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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 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. 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 საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ 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 შედეგის 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.

Yevchuk YuI, Rozhko MM, Pantus AV, Yarmoshuk IR, Pantus PV. ANALYSIS OF THE CLINICAL EFFECTIVENESS OF USING THE CREATED COMBINED FIBRIN-BONE SCAFFOLD FOR THE RECONSTRUCTION OF BONE TISSUE DEFECTS OF THE JAWS.....	6-13
Anton Yu. Postnov, Tatiana V. Kirichenko, Yuliya V. Markina, Petr V. Chumachenko, Andrey V. Suslov, Alexandra G. Ivanova, Eduard R. Charchyan, Alexander M. Markin. INFLAMMATORY FACTORS IN DISSECTION OF THORACIC AORTIC ANEURYSM.....	14-17
Gohar Arajyan, Qristine Navoyan, Nvard Pahutyanyan, Hovhannes Hunanyan, Anahit Pogosyan, Hrachik Gasparyan. COMPREHENSIVE STUDY OF ANTIOXIDANT ACTIVITY OF OXALIC ACID DIAMIDE DERIVATIVES AND THEIR EFFECT ON THE CONCENTRATION OF MALONIC DIALDEHYDE IN THE BRAIN AND LIVER TISSUES OF WHITE RATS.....	18-23
Nino Abesadze, Jenaro Kristesashvili, Arsen Gvenetadze. LOW 25OHD IN ENDOMETRIOSIS- RISK FACTOR OR CONSEQUENCE?!.....	24-31
Stepanyan L, Lalayan G. STRESS RESILIENCE AND DECISION-MAKING UNDER PRESSURE: ENHANCING ATHLETIC PERFORMANCE IN COMPETITIVE SPORTS.....	32-37
Hasan M. Abed, Abdulameer M. Hussein, Sabah N. Jaber. ENDOVASCULAR INTERVENTIONS: A NEW INSIGHTS AND CLINICAL PRACTICE.....	38-46
Changsheng He, Jian Liu, Linhai Xu, Fanhua Sun, Yan Wang, Jia Lou. THE RELATIONSHIP BETWEEN SERUM INFLAMMATORY CYTOKINES AND HYPERLIPIDEMIC ACUTE PANCREATITIS.....	47-49
Artemov O.V, Lytvynenko M.V, Chumachenko I.V, Bondarenko A.V, Dotsenko N.V, Ostapchuk K.V, Koshelnyk O.L, Gargin V.V. THE INFLUENCE OF THE DEMODEX MITE ON THE MORPHOLOGICAL PICTURE OF EYELID PAPILOMA.....	50-54
Othman K.M. Al-Sawaf, Mahmoud AM Fakhri. CHARACTERIZATION OF SERUM SERINE PROTEASE BIOCHEMICAL PROFILE IN PATIENTS WITH RENAL FAILURE.....	55-58
Sergey Lee, Marat Assimov, Yuriy Ignatiev, Fatima Bagiyarova, Gulbanu Absatarova, Aizhan Kudaibergenova, Sholpan Mardanova, Tatyana Tsapenko, Baimakhan Tanabayev, Assel Ibrayeva, Anel Ibrayeva, Ildar Fakhradiyev. PREVALENCE AND FACTORS OF PROFESSIONAL BURNOUT AMONG PRIMARY HEALTHCARE WORKERS IN THE REPUBLIC OF KAZAKHSTAN: RESULTS OF A NATIONAL STUDY.....	59-68
I.A. Yusubov. RESULTS OF PERCUTANEOUS TREATMENT OF LIMITED FLUID FORMATIONS AFTER ABDOMINAL SURGERY.....	69-74
Nawar M. Abd-alaziz, Ammar L. Hussein, Mohammed M Abdul-Aziz. STUDY THE RELATIONSHIP BETWEEN OSTEOPROTEGERIN AND KIDNEY INJURY MOLECULE-1 AND SOME BIOCHEMICAL VARIABLES IN PATIENTS WITH KIDNEY STONES.....	75-78
Tsisana Giorgadze, Tinatin Gognadze. SUBSTRATE SPECIFICITY OF β -GLUCOSIDASE FROM <i>YUCCA GLORIOSA</i> LEAVES.....	79-82
Sheishenov Zhalil, Kemelbekov Kanatzhan, Joshibaev Seitkhan, Turtabaev Baglan, Zhunissov Bakhytzhani. COMPARATIVE ANALYSIS OF THE CLINICAL RESULTS OF PATIENTS WITH ASD OPERATED VIA RIGHT ANTERIOR MINITHORACOTOMY AND MEDIAN STERNOTOMY.....	83-88
Sosonna L, Ohurtsov O, Piriatska N, Vdovitchenko V, Seleznova R, Kolba O, Gryzodub D, Rozhkova O, Shevtsov O. INDIVIDUAL ANATOMICAL VARIABILITY OF THE SKULL'S FACIAL SECTION CONSIDERING GENDER AND CRANIOTYPE BASED ON COMPUTED TOMOGRAPHY DATA.....	89-95
Osminina M.K, Aslamazova A.E, Podchernyaeva N.S, Khachatryan L.G, Velikoretskaya M.D, Chebysheva S.N, Polyanskaya A.V. SYSTEMIC OR LIMITED IS HEMISCLERODERMA OF FACE IN A PERSON WITH UVEITIS? EXPERIENCE OF 10 CASES OF UVEITIS IN HEMISCLERODERMA OF FACE FROM ONE RHEUMATOLOGY CENTER.....	96-100
F.T. Khalilova, A.A. Kerimov. CLINICAL AND LABORATORY CHARACTERISTICS OF THE LATENT FORM OF POLYCYTHEMIA VERA.....	101-105
Ahlan S. Ibrahim, Sukayna H. Rashed. ISOLATION AND PURIFICATION OF TRANSGLUTAMINASE 1 USING BIOCHEMICAL TECHNIQUES.....	106-111
Tingting Li, Xu Zhang, Baohong Xue, Lianping He, Qiaoqiao Chen, Dexun Zhao. THE RELATIONSHIP BETWEEN MENTAL HEALTH AND PHYSICAL ACTIVITY AMONG STUDENTS FROM A PRIVATE UNIVERSITY: A CROSS-SECTION STUDY.....	112-117
Narkhojayev Nurgali, Turmetov Ibadulla, Kemelbekov Kanatzhan, Bektayev Erkebai, Akhmetov Almasbek, Zhunissov Bakhytzhani. RESULTS OF SURGICAL TREATMENT OF PECTUS EXCAVATUM IN CHILDREN AND ADOLESCENTS.....	118-122

