GEORGIAN MEDICAL NEWS

ISSN 1512-0112

NO 7-8 (364-365) Июль-Август 2025

ТБИЛИСИ - NEW YORK

ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

Monthly Georgia-US joint scientific journal published both in electronic and paper formats of the Agency of Medical Information of the Georgian Association of Business Press. Published since 1994. Distributed in NIS, EU and USA.

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:

GEORGIAN MEDICAL NEWS
No 7-8 (364-365) 2025

ENDOSCOPIC INJECTION HEMOSTASIS AND LOCAL TREATMENT OF GASTRODUODENAL BLEEDING. LITERATURE REVIEW AND OWN DEVELOPMENTS

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Abstract.

Gastric ulcer and duodenal ulcer remain one of the most common and dangerous pathologies, accompanied by a high level of gastrointestinal bleeding. Endoscopic methods of hemostasis, including injection and combined methods, are the basis for the treatment of gastroduodenal bleeding, but there is a problem of high risk of relapse and insufficient effectiveness of individual methods.

This article discusses modern approaches to endoscopic hemostasis in ulcer bleeding, including injection of vasoconstrictors and the use of the latest methods of local treatment. Particular attention is paid to the development of new methods of delivering medicinal preparations, such as egg oil and Kalanchoe juice, to the ulcer defect area, as well as the possibility of using an additional manipulation channel to prevent damage to endoscopic equipment.

The conducted review demonstrates that the improvement of existing methods of hemostasis and local treatment, as well as the introduction of innovative therapeutic approaches, contributes to an increase in the effectiveness of the treatment of gastroduodenal ulcer bleeding and a reduction in the risk of relapse, which is important for clinical practice.

Key words. Peptic ulcer, endoscopic hemostasis, gastroduodenal bleeding.

Introduction.

Gastric ulcer and duodenal ulcer remain one of the most common diseases of the digestive system. In general, ulcers account for 40% to 62% of cases of gastrointestinal bleeding [1]. The relevance of the problem is also emphasized by the mortality rate, which ranges from 6 to 14%, and in the group of patients with severe bleeding reaches 50% [2].

According to Dibirov M.D. (2013), out of 120 patients with gastroduodenal bleeding, the bleeding intensity according to the Forest classification FIA was detected in 15 patients, FIB in 46, FIIa in 27, FIIb in 32 patients [3,4]. Moreover, with bleeding ulcers of FIIa and FIIb type, the risk of recurrent bleeding is very high and reaches 40-50% [5].

In case of gastrointestinal bleeding, the most frequently used method of hemostasis is a combination of methods during endoscopy, such as injection hemostasis with vasoconstrictors, ethanol injections and sclerosant administration, as well as in combination with diathermocoagulation of the bleeding source. With ongoing jet arrosive bleeding, Forrest Ia, occurs in 8-10% of patients, of which the risk of potential relapse exists in 80-85%, and with Forrest Ib, it occurs in 10-15% of patients, the risk of relapse in the latter is 5%. Bleeding that has stopped during endoscopic examination according to Forrest II occurs in 25-40% of patients with a risk of potential relapse of 40-50% [7]. According to Yudin S.V. et al. (2002), in case of ongoing bleeding (Forrest-1), the method of combining infiltration of hemostatic solutions and electrocoagulation of eroded vessels is more effective [8].

In addition, it is known that 20.8% of primary attempts at endoscopic hemostasis are ineffective [9]. Therefore, prevention of hemorrhage recurrence is an important and relevant component in the treatment of gastroduodenal ulcer bleeding.

Purpose of the study.

Review of data on endoscopic hemostasis by injection method and local treatment for gastroduodenal ulcer bleeding based on the results of a patent search and analysis of medical literature.

Materials and Methods.

Known patents for inventions and other medical publications on new methods of endoscopic injection hemostasis and local treatment of gastroduodenal ulcer bleeding were studied and our own developments on this problem were described.

Results and Discussion.

It has been established that endoscopic hemostasis methods are successfully used to stop gastroduodenal ulcer bleeding. Among them are physical, mechanical, infiltration and combined methods of hemostasis, including the application of hemostatic drugs or adhesive aerosols to the wound surface through an endoscope [10]. However, with all the variety of endoscopic hemostasis methods, there is currently no consensus in the literature on the tactics of using a particular method depending on the type of bleeding and its intensity, or on the frequency of using endoscopic hemostasis [11]. It has been proven that the effectiveness of endoscopic hemostasis in patients with gastrointestinal bleeding is increased by combined treatment options [12-14].

