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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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PERSONIFICATION OF ANTIHYPERTENSIVE THERAPY IN ISCHEMIC CEREBRAL STROKE

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Abstract.

The purpose of the study is to optimize monitoring and personalize antihypertensive therapy in patients with severe ischemic cerebral stroke (ICS).

We examined 37 patients with ICS, average age 74,1±1,3 years, who received treatment in intensive care wards of the stroke department with general neurology beds of the Municipal Non-Profit Enterprise "City Hospital № 9" of the Zaporizhzhia City Council. There were 16 men (43,2%), average age 71,9±2,1 years; women – 21 (56,8%), average age 75,8±1.6 years.

Personification of antihypertensive therapy for severe ICS was carried out based on the etiology of hypertensive hemodynamic disorders: hyperkinetic type of arterial hypertension (Cardiac index ≥ 3,80 L×min^{-1}×m^{-2}) or hypokinetic type of arterial hypertension (Cardiac index ≤ 2,98 L×min^{-1}×m^{-2}).

In patients with severe ICS and hyperkinetic type of arterial hypertension, initial hemodynamic parameters were characterized by Mean arterial pressure (MAP) of 111,4 ± 1,4 mm Hg; Heart rate (HR) of 107,2±1,6 min; Cardiac index (CI) 6,74±0,27 L×min^{-1}×m^{-2}; the Total peripheral vascular resistance (TPVR) is 674±36 dyn×sec^{-1}×cm^{-5}. For the purpose of antihypertensive correction of the hyperkinetic type of arterial hypertension (CI ≥ 3,80 L×min^{-1}×m^{-2}), a solution of Magnesium Sulfate was used intravenously at a dose of 2500-5000 mg×day-1 in combination with Bisoprolol 5-10 mg×day^{-1} orally. This made it possible to stabilize hemodynamic parameters by the end of intensive therapy within the limits of eukinetic values: MAP 95,2 ± 1,5 mm Hg (p < 0,05); HR 81,9 ± 1,5 min (p < 0,05); CI 3,60±0,15 L×min^{-1}×m^{-2} (p < 0,05); TPVR is 1079±58 dyn×sec^{-1}×cm^{-5} (p < 0,05).

In patients with severe ICS and hypokinetic type of arterial hypertension, initial hemodynamic parameters were characterized by MAP of 117,7 ± 2,8 mm Hg; HR of 76,7 ± 1,5 min; CI 2,74±0,18 L×min^{-1}×m^{-2}; TPVR is 1754±123 dyn×sec^{-1}×cm^{-5}. For the purpose of antihypertensive correction of the hypokinetic type of arterial hypertension (CI ≤ 2,98 L×min^{-1}×m^{-2}), a solution of Ebrantil was used intravenously as a bolus of 1,25-2,5 mg with a further infusion of 5-40 mg×hour^{-1}. This made it possible to stabilize hemodynamic parameters by the end of intensive therapy within the limits of eukinetic values: MAP 92,7 ± 1,7 mm Hg (p < 0,05); HR 81,4 ± 0,9 min (p < 0,05); CI 3,65±0,16 L×min^{-1}×m^{-2} (p < 0,05); TPVR is 1036±46 dyn×sec^{-1}×cm^{-5} (p < 0,05).

Key words. Ischemic cerebral stroke, hyperkinetic type of arterial hypertension, hypokinetic type of arterial hypertension, antihypertensive personalized therapy.

Introduction.

Brain stroke is a leading cause of death and disability worldwide. In Ukraine, according to official statistics, about 100 thousand cerebral strokes occur every year (more than a third of them in people of working age), 30-40% of patients with cerebral stroke die within the first 30 days and up to 50% within the first year from the onset diseases, 20-40% of surviving patients become dependent on outside help (12,5% of primary disability), and only about 10% return to a full life [1].

Moreover, ischemic cerebral stroke accounts for approximately 76% of all cerebral strokes [2].

The modern concept of intensive care for patients with intracranial hypertension requires timely receipt of the results of special instrumental studies characterizing the dynamics of the development of the pathological process. In most cases, treatment is determined only by clinical signs such as hypertension [3] or if there is evidence of other organ damage such as acute heart failure, pulmonary edema, aortic aneurysm dissection caused by hypertension [4].