Krushelnyska HL, Batryn OV, Ryzhenko LM, Lytvyn NA, Dobrianska NV, Lyga AI. INFORMATION FACTORS OF MEDIA INFLUENCE ON THE FORMATION OF STATE POLICY IN THE FIELD OF LEGAL REGULATION OF BIOMEDICAL TECHNOLOGIES.....	123-129
Vahe Ashot Ter-Minasyan. EVALUATION OF KNOWLEDGE AND ATTITUDE REGARDING CERVICAL CANCER SCREENING PRACTICE: A MULTICENTER REGIONAL STUDY.....	130-136
Muhsin S.G. Almozic'1, Abbas A. Khudhair, Falah Hassan Shari. REMEDIAL INTERVENTION OF FERTILITY AGENT AND GENE 35 ON INDUCED CYSTIC OVARY IN RATS.....	137-141
Rongzheng Yuan, Hui Wang, Jing Chen. THE EFFECT OF LOW MOLECULAR WEIGHT HEPARIN SODIUM IN THE TREATMENT OF ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE COMORBID WITH PULMONARY HEART DISEASE ON PROMOTING THE BALANCE OF BLOOD VESSELS.....	142-146
Arailym Maikenova, Alexander Nersesov, Elmira Kuantay, Mukhtar Kulimbet, Massimo Giuseppe Colombo, Chavdar Pavlov, Yerkezhan Yerlanova. EVALUATION OF PREDICTORS OF INEFFECTIVENESS OF ANTIVIRAL THERAPY FOR CHRONIC HEPATITIS C IN THE REPUBLIC OF KAZAKHSTAN: A MATCHED CASE-CONTROL STUDY.....	147-154
Ahmed N. Ali, Muna A. Kashmoola. EVALUATION OF PROTEIN C AND S IN β -THALASSEMIA MAJOR.....	155-160
Sh.Tsiklauri, N.Nakudashvili, M.Lomaia. EFFECT OF INTRANASAL ELECTROPHORESIS WITH 5% POTASSIUM IODATE SOLUTION ON CLINICAL OUTCOME OF PATIENTS WITH HYPERTROPHIC RHINITIS.....	161-164
Fang Xu, Zhijuan Xu, Ming Li. INTRAVITREAL INJECTION CONBERCEPT IMPROVES THE BEST-CORRECTED VISUAL ACUITY IN PATIENTS WITH WET AGE- RELATEDMACULAREDEMA.....	165-167
Lilit Darbinyan, Margarita Danielyan, Vergine Chavushyan, Karen Simonyan, Michael Babakhanyan, Lilia Hambardzumyan, Larisa Manukyan, Kristine Karapetyan, Lusya Hovhannisyan. THE PROTECTIVE EFFECTS OF SELENIUM-ENRICHED HYDROPONIC RADISH ON PARACETAMOL-INDUCED LIVER DAMAGE IN RATS.....	168-172
Grygorova A.O, Grygorov S.M, Yaroslavska Yu.Yu, Mykhailenko N.M, Demyanyk D.S, Steblianko A.O, Rak O.V, Voloshan O.O, Nazaryan R.S. SIGNS OF ORAL CAVITY MICROCIRCULATORY DISORDERS IN ADOLESCENTS WHO SMOKE.....	173-177
Ali H. Kadhim, Nihad N. Hilal, Taghreed AH. Nassir. A COMPARATIVE STUDY ON THE VARIABLE EFFECTS OF ALCOHOL AND NON-ALCOHOL-RELATED FATTY LIVER DISEASE ON METABOLIC AND INFLAMMATORY BIOMARKERS.....	178-182
Papoyan Varduhi, Galstyan Alina, Sargsyan Diana. FACTOR ANALYSIS OF THE COMPETENCIES OF PERSONAL RESOURCES OF SPECIALIST.....	183-189
Chulpanov Utkir, Turdaliyeva Botagoz, Buleshov Myrzatai, Zhanabaev Nurlan, Kanatzhn Kemelbekov. COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF INNOVATIVE HIGH-TECH CARDIAC SURGERY IN PATIENTS WHO HAVE SUFFERED AN ACUTE MYOCARDIAL INFARCTION.....	190-195
Tea Charkviani, Jenara Kristasashvili, Tamar Barbakadze, Mariam Gabadze, Tamar Kbilashvili, Mariam Makharadze. THE RELATIONSHIP BETWEEN FOLLICLE SIZE, OOCYTE MATURATION, BLASTOCYST FORMATION, BLASTOCYST PLOIDY, AND PREGNANCY OUTCOMES IN YOUNG WOMEN UNDERGOING IVF.....	196-203
Yunfei Wu, Koulong Wu, TianhuaDu. STUDY ON THE EFFECTS OF ART PAINTING COMBINED WITH SPORTS ON MYOPIA PREVENTION AND VISION IMPROVEMENT.....	204-207
Lulëjeta Ferizi-Shabani, Shefqet Mrasori, Valbona Ferizi, Gonxhe Barku, Milazim Gjocaj, Blerim Krasniqi, Basri Lenjani. EVALUATION OF DENTAL AND PERIODONTAL STATUS IN CHILDREN WITH TYPE 1 DIABETES MELLITUS.....	208-212
Rana Dawood Salman Al-kamil, Mustafa Ragheb Abed, Sanaryh Mohammed Al-awad, H. N. K. AL-Salman, Hussein H. Hussein, Dawood Chaloob Hilyail, Falah Hassan Shari. ISOLATION, CHARACTERIZATION, AND ANTIHYPERTENSIVE ACTIVITY ALKALOIDS EXTRACTED FROM THE LEAVES OF THE ALSTONIA SCHOLARIS PLANT.....	213-217
Tchernev G, Broshtilova V, Kordeva S. SHARK PEDICLE ISLAND FLAP FOR BASAL CELL CARCINOMA OF THE PERIALAR ZONE OF THE NOSE: PHOTOTOXICITY AND PHOTOCARCINOGENICITY MEDIATED BY POTENTIALLY NITROSAMINE CONTAMINATED DRUG INTAKE -A NEW EXPLANATION FOR THE SKIN CANCERS PATHOGENESIS?	218-222

