 31 cases (67.4%), corresponding to a 95% CI of 53.0-79.1. At the same time, in 15 patients (32.6%), the outcome did not reach the "good" category: satisfactory outcomes were observed in 9 patients (19.6%), and unsatisfactory outcomes in 6 (13.0%).

Thus, despite the predominance of favourable in-hospital clinical outcomes, every third patient retained clinically meaningful limitations in treatment effectiveness under the traditional strategy. These findings should be interpreted cautiously because the outcome categories were based mainly on clinical symptoms at discharge and not on standardized long-term objective assessment of esophageal lumen patency.

Discussion.

The problem of treating chemical burns of the esophagus in children remains highly clinically and socially significant, because severe injuries (grade III) make the main contribution to late complications - cicatricial strictures, dysphagia, nutritional deficiency, and prolonged hospitalization. In paediatric surgery, this means not only a high risk of disabling outcomes, but also a substantial burden on inpatient resources, the need for repeated staged interventions, and increased treatment costs.

The obtained results suggest that traditional methods for managing cicatricial stenoses after grade III esophageal burns have important limitations in terms of both effectiveness and safety. In particular, direct ("blind") bougienage was feasible as the primary method in only 45.7% of patients, whereas 54.3% of children required gastrostomy followed by staged string-guided bougienage. At the same time, this distribution reflects treatment selection for more severe cases and therefore should not be interpreted as a direct comparative estimate of method superiority.

Table 1. *Distribution of patients with esophageal burns by disease duration (time to admission).*

Timing of admission and burn grade	1 week (grade I)	1 week (grades II-III)	2-3 weeks (grade III)	4-6 weeks and more (grade III)	Total
Number of patients	30 (26.1%)	51 (44.3%)	10 (8.7%)	24 (20.9%)	115 (100%)

Table 2. *Patients with grade III esophageal burns by time since injury (time to admission).*

Time to admission	n	%
1 week	12	26.1
2-3 weeks	10	21.7
4-6 weeks and later	24	52.2
Total	46	100

Table 3. *Degree of cicatricial esophageal narrowing according to the Yu.I. Gallinger classification.*

Grade	Characteristic	Number of patients, n (%)	95% CI for %, (Wilson)
II	Lumen 6-8 mm	21 (45.6)	32.2-59.8
III	Lumen 3-5 mm	20 (43.5)	30.2-57.8
IV	Lumen 1-2 mm	5 (10.9)	4.7-23.0
II-III (combined)	Severe strictures (6-8 mm and 3-5 mm)	41 (89.1)	77.0-95.3
Statistical comparison	II-III vs IV	-	Chi-square test: $p < 0.001$

Note: *The p-value was calculated by comparing the frequency of grade II-III stenoses (combined category) versus grade IV stenosis using the chi-square test (χ^2), df = 1.*

Table 4. *Treatment methods and key procedural outcomes in children with grade III esophageal burns.*

Item	n / N	%	95% CI (%)
Primary treatment strategy (N = 46)			
Direct (blind) bougienage as primary method	21 / 46	45.7	32.2-59.8
Gastrostomy with string-guided bougienage as primary method	25 / 46	54.3	40.2-67.8
Outcomes of attempted blind bougienage (N = 29 attempts)			
Esophageal perforation (during blind bougienage)	2 / 29	6.9	1.9-22.0
Failure of blind bougienage requiring conversion to gastrostomy	8 / 29	27.6	14.7-45.7

Table 5. *Treatment outcomes by type of chemical agent.*

Type of agent	Direct bougienage	Gastrostomy with bougienage	Total
Acids	17 (54.8%)	14 (45.2%)	31 (67.4%)
Alkalis	4 (26.7%)	11 (73.3%)	15 (32.6%)
Comparative analysis (Alkalis vs Acids)	-	RR = 1.62; 95% CI 0.99-2.66 | RD = 28.2%; 95% CI -14.2 to 59.9	Fisher's exact test: p = 0.115

Note: *RR is calculated for the outcome "need for gastrostomy (gastrostomy with bougienage)" in alkali burns vs acid injuries. The difference did not reach statistical significance at $p < 0.05$ and should be interpreted as a trend requiring confirmation in a larger sample.*

Table 6. *Mean length of hospital stay.*

Type of agent	n	Mean bed-days (M ± SD)	Difference (alkalis - acids), days	Between-group comparison
Acids	31	39.06 ± 3.8	-	-
Alkalis	15	45.2 ± 3.9	+6.14	Welch's t-test: $p < 0.001$; 95% CI for difference 3.64-8.64

Table 7. *Treatment outcomes in grade III esophageal burns.*

Outcome category	n	%	95% CI (%)
Good	31	67.4	53.0-79.1
Satisfactory	9	19.6	10.7-33.2
Unsatisfactory	6	13.0	6.1-25.7

Another argument in favor of revising traditional approaches is the risk of complications, primarily perforation. In our material, esophageal perforation was recorded in 6.9% of cases, which underscores the potential danger of dilation without visual control, especially in the presence of severe cicatricial deformities, a tortuous lumen, and "rigid" strictures. Even a relatively low frequency of this complication in pediatric practice is clinically critical, since perforation is associated with the risk of mediastinitis, the need for emergency surgery, and worsening prognosis.