As part of cerebral autoregulation, blood pressure typically increases during the acute phase of ischemic cerebral stroke, maximizing perfusion in ischemic brain regions. However, severe arterial hypertension can lead to hemorrhagic transformation of the infarction, hypertensive encephalopathy, as well as cardiopulmonary and renal complications [5].

Therefore, the tactics of antihypertensive therapy in patients with ischemic cerebral stroke in the acute period has its own characteristics [5,6].

Currently, it is recommended to correct arterial hypertension only for systolic blood pressure values ≥ 220 mm Hg. and diastolic blood pressure ≥ 120 mm Hg. Correction of arterial hypertension in the first 24 hours after the development of ischemic cerebral stroke should not exceed 15% of the initial blood pressure value.

If intravenous thrombolysis is indicated, it is recommended to reduce systolic blood pressure to ≤ 185 mmHg before initiating it. and diastolic blood pressure to values ≤ 110 mmHg. After completion of the procedure, monitor blood pressure numbers in the range of systolic blood pressure ≤ 180 mm Hg. and diastolic blood pressure ≤ 105 mm Hg. If it is impossible to ensure the specified blood pressure values, it is recommended to refuse thrombolysis due to the risk of hemorrhage [8].

Under physiological conditions, the constancy of cerebral blood flow is ensured by cerebral autoregulation through dilatation or constriction of cerebral arterioles. However, this mechanism of cerebral autoregulation is effective only when the mean arterial pressure is in the range of 50-150 mmHg. Pressure above this level causes hyperemia and swelling of the brain, which is accompanied by an increase in intracranial pressure. Therefore, control and correction of arterial hypertension takes a predominant place in the complex of intensive care for ischemic cerebral stroke [8].

The purpose of the study is to optimize monitoring and personalize antihypertensive therapy in patients with ischemic cerebral stroke.

Materials and Methods.

We examined 37 patients with ischemic cerebral stroke, average age 74,1±1,3 years, who received treatment in intensive care wards of the stroke department with general neurology beds of the Municipal Non-Profit Enterprise "City Hospital № 9" of the Zaporizhzhia City Council. There were 16 men (43,2%), average age 71,9±2,1 year; women – 21 (56,8%), average age 75,8±1,6 years.

Depending on the etiology of hypertensive hemodynamic disorders (hyperkinetic type of arterial hypertension or hypokinetic type of arterial hypertension), patients with ischemic cerebral stroke were divided into 2 groups according to the cardiac index values [9].

Group 1 consisted of 21 patients (average age 74,1±1,6 years) with ischemic cerebral stroke whose hemodynamic parameters were characterized by the hyperkinetic type of arterial hypertension, and cardiac index values corresponded to ≥ 3,80 $L \times min^{-1} \times m^{-2}$.

There were 8 men (38,1%), average age 74,1±2,9 years; women – 13 (61,9%), average age 74,1±1,9 years.

In the intensive care complex, in order to personalize the antihypertensive component, a solution of Magnesium Sulfate was used intravenously at a dose of 2500-5000 mg×day-1 in combination with Bisoprolol 5-10 $mg \times day^{-1}$ orally.

Group 2 consisted of 16 patients (average age 74,1±2,3 years) with ischemic cerebral stroke whose hemodynamic parameters were characterized by a hypokinetic type of arterial hypertension, and cardiac index values corresponded to ≤ 2,98 $L \times min^{-1} \times m^{-2}$.

There were 8 men (50,0%), average age 69,6±2,9 years; women – 8 (50,0%), average age 78,6±2,7 years.

In the intensive care complex, in order to personalize the antihypertensive component, a solution of Ebrantil was used intravenously as a bolus of 1,25-2,5 mg with a further infusion of 5-40 $mg \times hour^{-1}$.

The diagnosis was established in accordance with the existing criteria for clinical neurological examination and neuroimaging methods using a computed tomograph "Neu Viz 16 Classic Multi slice CT (China)".

The severity of ischemic cerebral stroke was assessed based on the severity of neurological symptoms as determined by the National Institutes of Health Stroke Scale [10].

Inclusion criteria:

Patients with ischemic stroke without cardiac arrhythmia.

Exclusion criteria:

Patients with ischemic stroke with cardiac arrhythmia.

Written consent to conduct the study was obtained from each patient or his relative (in the absence of productive contact with the patient), in accordance with the recommendations of ethical committees on biomedical research, Ukrainian legislation on health protection and the 2000 Declaration of Helsinki, European Society Directive 86/609 on participation people in biomedical research.