Meruert T. Orazgalieva, Meyrbek J. Aimagambetov, Zhanna D. Bryzhakhina, Serik D. Zhanybekov, Ainash S. Orazalina. RISK FACTORS FOR THE DEVELOPMENT OF COAGULOPATHY DURING SURGERY IN MECHANICAL JAUNDICE.....	223-228
Noor N. Noori, Nawal A. Murtafha. UNCONTROLLED TYPE 2 DIABETES MELLITUS MODULATED PLASMA LEVELS OF LIPID CATABOLIC PROTEINS.....	229-233
Ling-Ling Zhou, Zhou-Zhou Lin, Lian-Ping He. PREVALENCE OF DEPRESSION AMONG UNIVERSITY STUDENTS IN CHINA: A PROTOCOL FOR A SYSTEMATIC REVIEW AND META-ANALYSIS.....	234-236
Nadine Khayyat, Sima Kalalfeh, Suha Khalifa. OPTIMISING THE CLINICAL ASSESSMENT OF CHILDHOOD AND ADOLESCENT OBESITY IN JORDAN.....	237-241
Shuasheva Y.A, Buleshov M.A, Kemelbekov K.S. CLINICAL, IMMUNOLOGICAL AND THESIOGRAPHIC CHARACTERISTICS RHEUMA-TOID ARTHRITIS AND CHRONIC RHEUMATICHEARTDISEASE.....	242-248
Sana A. Abdulmawjood, Eman S. Mahmoud, Rana T Altaee. ASSESSMENT OF CIPROFLOXACIN EFFECTS ON SOME CHICKS' ORGANS: A COMPREHENSIVE BIOCHEMICAL AND HISTOLOGICALSTUDY.....	249-254
Knarik V. Kazaryan, Naira G. Hunanyan, Margarita H. Danielyan, Rosa G. Chibukchyan, Yulia Y. Trofimova, Arus V. Mkrtychyan, Kristine V. Karapetyan, Karwan H. Syan, Tatevik A. Piliposyan. REGULATION OF SPONTANEOUS ELECTRICAL ACTIVITY IN THE ORGANS OF RE-PRODUCTIVE SYSTEM BY OXYTOCIN.....	255-259
Lantukh I.V, Kucheriavchenko V.V, Yurko K.V, Bondarenko A.V, Merkulova N.F, Mohylenets O.I, Gradil G.I, Bondar O.Ye, Bodnia I.P, Burma Ya.I, Tsyko O.V, Tkachenko V.G. PSYCHOLOGICAL FEATURES OF REHABILITATION OF HIV-INFECTED PATIENTS.....	260-264
Serikbayeva Saltanat, Shaimerdenova Gulbanu, Ormanov Namazbai, Ormanov Talgat, Abuova Gulzhan, Kaishibayeva Gulnaz, Kemelbekov Kanatzhan. PEROXIDATION OF SALIVA LIPIDS IN PATIENTS WITH POSTCOVID SYNDROME DURING HIRUDOTHERAPY.....	265-269
M.V. Poghosyan, H.Y. Stepanyan, Avetisyan Z.A, J.S. Sarkissian. THE EFFECTS OF HYDROCORTISONE ON SYNAPTIC PROCESSES IN PARKINSON'S DISEASE UNDERLYING THE POTENTIAL THERAPEUTICSTRATEGIES.....	270-277
Changsheng He, Jian Liu, Linhai Xu, Fanhua Sun. THE EFFECT OF PERCUTANEOUS CATHETER DRAINAGE COMBINED WITH SOMATOSTATIN ON INFLAMMATION AND PLASMA THROMBOXANE 2, PROSTACYCLIN I2 LEVELS IN PATIENTS WITH SEVERE PANCREATITIS.....	278-283
Tea Chitadze, Nino Sharashidze, Tamar Rukhadze, Nino Lomia, Giorgi Saatashvili. EVALUATION OF LEFT VENTRICULAR SYSTOLIC FUNCTION IN POSTMENOPAUSAL WOMEN WITH BREAST CANCER RECEIVING ADJUVANT ANTHRACYCLINE AND TRASTUZUMAB THERAPY: A 2-YEAR FOLLOW-UP STUDY.....	284-293

