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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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EFFICACY OF THE ALGORITHMIC STEP-UP APPROACH OF INTERVENTIONAL TREATMENT OF PATIENTS WITH ACUTE NECROTIZING PANCREATITIS

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Abstract.
Aim: To estimate the efficacy of the algorithmic step-up approach of interventional treatment of acute necrotizing pancreatitis (ANP).
Material and methods: We performed a prospective observational cohort study of the efficacy of the developed approach of surgical treatment of 317 patients with different morphological forms of ANP. The following parameters were collected for each episode: length of hospital stay, mortality rate, occurrence of organ failure and local complications.
Results: Transcutaneous punction/drainages were applied as the first step in 37 patients with acute necrotic collections. In the presence of walled-off pancreatic necrosis (WOPN) endoscopic procedures were preferred in case their close localization to the stomach or duodenum in 65 observations. Initial surgical treatment was not effective in 18.8% and video-assisted retroperitoneal debridement in patients with ANP or necrosectomies under endoscopic control in cases of WOPN were performed. Involuntary laparotomic necrosectomies were conducted in 14.5% of patients as a final step of the suggested algorithmic approach. During postoperative period complications occurred in 28.3% of patients. They included 7 new episodes of organ failure, 4 cases of arosive hemorrhage, and 5 cases of pancreatic and duodenal fistulas. Overall mortality rate was 3.3%, after laparotomic surgical treatment – 6.5%.
Conclusions: Surgical treatment in patients with ANP based on the developed algorithmic step-up approach is followed by acceptable complication and mortality level.
Key words. Acute necrotizing pancreatitis.

Introduction.
The occurrence of acute pancreatitis 2.5-3.1% increases annually and ranges from 15 to 80 cases per 100,000 of the population in the countries of Europe and North America [1]. The development of primary aseptic acute inflammatory process in the pancreas, peri-pancreatic tissues as a result of enzymatic damage to the acinar parenchyma with the subsequent formation of necrosis foci is the basis of the disease. This damage is characterized by a transition from the local to systemic inflammatory response, accompanied by various disorders causing dysfunction of the internal organs with the possible occurrence of multiple organ failure syndrome. Subsequently, when the course of the disease becomes unfavorable, infection joins the aseptic inflammation. Irrespective of the advanced diagnostics, conservative and surgical treatment, mortality rate in severe forms of acute necrotizing pancreatitis (ANP) remains high and ranges from 15% to 45% [2-4]. At the same time, the ideas concerning the place, role and methods of surgical procedure in ANP are significantly different, there is no single point of view concerning the indications for the use of mini-invasive methods of treatment and laparotomic necrosectomy depending on the terms of the disease, extension, nature and localization of pathological foci [5-6].

Aim.
The aim of the study was to estimate the efficacy of the algorithmic step-up approach of interventional treatment of ANP.

Materials and methods.
The results of treatment of 317 patients with ANP who underwent with application of the algorithmic step-up approach for 2016-2020 years were analyzed. Acute pancreatitis was defined according to the 2012 Revision of the Atlanta Classification as an association of two out of the three following features: typical abdominal pain (acute onset of a persistent, severe, epigastric pain often radiating to the back), serum lipase or amylase activity at least three times higher than that of the upper range of the normal one, and characteristic findings of acute pancreatitis on abdominal cross-sectional imaging studies [7]. Necrotizing pancreatitis was characterized by inflammation and associated pancreatic parenchymal necrosis and/or peripancreatic necrosis, demonstrated by the lack of pancreatic parenchymal enhancement and/or the presence of findings of acute necrotic collection and walled-off necrosis on contrast-enhanced computed tomography (CT). The CT-protocol for pancreatic evaluation consisted in a retarded venous phase after 35 s of venous contrast administration. CT scans were taken in all patients for making the diagnosis of ANP between 72-96 h after the onset of abdominal pain and were repeated if indications for surgery arose. Only those patients with the interventional treatment indicated were included into current study. Besides, persons were excluded if any of the following criteria were present: a) age < 18 and > 80 years; b) recent surgical interventions; c) psychoses; d) pregnancy; e) previously history of chronic pancreatitis. After exclusion of the above-mentioned cases 317 patients with ANP were enrolled into the current study (Table. 1) including 145 females (45.7%), and 172 males (54.3%), aged from 18 to 78 years (the average age was 48 ± 1 year). The severity degree of ANP was assessed according to the recommendations of the International Pancreatitis Classification Review Group (Atlanta, 2012) [7] by the presence of transient or constant organ failure. There were 190 (40.2%) patients with moderate and 127 (39.2%) – with severe ANP. Initial treatment of every patient started with individually chosen conservative measures. The main principles of the intensive therapy were the following: effective analgesia, fluid resuscitation for correction of disorders of the central hemodynamics and peripheral circulation, early enteral nutrition, and adequate protein-energy supply. Nasojejunal enteral feeding was initiated when the oral one was not tolerated after 48-72 hours after admission.