Indicators of systemic hemodynamics and the level of blood oxygen saturation were determined using a bedside patient monitor "Vismo PVM-2703" (Nihon Kohden Corporation, Japan):

- systolic blood pressure, mm Hg.
- diastolic blood pressure, mm Hg.
- mean arterial pressure, mm Hg.
- heart rate, in min.
- minute blood volume, $L \times min^{-1}$.
- cardiac index, L×min-1×m^{-2}.
- arterial blood oxygen saturation, %.

Total peripheral vascular resistance (TPVR) was calculated using formula 1 [11]:

$TPVR = MAP \times 79980 / MBV$, $dyn \times sec^{-1} \times cm^{-5}$ (1)

where MAP – mean arterial pressure, mm Hg.

MBV – minute blood volume, $L \times min^{-1}$.

The oxygen delivery index (IDO_2) was calculated using formula 2 [12]:

$IDO_2 = CI \times (1{,}34 \times Hb \times SaO_2) = CI \times CaO_2$, $ml \times min^{-1} \times m^{-2}$ (2)

where CI – cardiac index, $L \times min^{-1} \times m^{-2}$.

Hb – blood hemoglobin concentration, $g \times l^{-1}$.

SaO_2 – arterial blood oxygen saturation, %.

CaO_2 – oxygen content in arterial blood, $ml \times L^{-1}$.

Statistical processing of the study results was carried out using descriptive statistics methods using the Microsoft Excel 2010 software package. The reliability of the values was assessed according to Student's t-test for group 1 (n = 21) and for group 2 (n = 16). The results obtained were considered significant at a significance level of $p < 0{,}05$ ($t \geq 2{,}08$) for group 1 (n = 21) and $p < 0{,}05$ ($t \geq 2{,}12$) for group 2 (n = 16).

Results and Discussion.

Changes in neurological status indicators in patients with ischemic cerebral stroke (ICS) and hyperkinetic type of arterial hypertension are presented in Table 1.

As can be seen from Table 1, in patients with ICS and hyperkinetic type of arterial hypertension, the level of consciousness determined by the Glasgow Coma Scale (GCS) at the beginning of intensive therapy (IT) was characterized by deep stupor. However, by 48 hours of IT, the severity of neurological symptoms decreased by 9%, and after 72 hours and by the End of IT by an average of 14%.

The severity of neurological symptoms according to the National Institutes of Health Stroke Scale (NIHSS) at all stages of treatment corresponded to severe ICS. At the same time, by 72 hours there was a decrease in neurological deficit by 16%, and by the End of IT by 18%.

Changes in hemodynamic parameters in patients with ischemic stroke and hyperkinetic type of arterial hypertension are presented in Table 2.

As can be seen from Table 2, in patients with ICS and hyperkinetic type of arterial hypertension, a decrease in systolic blood pressure (BP syst.) was achieved starting from 4,5 hours of IT by 16%, then within 12-24 hours by 20%, by 48 hours at 22%, from 72 hours until the End of IT at 24%.

Diastolic blood pressure (BP diast.) tended to decrease statistically by 6% only by 72 hours from the start of treatment.

Table 1. *Characteristics of neurological status indicators in patients with ischemic cerebral stroke and hyperkinetic type (CI ≥ 3,80 L×min^{-1}×m^{-2}) arterial hypertension (M±m).*

Indicators	Intensive therapy (IT)						
	Start of IT	4,5 hours	12 hours	24 hours	48 hours	72 hours	End of IT
GCS, points	12,0 ±0,4	12,1 ±0,4	12,2 ±0,5	12,9 ±0,4	13,2 ±0,4*	13,9 ±0,3*	14,0 ±0,3*
NIHSS, points	16,7 ±0,7	16,2 ±0,7	16,0 ±0,7	15,1 ±0,8	14,8 ±0,7	14,0 ±0,7*	13,7 ±0,7*

*Note: *-p <0,05 compared to baseline values (n = 21)*

Table 2. *Characteristics of hemodynamic parameters in patients with ischemic cerebral stroke and hyperkinetic type (CI ≥ 3,80 L×min^{-1}×m^{-2}) arterial hypertension (M±m).*