COMPARATIVE ANALYSIS OF THE CLINICAL RESULTS OF PATIENTS WITH ASD OPERATED VIA RIGHT ANTERIOR MINITHORACOTOMY AND MEDIAN STERNOTOMY

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Abstract.

Introduction: Median sternotomy has been the conventional approach for correction of atrial septal defect despite poor cosmetic results at times. Right anterior minithoracotomy was, therefore, assessed as an alternative procedure with a better cosmetic outcome.

Material and Methods: from April 2008 through February 2017 102 patients underwent correction of atrial septal defect with the use of normothermic perfusion on a beating heart through right anterior minithoracotomy involving a short incision through the fourth intercostals space and the direct cannulation. The 75 were female and 27 male end the averaging age $19,2 \pm 2,0$ years. The corrected defects included atrial septal defect type II, atrial septal defect with short aortic edge, atrial septal defect with short inferior edge, atrial septal defect with short superior edge, sinus venosus superior type atrial septal defect and sinus venosus inferior type atrial septal defect. The length of the skin incision varied from 4 to 10 cm, depending on the age of the patient.

Results: There was no operative or late mortality or major morbidity. The mean cardiopulmonary bypass time was 19 ± 4 minutes, the duration of mechanical ventilation after surgery in patients was $2,4 \pm 0,9$ hours. Cosmetic result was very satisfactory in all patients.

Conclusions: The right anterior minithoracotomy incision is a safe and effective alternative to a median sternotomy for correction of atrial septal defect. Cosmetic results are highly satisfactory.

Key words. Atrial septal defect, minimally invasive cardiac surgery, minithoracotomy.

Introduction.

As you know, the gold standard for performing surgical interventions on the heart in the conditions of artificial circulation (cardiopulmonary bypass), is the standard median sternotomy (SS), which provides full scope in the operating field and the implementation of manipulations without difficulties.

It is obvious that cardiac surgery is characterized by its multi-position and high degree of invasiveness (the operating aggression itself, artificial blood circulation (cardiopulmonary bypass), cardioplegia, hemodilution, heparinization, cooling, warming, electro-pulse therapy, etc.), not to mention specific complications of SS access, such as sternal instability, a high percentage of purulent-septic complications, great trauma, serious cosmetic insufficiency, and much more. In this regard, alternative minimally invasive approaches have been developed, i.e. various variants of thoracotomies, partial sternotomies,

thoracoscopic methods, various techniques were proposed to improve the exposure of the operation object. Therefore, it is relevant to reduce the trauma of the operation, perioperative complications associated with the above factors [1-5].

Our experience shows that the closure of the dmpp (ASD) through right anterior minithoracotomy (RIGHT minithoracotomy) on the working heart (continuous perfusion of the heart without cross clamping the ascending aorta) is feasible, effective and safe without the use of special consumables with standard surgical tools [6-7].

In this article, we will present the results of 187 patients operated with a diagnosis of dmpp (ASD) in the Scientific and clinical center of cardiac surgery and transplantation in Taraz, Republic of Kazakhstan from the PMT and SS.

Materials and Methods.

The patients: Patients were operated on from April 2008 to February 2017 and were divided into 2 groups. 102 patients were operated on using RAMT under normothermic perfusion (NP) on a beating heart) of which 75 were female and 27 male. The age of patients in this group ranged from 1 year 6 months to 45 years, averaging $19,2 \pm 2,0$ years.