Table 1. *Patient's characteristics.*

	Amount of patient (n=317)
IBW, kg/m^2	26,4±1,8
Severity at admission, n (%): - moderate - severe	 190 (60,2) 127 (39,8)
APACHEII, points	11,3±0,33
Spread of pancreatic necrosis, n (%): - less than 30% - 30-50% - more than 50%	 132 (41,6) 145 (45,8) 40 (12,6)
Local complications: - acute necrotic collections - walled-off necrosis	 188 (59,5) 129 (40,5)
Infectious complications before intervention, n (%)	193 (60,9)

If there were problems with nasojejunal intubation, nasogastric tube feeding was indicated. Parenteral nutrition was only initiated when oral route was not tolerated or sufficient, but at least small amount of enteral feeding was present in all the patients. Antibacterial prophylaxis was not indicated, and antibiotics were administered only for patients with suspected infectious complications.

According to the international guidelines, interventional treatment was performed in case of suspected or confirmed infection of pancreatic necrosis or peri-pancreatic necrosis and gastrointestinal obstruction due to compression by necrotic collections [8-9]. The decision to perform surgery was mostly based on clinical signs (i.e., deterioration). Infected necrosis was diagnosed on CT findings of retroperitoneal gas, positive blood culture or concentration of presepsin over 600 pg/ml or procalcitonin over 1.8 mg/ml [10]. Suspected infected necrosis was defined as persistent clinical manifestations of sepsis without presence of gas in the peri-pancreatic collection on CECT. Whenever possible, surgery was postponed until approximately four weeks after the onset of disease.

Surgical treatment was performed by the algorithmic step-up approach (Figure. 1). Depending on the localization and morphological characteristics of the pathological foci, transcutaneous or EUS-controlled punctions/drainages were used as a first step. Transcutaneous punctures under ultrasound control were preferred for the patients with acute necrotic collections (ANC) independent of their localization. EUS procedures were applied as the initial invasive treatment in the presence of walled-off pancreatic necrosis (WOPN) and its close localization to the stomach or duodenum wall. If initial surgical treatment wasn't effective minimally invasive necrosectomies were performed. Video-assisted retroperitoneal debridement (VARD) was applied during the period till the 4th week of illness. In patients with WOPN, adjacent to the stomach or duodenum, endoscopic necrosectomy was preferred. Combined application of both procedures was used in patients with extended necrotic collections. If the above-mentioned interventions could not be performed or their effectiveness was insufficient, we passed on to the final step - performance of open laparotomic necrosectomy.