Indicators	Intensive therapy (IT)						
	Start of IT	4,5 hours	12 hours	24 hours	48 hours	72 hours	End of IT
BP syst., mm Hg	174,3 ±2,6	146,7 ±3,2*	138,6 ±3,2*	139,0±2,8*	136,2±2,0*	132,9±2,0*	133,3 ±1,9*
BP diast., mm Hg	80,0 ±1,5	78,1 ±2,0	78,6 ±1,4	77,6 ±1,4	77,1 ±1,0	75,2 ±1,5*	76,2 ±1,6
MAP, mm Hg	111,4 ±1,4	101,0 ±2,2*	98,6 ±1,8*	98,1 ±1,4*	96,8 ±1,1*	94,4 ±1,4*	95,2 ±1,5*
HR, min.	107,2 ±1,6	100,6 ±1,6*	92,6 ±1,4*	87,7 ±1,0*	84,4 ±0,9*	83,2 ±1,0*	81,9 ±1,5*
SV, mL	123,32± 4,80	96,35 ±3,96*	85,23 ±3,28*	89,73 ±4,01*	86,66 ±3,15*	85,48 ±3,02*	86,16 ±3,39*
MVBC, L×min^{-1}	13,22 ±0,50	9,69 ±0,40*	7,89 ±0,33*	7,87 ±0,38*	7,31 ±0,28*	7,12 ±0,24*	7,06 ±0,30*
CI, L×min^{-1}×m^{-2}	6,74 ±0,27	4,94 ±0,23*	4,03 ±0,17*	4,01 ±0,21*	3,73 ±0,20*	3,63 ±0,17*	3,60 ±0,15*
TPVR, dyn×sec^{-1}×cm^{-5}	674 ±36	833 ±50*	999 ±55*	997 ±64*	1059 ±42*	1062 ±51*	1079 ±58*

*Note: *-p <0,05 compared to baseline values (n = 21)*

Table 3. *Characteristics of indicators of oxygen transport status in patients with ischemic cerebral stroke and hyperkinetic type (CI ≥ 3,80 L×min^{-1}×m^{-2}) arterial hypertension (M±m).*

Indicators	Intensive therapy (IT)						
	Start of IT	4,5 hours	12 hours	24 hours	48 hours	72 hours	End of IT
SaO_2, %	93,2 ±0,6	96,2 ±0,3*	96,8 ±0,2*	97,3 ±0,1*	97,5 ±0,1*	97,8 ±0,1*	98,1 ±0,1*
IDO_2, ml×min^{-1}×m^{-2}	1130 ±51	825 ±40*	698 ±39*	696 ±39*	663 ±38*	654 ±36*	640 ±40*

*Note: *-p <0,05 compared to baseline values (n = 21)*

Table 4. *Characteristics of neurological status indicators in patients with ischemic cerebral stroke and hypokinetic type (CI ≤ 2,98 L×min^{-1}×m^{-2}) arterial hypertension (M±m).*

Indicators	Intensive therapy (IT)						
	Start of IT	4,5 hours	12 hours	24 hours	48 hours	72 hours	End of IT
GCS, points	12,1 ±0,5	12,4 ±0,5	12,8 ±0,5	13,1 ±0,5	13,4 ±0,5	13,6 ±0,5*	13,8 ±0,5*
NIHSS, points	16,6 ±0,5	16,1 ±0,5	15,4 ±0,5	15,1 ±0,6	14,7 ±0,6*	13,7 ±0,8*	13,6 ±0,8*

*Note: *-p <0,05 compared to baseline values (n = 21)*

Table 5. *Characteristics of hemodynamic parameters in patients with ischemic cerebral stroke and hypokinetic type (CI ≤ 2,98 L×min^{-1}×m^{-2}) arterial hypertension (M±m).*