The second control group included 85 patients, of which 39 were female and 46 were male. The age of patients ranged from 4 years 3 months to 52 years, averaging $25,3 \pm 4,4$ years. Patients in the control group were operated on using MS access under NP on a beating heart. All patients underwent general clinical examination methods, including the assessment of complaints, medical history, objective patient status, electrocardiography, transthoracic, in some cases, transesophageal echocardiography, chest X-ray (frontal projection) and laboratory tests.

The majority of patients had contraindications for the endovascular method of treatment due to the anatomy of the defect. In addition, 12 had an unsuccessful attempt for closure the defect in the catlab.

Contraindications for RAMT were previous chest injury, pleurisy, concomitant heart disease.

The main indicators of the clinical characteristics of patients included in the study are presented in table 1.

Operation technique.

It should be noted that the surgery was performed with a standard set of surgical instruments i.e. without the use of special thoracoscopic instruments, such as a pusher, Chitwood or flexibel clamp, single-lumen endotracheal intubation, a special retractor, etc.

As everyone knows, with MS, the skin incision begins retreating 1.5-2.0 cm below the jugular fossa and continues to

the xiphoid process [2]. The length of the incision varies from 15 to 30 cm, depending on the age of the patient (Figure 1).

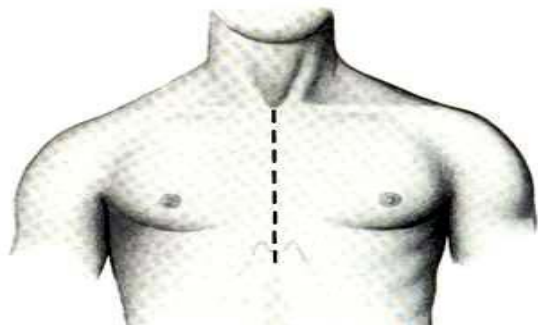


Figure 1. The skin incision line in MS.

ASD correction using RAMP.

A RAMP skin incision began at the right edge of the sternum at the level of IV (less often III) intercostal space and continued to arcuate down to the midclavicular line (Figure 2).

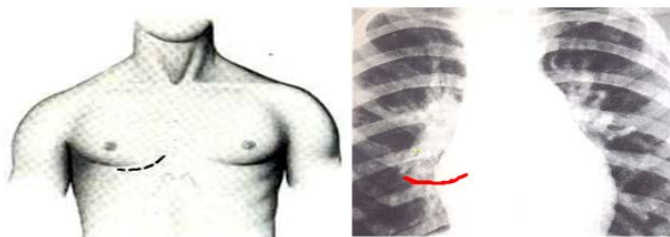


Figure 2. The line of the skin incision in RAMP.

The length of the skin incision varied from 4 to 10 cm, depending on the age of the patient. The direction of the skin incision in girls continued, circling the mammary gland from below along the skin fold.

Then, the skin and subcutaneous tissue were dissected, in women it is often necessary to move the mammary gland together with the capsule up. Then part of the pectoralis major muscle and intercostal muscle were dissected along the upper edge of the underlying rib. Hemostasis was carried out more carefully in order to avoid hemorrhage sites and a retractor was installed. The right lung was removed using a flexible retractor and the pericardium was longitudinally dissected with a patch. In cases of deep location of the aorta, for better access to the aorta (direct cannulation) in patients taller than 150 cm, the cartilaginous part of the IV rib had to be crossed, Figure 3.



Figure 3. The intersection of the cartilaginous part of the rib.

The intersection of the cartilaginous part of the rib in the form of a step provides tight fixation, which facilitated rapid healing without the formation of a false joint.

After opening the pericardium, the heart and large vessels were inspected for accessibility of the ascending aorta and the inferior vena cava (IVC). To bring the heart closer to the right pleural cavity and improve exposure, the following technique was used: the medial edge of the pericardial incision is pulled into the wound using three holders.

After this, general heparinization was performed and purse string sutures were applied. To improve visibility during manipulations on the aorta, a purse string suture was preliminarily applied to the appendage of the right atrium and was taken down and to the right (Figure 4).

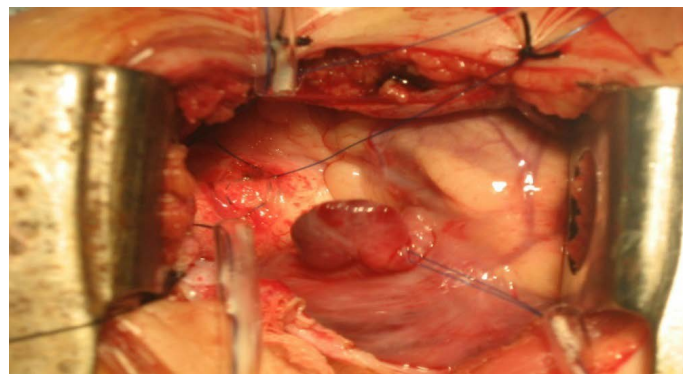


Figure 4. Type of surgical wound without traction of the upper edge of the wound.