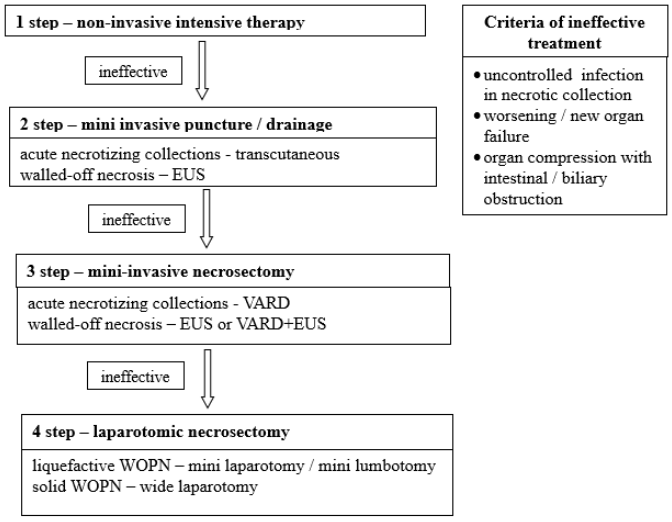

Figure.1. *Chart flow of algorithmic step-up approach of surgical treatment of symptomatic acute necrotizing pancreatitis.*

Criteria of inefficacy of the suggested treatment were lack of control of infectious process in necrotic collections, worsening or occurrence of new organ failure, abdominal organ compression by necrotic collections with symptoms of gastrointestinal obstruction. The necessity for the following step of treatment depended on an individual patient basis and the agreement with a multidisciplinary team experienced in the management of ANP (including surgeons, anesthesiologists, physicians, gastroenterologists, and interventional radiologists). Primary endpoint of the study was complications rate. First found postoperative organ failure, the duration of the intensive care after surgery, infectious and postoperative complications, postoperative mortality were determined. Acquired results were summarized calculating mean values and their respective standard errors of the mean (SEM). As it was an evaluation study there was not a control group and we only compared complications rate in patients depending on either transcutaneous or endoscopic route was used. Two-group comparisons were performed using the Mann–Whitney U-test with the Bonferroni correction, and multiple comparisons were performed using the Kruskal–Wallis H test or one-way repeated-measures analysis of variance (ANOVA) with Dunnett's multiple comparison tests. Values of P less than 0.05 were considered to indicate statistical significance. Group comparisons were performed using JMP software (SAS Institute, Cary, North Carolina, USA). Analyses of Spearman correlation coefficients and interactions were made using SPSS 18 software (SPSS, Chicago, Illinois, USA).

Results.

In 96 (32.2%) patients with ANP conservative measures were definitive methods of treatment without any interventions. Transcutaneous puncture and drainage by 12-16 Fr diameter silicone tube under ultrasound control were preferred for situation when necessity for intervention occurred before 4th week from the onset (Table 2). This approach was applied in 92 observations: 37 (67.4%) cases of ANC and 55 (47.8%) patients with WOPN located more than 10 mm from stomach/duodenal wall. Transcutaneous interventions served as a definitive method

of the invasive treatment in 72 (81.1%) of these patients.
EUS procedures were used as the initial step of surgical treatment in 69 (22.2%) patients with walled-off pancreatic necrosis and close localization of the pathological foci to the stomach or duodenum wall. The efficiency of EUS procedures reached 87.2% (in 60 cases there was no necessity for further treatment).

Table 2. *Efficacy of surgical treatment of patients with acute necrotizing pancreatitis.*

Interventional procedures	**Amount of operated patients, n, (necessary for further laparotomy, %)**	
	Acute necrotic collections	**Walled-off necrosis**
Mini invasive punction/drainages: - transcutaneous - endoscopic - combined	 37 (18,9) 15 (26,6) 5 (20)	 55 (29,9) 54 (7,4) 6 (0)
Mini invasive necrosectomies: - transcutaneous video-assisted retroperitoneal debridement - endoscopic ultrasound guided necrosectomy - combined approach	 4 (0) - 4 (26,7)	 10 (10,0) 23 (13,0) 12 (0)
Open necrosectomies: - mini laparotomy - mini-lumbotomy - conventional wide laparotomy	 - - 8 (37,5)	 7 (14,3) 5 (20,0) 38 (10,5)