Indicators	Intensive therapy (IT)						
	Start of IT	4,5 hours	12 hours	24 hours	48 hours	72 hours	End of IT
BP syst., mm Hg	161,9 ±3,6	138,8 ±2,6*	136,9 ±3,0*	133,8 ±2,9*	137,5 ±2,8*	135,6 ±2,7*	130,6 ±2,5*
BP diast., mm Hg	95,6 ±2,7	78,1 ±1,0*	77,5 ±1,4*	75,6 ±1,3*	78,1 ±2,5*	77,5 ±1,9*	73,8 ±1,5*
MAP, mm Hg	117,7 ±2,8	98,3 ±1,1*	97,3 ±1,6*	95,0 ±1,6*	97,9 ±2,5*	96,9 ±2,0*	92,7 ±1,7*
HR, min.	76,7 ±1,5	78,9 ±1,3	79,6 ±1,4	82,4 ±1,5*	87,3 ±0,5*	83,9 ±0,5*	81,4 ±0,9*
SV, mL	69,99 ±3,47	86,33 ±3,67*	86,52 ±4,83*	87,58 ±3,58*	84,80 ±4,18*	81,65 ±3,36*	87,96 ±3,01*
MVBC, L×min^{-1}	5,37 ±0,29	6,81 ±0,32*	6,89 ±0,43*	7,22 ±0,34*	7,40 ±0,37*	6,85 ±0,30*	7,16 ±0,26*
CI, L×min^{-1}×m^{-2}	2,74 ±0,18	3,48 ±0,13*	3,51 ±0,24*	3,68 ±0,18*	3,78 ±0,23*	3,50 ±0,18*	3,65 ±0,16*
TPVR, dyn×sec^{-1}×cm^{-5}	1754 ±123	1155 ±52*	1130 ±60*	1053 ±49*	1058 ±97*	1131 ±77*	1036 ±46*

*Note: *-p <0,05 compared to baseline values (n = 21)*

Table 6. *Characteristics of indicators of oxygen transport status in patients with ischemic cerebral stroke and hypokinetic type (CI ≤ 2,98 L×min^{-1}×m^{-2}) arterial hypertension (M±m).*

Indicators	Intensive therapy (IT)						
	Start of IT	4,5 hours	12 hours	24 hours	48 hours	72 hours	End of IT
SaO_2, %	94,0 ±0,6	96,6 ±0,2*	97,1 ±0,2*	97,5 ±0,1*	97,7 ±0,2*	97,9 ±0,1*	98,3 ±0,1*
IDO_2, ml×min^{-1}×m^{-2}	471 ±35	614 ±44*	631 ±47*	664 ±38*	688 ±57*	641 ±48*	657 ±54*

*Note: *-p <0,05 compared to baseline values (n = 21)*

Mean arterial pressure (MAP) decreased by 9% at 4,5 hours of IT, by 11% at 12 hours, by 12% at 24 hours, by 13% at 48 hours, and by 15% from 72 hours until the End of IT.

Heart rate (HR) decreased by 6% by 4,5 hours of IT, by 14% by 12 hours, by 18% by 24 hours, by 21% by 48 hours, by 22% by 72 hours, and by 24% by the End of IT.

The value of stroke volume (SV) decreased by 22% by 4,5 hours of IT, by 31% by 12 hours, by 27% by 24 hours, and by an average of 30% from 48 hours until the End of IT.

The values of minute volume of blood circulation (MVBC) and cardiac index (CI) decreased equally by 27% by 4,5 hours of IT, by an average of 40% within 12-24 hours, by 45% by 48 hours, by 46% by 72 hours, by 47% by the End IT.

The values of total peripheral vascular resistance (TPVR) increased by 19% by 4,5 hours of IT, by an average of 33% within 12-24 hours, by 36% by 48 hours, by 37% by 72 hours, and by 38% by the End of IT.

Changes in indicators of oxygen transport status in patients with ischemic stroke and hyperkinetic type of arterial hypertension are presented in Table 3.

As can be seen from Table 3, in patients with IS and hyperkinetic type of arterial hypertension, a statistically significant increase in blood oxygen saturation (SaO_2) was noted from 4,5 hours of intensive therapy by 3%, then within 12-48 hours by an average of 4%, from 72 hours until the End of IT by an average of 5%.

A decrease in the oxygen delivery index (IDO_2) was observed by 4,5 hours of IT by 27%, within 12-24 hours by an average of 38%, by 48 hours by 41%, by 72 hours by 42% and by the End of IT by 43%.

Changes in neurological status indicators in patients with ICS and hypokinetic type of arterial hypertension are presented in Table 4.

As can be seen from Table 4, in patients with ICS and hypokinetic type of arterial hypertension, the level of consciousness determined by the GCS at the Start of IT was characterized by deep stupor. However, by the 72 hours of IT, the severity of neurological symptoms decreased by 11% and by 12% by the End of IT.

The severity of neurological symptoms according to the NIHSS scale at all stages of treatment corresponded to severe ICS. At the same time, by 48 hours of IT, there was a decrease in neurological deficit by 11%, by 72 hours by 17%, and by the End of IT by 18%.

Changes in hemodynamic parameters in patients with ICS and hypokinetic type of arterial hypertension are presented in Table 5.