Next, two purse string sutures were placed on the aorta: the first was double, placed as high as possible for the installation and fixation of the arterial cannula, the second - at the highest point of the aorta (about 1.5-2.0 cm below the previous one), for the prevention of aeroembolism. At the same time, a sufficient distance between the first and second purse string sutures was provided to clamp the aorta if necessary.

For insertion of a cannula into the SVC, a pouch was placed on the appendage of the right atrium after preliminary squeezing it with a soft clamp. The pouch for introducing the cannula into the IVC is as close as possible to the ostium of the latter.

After the pouches were placed on the aorta, the right atrium appendage and the vena cava bypass, we started connecting the heart-lung machine. When the machine was connected, an IVC cannula was inserted through a separate stab wound at the level of the 7th intercostal space according to L. axillaris anterior dextra, which was subsequently used to install the drainage tube.

Figure 5 shows the pouches on the appendage of the RA and at the highest point of the aorta for the prevention of air embolism.

Correction of ASD.

After reaching the calculated perfusion rate, the vena cava turnstiles were pinched, and ventilation was turned off. Using a d-6 F needle, a puncture was made in the center of the 2nd pouch on the aorta for prolonged prophylaxis of air embolism and longitudinal right atriotomy was performed. With a large defect (> 1.0 cm) and small sizes of the left atrium, preference was given to the patch closure ASD, and for small defects (<1.0

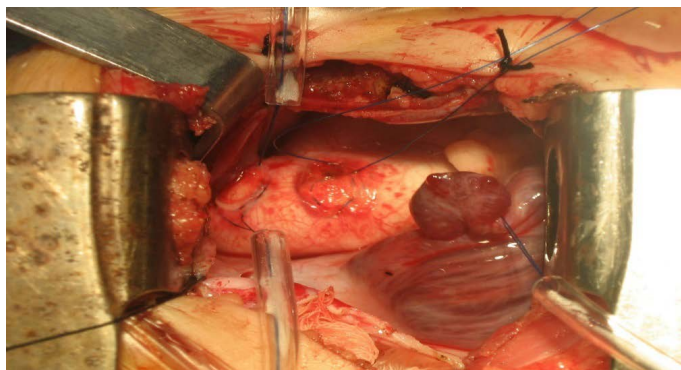


Figure 5. This maneuver is especially important during aortic cannulation and hemostasis control after cannula removal.

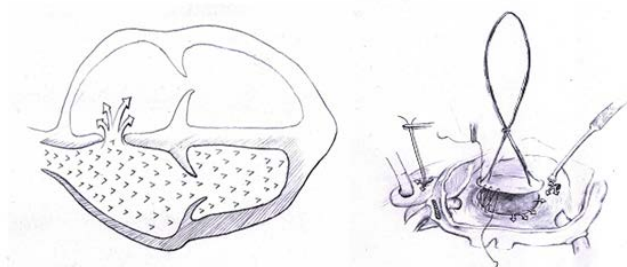


Figure 6. The main stage of the ASD correction and the principle of the correction of the defect in a beating heart without cross-clamping the aorta.



Figure 7. After 6 months.

cm) and normal sizes of the cavity of the left atrium, the defect was direct closure (Figure 6).

Prevention of Air Embolism.

For adequate prevention of aeroembolism, in our work, we maintained the following main conditions:

- Lowering the head end of the operating table by 20-25°.
- Ensuring adequate perfusion pressure (not lower than 60 mm Hg).
- Changing the position of the operating table by 30° towards the assistant and inserting a roller between the shoulder scapula of the patient.
- After reaching the estimated puncture rate in the region of the second pouch at the highest point of the ascending aorta for bloodletting and prolonged aeroembolism.
- The level of blood to be kept along the edge of the defect, and careful drainage of blood by an assistant using cardiome suction from the ostium of the coronary sinus.

Before tightening the last suture on the septal defect, the anesthetist inflates the lungs, which creates an overflow of the left heart.

Before the last sutures are applied to the RA, the vena cava is completely released, and the full respiratory volume of ventilation is turned on. Bloodletting from a hole in the ascending aorta continues until hemodynamics is completely stabilized, i.e. rise in systemic blood pressure within 90-100 / 60-70 mm Hg. and after stopping the bypass continues for 5-7 minutes.

Thus, the prevention of air embolism itself requires a coordinated interaction between the surgeon and the anesthetist, especially when creating massive blood supply at the stage of sealing the RA.

The effectiveness of the prevention of air embolism was evaluated using transesophageal echocardiography.

Myocardial Protection in Cardiac Surgery.

The current cardioplegia technique, despite perfection, will not replace its coronary blood flow. The myocardium is affected by the so-called "mandatory ischemia" i.e. in most cases, it leads to reperfusion damage to the myocardium after removing the cross-clamp from the aorta and resuming coronary blood flow [8,9].

The results of randomized trial trials revealed that the advantage of one or another method of myocardial protection continues to be debated, and the controversy over the composition of cardioplegic solutions, their basis, temperature, administration options, and application of reperfusion aspects stimulate further experimental studies and clinical trials aimed at improving the safety of cardiac surgery interventions. Therefore, we proposed a method for the ASD correction on a beating heart without cardioplegic arrest, which allows us to avoid the above disadvantages of switched off coronary blood flow.