The most widely used method in the treatment of gastroduodenal bleeding is the infiltration method aimed at vasoconstriction, in particular, with the injection of pure ethanol into the submucosal layer of the stomach. The method has the advantage of being simple to perform and does not require expensive equipment. According to the author, the efficiency fluctuates around 50% with the injection of 70% ethanol [15].

There is also a known method of endoscopic hemostasis in gastroduodenal bleeding by using a liquid to stop capillary bleeding "Hemostab", which is injected into the area of the hemorrhage source followed by argon-plasma coagulation [16]. The disadvantage of this method is that the simultaneous

implementation of injection hemostasis and coagulation can cause pronounced local inflammatory tissue reactions with disruption of microcirculation and trophism of periulcerogenic zones.

Some authors inject gastric ulcers with ozonized isotonic sodium chloride solution, which is injected into the submucosa of the stomach during gastroscopy using an injector at 4-5 points, 1-2 ml in each injection, retreating 0.5-1 cm from the edge of the ulcer [17]. It is based on the bactericidal effect of ozone, associated with local damage to the plasma membrane with the loss of viability of the bacterial cell [18]. However, this results in rapid, uneven decomposition of dissolved ozone, which does not allow for precise dosing of the ozone concentration.

Another type of endoscopic injection hemostasis is infiltration of adrenaline solution [19]. However, there are data on possible recurrence of bleeding after isolated local injection of adrenaline [20,21].

The method of endoscopic hemostasis is also used for complicated bleeding of chronic gastroduodenal ulcers by injection of 0.01% solution of adrenaline hydrochloride, which is administered in the amount of 10 ml. In this case, the drug is injected from 4-6 points at 1.6-2.5 ml per point. Additionally, 1 mg of dalargin diluted in 2 ml of physiological solution is injected, while the drug is injected from 4 points at 0.5 ml per point. The introduction of drugs is carried out into the submucosal layer of the periulcerogenic shaft with subsequent application of the ulcer defect bottom with the drug TachoComb [22]. The disadvantage of this technical solution is the unreasonably cumbersome arsenal of means for infiltration into the ulcer defect zone. In addition, according to the developers, early relapses of bleeding are possible, associated, firstly, with low alpha-mimetic activity, and secondly, with the presence of beta2-mimetic activity in adrenaline. The latter is accompanied by relaxation of peripheral vessels, without providing hemostasis due to vasoconstriction. It is important to note that the introduction of Tachocomb in the form of a factory version is not feasible due to the narrow lumen of the biopsy channel of a conventional endoscope and the adhesion of the drug to its wall due to the presence of a sticky layer of the Tachocomb plate. Adhesion of Tachocomb to the wall of the channel damages the endoscope itself. In addition, to carry out the hemostasis procedure, repeated insertion and removal of the endoscope into the gastroduodenal zone is necessary, which is also not indifferent to the psychological component for the patient with causing unpleasant sensations. Therefore, it is necessary to develop more convenient and standardized methods of introducing Tachocomb into the stomach.

When using the endoscopic hemostasis method for ulcerative bleeding in the gastroduodenal zone, a medicinal mixture containing 1% hydrogen peroxide solution in a volume of 10-40 ml and 2 ml of 5% ascorbic acid solution is introduced into the submucosal space of the ulcer defect area every 8-12 hours [23]. The disadvantages of this method are the introduction of a combination of drugs that do not have a vasoconstrictor effect (ascorbic acid and hydrogen peroxide) and a large amount of solution into the submucosal space, which can adversely affect the trophism of the defect area and surrounding healthy tissues (risk of secondary acute ulcers and erosions), as well as the need for frequent repeated injections in the same doses (increasing treatment costs, increasing the labor intensity of hemostasis and increasing the risk of side effects of the drugs used).

There is a method of endoscopic hemostasis in non-variceal gastroduodenal bleeding, including endoscopic injections of 0.2% norepinephrine solution in the amount of 1 ml per injection paravasally in 3 points around the source of bleeding, as well as in the submucosal layer along the edges of the defect, with a total volume of the injected solution of 7-8 ml [24]. Norepinephrine has virtually no effect on beta-adrenergic receptors, providing drug vasoconstriction and mediated hemostasis. However, this method does not achieve reliable hemostasis due to the short-term local effect of the injected drug with an openly left bleeding surface of the ulcerative defect of the gastroduodenal wall. It is also known that recurrence of bleeding after isolated local use of vasoconstrictors reaches 16.7% - 24.1% [25,26].