The chemical nature of the agent is of particular importance. Alkali substances cause deep tissue injury via liquefaction necrosis, which is accompanied by massive scarring and the formation of more severe stenoses. In our study, alkali burns showed a tendency toward a more unfavorable clinical profile: the need for gastrostomy was 1.62 times higher than in acid

injuries, but the difference did not reach statistical significance ($p = 0.115$) and therefore should be interpreted as a trend requiring confirmation in a larger sample.

Thus, the obtained results show that in grade III esophageal burns, traditional methods are associated with a frequent need for gastrostomy and with perforation risk during blind dilation. However, because the study did not include a direct comparison with visually controlled techniques and because treatment selection was determined by case severity, these data should be regarded as evidence of the limitations of traditional approaches rather than proof of superiority of alternative methods.

The study has several important limitations: retrospective single-center design, selection by indication (confounding by indication), assessment of final outcomes only at discharge, reliance primarily on subjective clinical symptoms rather than standardized endoscopic/radiologic post-treatment scales, and incomplete documentation of procedural burden such as the number and timing of bougienage sessions.

Conclusion.

Traditional methods for treating grade III chemical esophageal burns in children are associated with important clinical limitations, including perforation risk and a frequent need for gastrostomy in severe cicatricial strictures. In alkali injuries, a 1.6-fold higher need for gastrostomy was observed, but this difference did not reach statistical significance and should be interpreted as a trend. Given the retrospective design, in-hospital outcome assessment, and selection by indication, further comparative studies are needed to determine whether visually controlled dilation strategies can improve safety and effectiveness.

Practical Significance.

The study results highlight the need for:

1. careful standardization of indications for blind bougienage and gastrostomy within staged treatment algorithms;
2. improved documentation of procedural burden and objective follow-up outcomes;
3. comparative evaluation of visually controlled dilation techniques as potentially safer alternatives.

Prospects for Further Research.

Further studies should be aimed at a comparative evaluation of traditional and visually controlled dilation methods (endoscopic guidewire bougienage, balloon dilation) in children with grade III esophageal burns, with analysis of perforation rates, the need for gastrostomy, duration of hospitalization, and long-term outcomes (restenosis rate, nutritional status, quality of life). A promising direction is the identification of prognostic factors of unfavorable course (alkali agent, time to admission, degree of stenosis according to Galinger) and the development of an algorithm for personalized treatment selection.

Clinical Recommendations.

Children with grade III chemical esophageal burns require early verification of severity, nutritional support, and staged restoration of esophageal patency. Because the present study evaluated only traditional methods, it does not allow direct recommendations regarding the superiority of visually controlled dilation. Blind bougienage should therefore be undertaken with caution, and the choice between repeated dilation and gastrostomy should be individualized according to stenosis severity, technical feasibility, and safety.

Personalization Perspective.

Treatment strategy should be selected individually, taking into account the type of chemical agent (especially alkali), time to admission, degree of stenosis according to Galinger, and the child's nutritional status. The present data may help identify patients in whom traditional blind techniques are likely to be limited, but comparative studies are required before recommending a preferred alternative strategy.

Conflict of interest.

Authors declare about not having financial and personal interests.

REFERENCES

1. Thomson M, Tringali A, Dumonceau J.-M, et al. Paediatric gastrointestinal endoscopy: ESPGHAN and ESGE guidelines - executive summary. Journal of Pediatric Gastroenterology and Nutrition. 2017;64:133-153.
2. Tringali A, Thomson M, Dumonceau J.-M, et al. Pediatric gastrointestinal endoscopy: European Society of Gastrointestinal Endoscopy (ESGE) and European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) Guideline Executive Summary. Endoscopy. 2017;49:83-91.
3. Chirica M, Kelly M.D, Siboni S, et al. Esophageal emergencies: WSES guidelines // World Journal of Emergency Surgery. 2019;14.
4. Lee J.H. Foreign body ingestion in children. Clinical Endoscopy. 2018;51:129-136.
5. Weigert J.M, Black A.E. Caustic ingestion in children. Continuing Education in Anaesthesia Critical Care & Pain. 2005;5:5-8.
6. Sutherland R, Kelsall W, Bramley K. Ingestion of foreign bodies and caustic substances in children. BJA Education. 2023;23:387-394.
7. Oliva S, Romano C, De Angelis P, et al. Foreign body ingestion and caustic injury in children: a clinical practice guideline. Digestive and Liver Disease. 2020;52:1266-1281.
8. Dorterler M.E, Günendi T. Foreign Body and Caustic Substance Ingestion in Childhood. Open Access Emergency Medicine. 2020;12:341-352.
9. Bawazir O, Almaimani M.O. Complications of esophageal strictures dilatation in children: A tertiary-center experience. Saudi Medical Journal. 2020;41:720-725.
10. Povilavičius J, Samalavičius N.E, Verkauskas G, et al. Conservative treatment of caustic oesophageal injuries in children: 15 years of experience in a tertiary care paediatric centre. Przegląd Gastroenterologiczny (Prz Gastroenterol). 2019;14:286-291.
11. Sharma B, Birk J. Endoscopic Dilation of Corrosive Strictures: Is It Safe?. Digestive Diseases and Sciences. 2022;67:2706-2707.
12. Geng L.-L, Liang C.-P, Chen P.-Y, et al. Long-Term Outcomes of Caustic Esophageal Stricture with Endoscopic Balloon Dilatation in Chinese Children. Gastroenterology Research and Practice. 2018;2018.