Results.

The main compared indicators for both groups were: the duration of the operation, the duration of mechanical ventilation in the postoperative period, the volume of blood loss, the frequency of transfusion of blood and its components, the time spent in the hospital, the subjective status and satisfaction with the cosmetic effect of the postoperative wound.

The total surgery time in both groups of operated patients did not exceed 2 hours (on average 1.45 ± 0.9), while in the group of MS on hemostasis during layering (due to increased bleeding of the sternum injection site, especially in adults patients) spent more time. There was no significant difference in bypass time, which characterizes the qualification of the operating surgeon. The duration of mechanical ventilation after surgery in patients of the main group was 2.48 ± 0.9 hours, while in the MS group it lasted on average 4.38 ± 0.5 hours. Drainage blood loss in the early postoperative period averaged 110 ml in the main group and up to 239 ml in the control group. An analysis of the data shows that in some cases, patients operated on by accessing a MS resorted to infusion of freshly frozen plasma (FFP) and the introduction of protamine for the purpose of hemostasis, Table 2.

Noteworthy is the subjective status of patients, i.e. after transferring to the ward, patients of the main group were allowed to lie on their side, for 2-3 days they could take care of themselves, and all patients and their family members were satisfied with the cosmetic effect, Figure 7.

Table 1. Comparative ASD characteristics in 2 groups.

Main diagnosis	Main group (n=102)		Control group (n=85)	
	abs.	%	abs.	%
ASD secundum	18	17,1	12	14,1
ASD with short aortic edge	16	15,2	9	10,5
ASD with short inferior edge	21	20	13	15,2
ASD with short superior edge	28	26,6	22	25,8
Sinus venosus superior type ASD	13	12,3	16	18,8
Sinus venosus inferior type ASD	9	8,5	13	15,2
ASD with pulmonary hypertension	37	35,2	34	40
ASD with arrhythmia	8		11	

Table 2. Comparative analysis.

Indicators	RAMP group (n=102)	MS group (n=85)	p
Surgery length, (min)	123 ± 12	116 ± 9	>0,05
Bypass time, (min)	19 ± 4	17 ± 5	>0,05
Ventilation time in postoperative period,(hr).	2,4 ± 0,4	4,3 ±	<0,05
Blood loss, (ml)	110	239	<0,05
Transfusion frequency FFP, (%)	11,5	46,9	<0,05
Length of stay in hospital (days)	4	7	<0,05

Discussion.

When heart defects were corrected under bypass conditions, MS became the most popular and standard access [10-15]. However, standard accesses to the heart are accompanied by extensive lesions of the soft tissues and muscles with vessels and nerve endings passing through them, as well as prolonged healing of the sternum. Moreover, serious drawback was low cosmetic effect of this access. Therefore, the reduction in the morbidity of the operation is primarily associated with surgical access. The main problem of mini-accesses is a great limitation of the size of the surgical field, which creates difficulties in visualizing and performing surgical procedures [12,16]. Given the incidence of patients with ASD with contraindications to the endovascular method and the experience of surgeons in our center, the correction of ASD with minithoracotomy was performed without technical difficulties, as evidenced by bypass duration, the duration of the surgery and the absence of any complications.

In our opinion, the revealed decrease in the volume of blood loss in the intraoperative period during thoracotomy is associated with minimal dissection of the soft tissues along the selected intercostal space, avoiding gross sternal damage during sternotomy.

Despite the achievements of cardiac surgery technology, the success of perfusion-anesthetic management and the improvement of methods for regulating vital functions, inadequate myocardial protection remains the main cause of complications and, in some cases, fatal outcomes during cardiosurgical operations. This is more relevant to ensuring adequate protection of the myocardium, the restoration of normal heart function depends on its effectiveness [8,9]. When

perfusion is performed without cross-clamping the aorta, the development of ischemic changes, cardiac arrhythmias and conduction disturbances after the anoxia period is reduced, the need for inotropic support for correction of small cardiac output syndrome after bypass with aortic constriction and the introduction of a cardioplegic solution is significantly reduced [6,7,10].

Prevention of aeroembolism is an important procedure in minimally invasive cardiac surgery, especially when the aorta is not pinched. Applying a series of sequential techniques described in this article, we managed to avoid air entering the left parts of the heart i.e. in the left atrium, especially in the left ventricle. For an objective assessment, the control was carried out by visualization of the transesophageal echocardiography [5,11]. All patients quickly woke up and there were no cases of neurological deficit. At the beginning of the RAMP development, our connection time to the bypass was 15-20 minutes longer. With the acquisition of the experience of the surgeon, this time did not differ significantly, averaging 20 ± 4 minutes. This testifies to the feasibility, safety and effectiveness of minithoracotomy in ASD correction [17-21].