We have previously proposed a new method, "Method of endoscopic hemostasis in non-varicose gastroduodenal bleeding," in which, against the background of standard basic hemostatic therapy, endoscopic injections of 0.2% norepinephrine solution are combined with endoscopic application of TachoComb ground to a powder state [27]. Unfortunately, when using this method, there is no regenerative component of action on the ulcer defect. This is due to the fact that the development of ulcerative bleeding is accompanied by an acute inflammatory reaction, severe local inflammation and destruction of the ulcer edges with progression of alteration of the marginal zone of ulcers, which can cause repeated bleeding [28]. However, it is noteworthy that the range of drugs for endoscopic treatment that affect the processes of hemostasis and regeneration in the ulcer crater zone is extremely narrow. Therefore, the search for means to stimulate regeneration in the area of a bleeding ulcer defect and ways of their local delivery deserves special attention [29].

In recent years, a new direction has emerged in the treatment of ulcerative lesions of the gastroduodenal zone using biologically active drugs that affect regeneration processes at the tissue level. Thus, against the background of basic antiulcer therapy, periulcerous administration of the erythrocyte superoxide dismutase drug "Erisod" has been proposed. The drug "Erisod, lyophilized powder for injection of 4 mg (1,600,000 IU) in ampoules" after dissolution "ex tempore" in 4.0 ml of physiological solution using an endoscopic injector is used for periulcerous injection of the ulcer defect from 3-4 points [30]. In this case, the drug "Erisol" was used for ulcers without signs of active bleeding. It should be taken into account that additional repeated multiple injections into the periulcerous zone can also worsen microcirculation and the local regenerative process.

In this regard, we have developed a new method, when after a session of endoscopic injection hemostasis, endoscopic application of the ulcer surface with a medicinal product containing liquid egg oil and Kalanchoe juice (in the ratio: egg oil - 90%, Kalanchoe juice - 10%) is continued, 2-3 cm wide and 1-2 mm thick in the amount of 10 ml with a daily course of treatment up to 2-3 times with subsequent continuation of oral use of egg oil with Kalanchoe juice 3 times a day, 1 tablespoon 30 minutes before meals and at night for 12 days [31].

The choice of the 9:1 ratio was based on preliminary laboratory and clinical trials showing that this proportion maintains optimal viscosity for retention on the mucosa for more than 30 minutes, minimizes the irritating effect of Kalanchoe juice, and at the same time ensures an effective concentration of its biologically active substances. Egg yolk oil, rich in phospholipids and vitamins A, E, D, forms a prolonged protective layer and extends the action of the preparation, while Kalanchoe juice in this ratio retains anti-inflammatory and regenerative activity.

Oil extracted from egg yolk is a rich source of phospholipids and fat-soluble vitamins A, E, D. Phospholipids, in turn, are the main building material of cell membranes of living organisms. Due to the high content of fat-soluble vitamins and lecithin, egg yolk oil can be used as a very good supplement to human nutrition [32].

Research conducted by the All-Russian Research Institute of Poultry Processing Products - Branch of the Federal Scientific Center " ARRTIPF " of the Russian Academy of Sciences (ARRIPPI) has established a positive effect of temperature on the ratio of fatty acids in egg yolk during its heat treatment in the temperature range from 55 to 90°C [33]. Moreover, thermal dehydration before charring eliminates the use of extractive substances, so the resulting oil does not contain artificial components [34].

Kalanchoe has an anti-inflammatory effect, stimulates the processes of epithelial tissue regeneration and thereby accelerates the processes of ulcer defect regeneration, normalizes microcirculation, and also has antibacterial activity against gram-positive and gram-negative microbes [35,36]. The experiment established the suppression of inflammation in the stomach, an increase in antioxidant activity and maintenance of cytoprotective protection of the mucous membrane [37,38]. Experiments conducted by our research group, as well as data from previously published studies, confirmed the suppression of gastric inflammation, increased antioxidant activity, and maintenance of mucosal cell protective effects. A randomized controlled study also confirmed higher rates of H. Pylori eradication in individuals treated with Kalanchoe compared to the control group of patients [39,40].