As can be seen from Table 5, in patients with ICS and hypokinetic type of arterial hypertension, a decrease in BP syst. was achieved starting from 4,5 hours of IT by 14%, then within 12-48 hours by an average of 15%, to 72 hours by 16% and by the End of IT by 19%.

A decrease in BP diast. was observed by 4,5 hours of intensive therapy by 18%, by 12 hours by 19%, by 24 hours by 21% and by the End of IT by 23%.

A decrease in MAP was observed by 16% by 4,5 hours of intensive therapy, finally stabilized by 17% by 48 hours, then by 18% by 72 hours and by 21% by the End of IT.

A statistically significant increase in HRe was observed by 24 hours of IT by 7%, a maximum increase by 48 hours by 12% and by the End of IT by 6%.

The value of SV increased by 19% by 4,5 hours of IT, and by 20% by 24 hours and by the End of IT.

The values of MVBC and CI increased equally by 21% by 4,5 hours of IT, then by 22% by 12 hours and 72 hours, and by 25% by the End of IT.

By 4,5 hours of IT, there was a decrease in TPVR by 34%, within 24-48 hours by 40% and by the End of IT by 41%.

Changes in indicators of oxygen transport status in patients with ICS and hypokinetic type of arterial hypertension are presented in Table 6.

As can be seen from Table 6, in patients with ICS and hypokinetic type of arterial hypertension, a statistically significant increase in SaO_2 was noted from 4,5 hours of IT by 3%, and subsequently for 24 hours until the End of IT on average by 4%.

An increase in the IDO_2 was observed by 4,5 hours of IT by 23%, by 12 hours by 25%, by 24 hours by 29%, by 48 hours by 32% and by the End of IT by 28%.

Conclusion.

1. Personification of antihypertensive therapy for severe ICS was carried out based on the etiology of hypertensive hemodynamic disorders: hyperkinetic type of arterial hypertension (CI ≥ 3,80 $L\times min^{-1}\times m^{-2}$) or hypokinetic type of arterial hypertension (CI ≤ 2,98 $L\times min^{-1}\times m^{-2}$).

2. In patients with severe ICS and hyperkinetic type of arterial hypertension, initial hemodynamic parameters were characterized by MAP of 111,4 ± 1,4 mm Hg; HR of 107,2±1,6 min; CI 6,74±0,27 $L\times min^{-1}\times m^{-2}$; the TPVR is 674±36 $dyn\times sec^{-1}\times cm^{-5}$.

For the purpose of antihypertensive correction of the hyperkinetic type of arterial hypertension (CI ≥ 3,80 $L\times min^{-1}\times m^{-2}$), a solution of Magnesium Sulfate was used intravenously at a dose of 2500-5000 mg×day-1 in combination with Bisoprolol 5-10 $mg\times day^{-1}$ orally.

This made it possible to stabilize hemodynamic parameters by the end of intensive therapy within the limits of eukinetic values: MAP 95,2 ± 1,5 mm Hg ($p < 0,05$); HR 81,9 ± 1,5 min ($p < 0,05$); CI 3,60±0,15 $L\times min^{-1}\times m^{-2}$ ($p < 0,05$); TPVR is 1079±58 $dyn\times sec^{-1}\times cm^{-5}$ ($p < 0,05$).

3. In patients with severe ICS and hypokinetic type of arterial hypertension, initial hemodynamic parameters were characterized by MAP of 117,7 ± 2,8 mm Hg; HR of 76,7 ± 1,5 min; CI 2,74±0,18 $L\times min^{-1}\times m^{-2}$; TPVR is 1754±123 $dyn\times sec^{-1}\times cm^{-5}$.

For the purpose of antihypertensive correction of the hypokinetic type of arterial hypertension (CI ≤ 2,98 $L\times min^{-1}\times m^{-2}$), a solution of Ebrantil was used intravenously as a bolus of 1,25-2,5 mg with a further infusion of 5-40 $mg\times hour^{-1}$.

This made it possible to stabilize hemodynamic parameters by the end of intensive therapy within the limits of eukinetic values: MAP 92,7 ± 1,7 mm Hg ($p < 0,05$); HR 81,4 ± 0,9 min ($p < 0,05$); CI 3,65±0,16 $L\times min^{-1}\times m^{-2}$ ($p < 0,05$); TPVR is 1036±46 $dyn\times sec^{-1}\times cm^{-5}$ ($p < 0,05$).

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