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РЕЗЮМЕ

СРАВНИТЕЛЬНЫЙ АНАЛИЗ КЛИНИЧЕСКИХ РЕЗУЛЬТАТОВ ЛЕЧЕНИЯ ПАЦИЕНТОВ С РАС, ОПЕРИРОВАННЫХ С ПОМОЩЬЮ ПРАВОЙ ПЕРЕДНЕЙ МИНИТОРАКОТОМИИ И СРЕДИННОЙ СТЕРНОТОМИИ

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Срединная стернотомия является общепринятым методом коррекции дефекта межпредсердной перегородки, несмотря

на то, что иногда она дает плохие косметические результаты. Таким образом, правая передняя миниторакотомия была оценена как альтернативная процедура с лучшим косметическим результатом.

Материалы и методы: с апреля 2008 по февраль 2017 года 102 пациентам была выполнена коррекция дефекта межпредсердной перегородки с использованием нормотермической перфузии на работающем сердце через правую переднюю миниторакотомия, включающую короткий разрез через четвертое межреберье и прямую канюляцию. Среди них 75 женщин и 27 мужчин в среднем возрасте $19,2 \pm 2,0$ года. Исправленные дефекты включали дефект межпредсердной перегородки II типа, дефект межпредсердной перегородки с коротким краем аорты, дефект межпредсердной перегородки с коротким нижним краем, дефект межпредсердной перегородки с коротким верхним краем, дефект межпредсердной перегородки верхнего типа и дефект межпредсердной перегородки нижнего типа. Длина кожного разреза варьировалась от 4 до 10 см, в зависимости от возраста пациента.

Результаты: Случаев оперативной или отдаленной смертности или серьезных осложнений не было. Среднее время искусственного кровообращения составило 19 ± 4 минуты, продолжительность искусственной вентиляции легких после операции у пациентов составила $2,4 \pm 0,9$ часа. Косметический результат у всех пациентов был удовлетворительным.

Вывод: правый передний миниторакотомический разрез является безопасной и эффективной альтернативой срединной стернотомии для коррекции дефекта межпредсердной перегородки. Косметические результаты весьма удовлетворительны.

Ключевые слова: дефект межпредсердной перегородки, малоинвазивная кардиохирургия, миниторакотомия.

რეზიუმე

ASD-ს მქონე პაციენტების კლინიკური შედეგების ომპარაციული ანალიზი, რომლებიც ოპერირებდნენ მარჯვენა წინა მინიტორაკოტომიით და მედიანური სტერნოტომიით

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მედიანური სტერნოტომია იყო ჩვეულებრივი მიდგომა წინაგულების სეპტალური დეფექტის კორექციისთვის, მიუხედავად ზოგჯერ ცუდი კოსმეტიკური შედეგებისა. მარჯვენა წინა მინიტორაკოტომია შეფასდა, როგორც ალტერნატიული პროცედურა უკეთესი კოსმეტიკური შედეგით.

მასალა და მეთოდები: 2008 წლის აპრილიდან 2017 წლის თებერვლამდე 102 პაციენტს ჩატარდა

წინაგულების ძგიდის დეფექტის კორექცია გულის ცემაზე ნორმოთერმული პერფუზიის გამოყენებით მარჯვენა წინა მინითორაკოტომიის საშუალებით, რომელიც მოიცავს მოკლე ჭრილობას მეოთხე ნეკნთაშუა სივრცეში და პირდაპირ კანულაციას. 75 ქალი და 27 მამაკაცი ბოლოს საშუალოდ ასაკი $19,2 \pm 2,0$ წლის. კორექტირებული დეფექტები მოიცავდა წინაგულების ძგიდის დეფექტს ii ტიპის, წინაგულების ძგიდის დეფექტს მოკლე აორტის კიდით, წინაგულების ძგიდის დეფექტს მოკლე ქვედა კიდით, წინაგულების ძგიდის დეფექტს მოკლე ზედა კიდით, სინუს ვენოზუს უმაღლესი ტიპის წინაგულების ძგიდის დეფექტს და სინუს ვენოზუს ქვედა ტიპის წინაგულების ძგიდის დეფექტს. კანის ჭრილობის სიგრძე მერყეობდა 4-დან 10 სმ-მდე, რაც დამოკიდებულია პაციენტის ასაკზე

შედეგები: არ იყო ოპერატიული ან გვიან სიკვდილიანობა ან ძირითადი ავადობა. საშუალო გულ-ფილტვის შემოვლითი დრო იყო 19 ± 4 წუთი, პაციენტებში ოპერაციის შემდეგ მექანიკური ვენტილაციის ხანგრძლივობა იყო $2,4 \pm 0,9$ საათი. კოსმეტიკური შედეგი ძალიან დამაკმაყოფილებელი იყო ყველა პაციენტში.

დასკვნები: მარჯვენა წინა მინითორაკოტომიის ჭრილობა არის უსაფრთხო და ეფექტური ალტერნატივა მედიანური სტერნოტომიისთვის წინაგულების ძგიდის დეფექტის კორექციისთვის. კოსმეტიკური შედეგები ძალიან დამაკმაყოფილებელია.

საკვანძო სიტყვები: წინაგულების ძგიდის დეფექტი, მინიმალურად ინვაზიური კარდიოქირურგია, მინითორაკოტომია.