Egg yolk oil has shown proven efficacy in experiments on burn and diabetic wound models - it activates epithelialization, angiogenesis and collagen synthesis, and increases the expression of EGF and VEGF [41,42]. Kalanchoe has demonstrated early and dense epithelialization of skin wounds in animals, and its bioactive flavonoids have antioxidant and anti-inflammatory properties, supporting reparation processes [43,44].

Another significant point in endoscopic hemostasis and treatment of gastroduodenal ulcer bleeding is the difficulty in delivering therapeutic agents to the area of gastroduodenal ulcer bleeding. In particular, adhesive aerosols, on the one hand, are characterized by damage to the manipulation channel of the endoscope due to the adhesion of the adhesive mass to the inner wall of the instrumental channel of the endoscope, leading to the unusability of the equipment. On the other hand, there is a need for local treatment of gastroduodenal pathologies with the delivery of coarser drugs, viscous and oily drugs to the pathological focus, which is not always possible through the standard manipulation channels of the fibrogastroduodenoscope. Restoration of the impaired function of the manipulation channel requires complex repair of the endoscope, or in some cases, disposal of expensive equipment as a whole.

In order to avoid damage to the standard manipulation channels of the fibrogastroduodenoscope during combined methods of treating pathologies of the gastroduodenal zone, we use an additional manipulation channel to the fibrogastroduodenoscope [40]. This additional manipulation channel to the fibrogastroduodenoscope consists of a 150 cm long silicone tube with a beveled distal end at an angle of 450 with a working internal diameter of 5 mm, an external diameter of 7 mm, which is fixed with adhesive tape to the lower edge of the endoscope, while the end of the silicone tube is 3 mm from the distal end of the endoscope. The silicone tube is equipped with an adapter at the proximal end with a tip for connection to a pneumoinsullator and a bulb reservoir for collecting medications and manually pumping them into the lumen of the silicone tube with subsequent introduction into the cavity of the stomach and duodenum.

During the design of the additional channel, the requirements of preserving the maneuverability of the endoscope, preventing clogging, and easy mounting without modifying the equipment were taken into account. Medical-grade silicone was selected due to its biocompatibility, resistance to oily and aqueous solutions, flexibility, and ability to withstand repeated sterilization. Tests showed that the channel enables delivery of preparations with viscosities up to 3000 mPa·s, including the egg yolk oil and Kalanchoe juice mixture, without clogging. The deviation in the bending angle of the endoscope tip when using the channel did not exceed 5%, which did not impair visualization. A 10 ml volume was delivered in an average of 12–15 seconds with manual insufflation. The channel withstood 30 sterilization cycles without loss of elasticity or integrity.

The additional manipulation channel of the fibrogastroduodenoscope can be used in any medical institution, is easy to use, allows creating a hemostatic layer in the area of the bleeding surface during gastroduodenal bleeding, and also provides local delivery of drugs for anti-relapse treatment of gastroduodenal ulcers, including bleeding. Reproduction of the additional channel of the fibrogastroduodenoscope is easy to perform and does not require any complex manipulations.

The clinic has begun clinical testing of the developed methods of endoscopic hemostasis using the injection method and local anti-relapse treatment of gastroduodenal ulcer bleeding.

Conclusion.

1. The conducted analysis shows that the search for new effective methods of endoscopic hemostasis by injection and local anti-relapse treatment of gastroduodenal ulcer bleeding is one of the urgent problems of clinical surgery.

2 An important component of endoscopic hemostasis and local treatment for gastroduodenal ulcer bleeding is the improvement of methods for delivering medicinal drugs to the ulcer defect area.

Author Contributions: conceptualization, K.Zh., N.O., S.I.; methodology, K.Zh., N.O., S.I., S.I., Y.K., O.T., R.K.; software, K.Zh., N.O.,R.K., A.M.; validation, K.Zh., N.O., S.I., S.I.,

Y.K., O.T., R.K., A.M., D.O.; formal analysis, K.Zh., N.O., S.I.; investigation, K.Zh., N.O., S.I., S.I., Y.K., O.T., R.K.; data curation, K.Zh., N.O.,R.K., A.M.; writing—original draft preparation, K.Zh., N.O., S.I.; writing—review and editing, K.Zh., N.O., S.I., R.K. visualization, K.Zh., N.O., S.I., R.K.; supervision, K.Zh., N.O., S.I., R.K.; project administration, K.Zh., N.O., S.I; funding acquisition, K.Zh., N.O., S.I. All authors have read and agreed to the published version of the manuscript.

Funding: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Conflicts of Interest: None of the authors have any conflicts of interest to disclosure.

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