When using transcutaneous drainage, the need for repeated same interventions emerged in 64.5% of observations, and in case of endoscopic access - in 21.3% (p=0.033). Insufficient drainage of necrotic masses and advance of the purulent-inflammatory process were the reasons for their implementation. Factors contributing to the ineffectiveness of diapeutic procedures were the lesions of more than 30% of the pancreas, the presence of several necrotic foci, and their large volume with the predominance of solid content (p=0.025). In case of insufficient drainage of the necrotic content, the canal for drainage was expanded and replaced with a larger diameter canal. For large pathological foci in 10 observations, alternative access (endoscopic or transcutaneous one respectively) for repeated diapeutic intervention was used. Simultaneously, according to the results of antibiotic grams, antibacterial therapeutic correction was indicated.
The following, more invasive step – mini-invasive necrosectomies, was used only in case of ineffectiveness of the previous methods and the presence of several factors of their insufficiency. Retroperitoneal access to the affected areas was preferred during the period till the 4th week of illness, lumbar video-controlled sanation by means of nephroscope was used for in 8 patients. In the presence of the separated pathological foci, adjacent to the stomach or duodenum, endoscopic necrosectomy was performed in 23 cases under echo-endoscopic control. Surgery was performed individually: for a small amount of solid component necrosectomy was completed with the introduction of two bilateral drainages of pig-tale type in 7 observations. When a large number of purulent masses was found, a cyst nasal probe to connect the system for continuous lavage with saline solution in the postoperative period was introduced into the cavity in 8 patients. With insufficient density of the surrounding capsule and a large amount of detritus, self-spreading coated metal stents were used in 8 patients to perform adequate and safe necrosectomy. Clinical improvement with a decrease in the signs of SIRS and organ failure was observed in all cases after the first endoscopic intervention. In 26 patients with large pancreatic necrosis, spreading into the retroperitoneal space, we have applied a combined retroperitoneal-video-endoscopic access, which simultaneously uses the benefits of endoscopic and lumbar video-controlled methods of necrosectomy. At the first stage, transcutaneous drainage was monitored under ultrasound control; at the second stage - puncture formation was conducted through the wall of the stomach or duodenum by means of echo-video-endoscope and, if necessary, its internal drainage was performed using plastic or metal stents. Despite the severity and extension of the lesion, the method proved to be highly effective, 92% of patients did not require further intervention.
If the above-mentioned interventions could not be used or their effectiveness was insufficient, we passed on to the next step – open laparotomic necrosectomy. We have developed the technique of the selective mini-laparotomy and mini-lumbotomy, the use of which reduced the traumatism of surgery. Indications for their implementation were suppurated separated foci of pancreatic necrosis of a small (up to 5-7 cm in diameter) size. Selective mini-open interventions were performed in 12 patients of the main group, the need for more invasive treatment emerged only in two patients.
Widespread laparotomic necrosectomy was performed in 46 (14.5%) patients of the main group (Table 3).

Table 3. *Complications after wide laparotomic surgical operations.*

	Amount of patient (n=46)
New cases of organ failure, n (%)	7 (15,2)
Multi organ failure, n (%)	2 (4,3)
Arosive hemorrhage, n (%)	3 (6,5)
Gastrointestinal hemorrhage, n (%)	1 (2,2)
Intestinal fistula, n (%)	3 (6,5)
Pancreatic fistula, n (%)	3 (6,5)
Infected complications, n (%)	3 (6,5)
Sepsis, n (%)	1 (2,2)
Mortality, n (%)	3 (6,5)

In 40 patients, interventions were performed following the use of transcutaneous or endoscopic procedures being the last stage in the step-by-step approach to surgical treatment of ANP suggested by us. In six patients, who were admitted to the hospital or transferred from other medical institutions following 4 weeks from the onset of the disease and who had widespread suppurated separated lesions with clinical manifestation of sepsis, laparotomy interventions as the first and final stages of surgery were performed.

In the postoperative period, complications were observed in 28.3% including new cases of organ failure in 7 cases, erosive bleeding in 4 cases, pancreatic and duodenal fistulas in 6 people. The overall mortality rate was 3.5% and following open laparotomic necrosectomies use was 6.5%.

Discussion.

Our results obtained are indicative of a successful surgical treatment of ANP that requires an individualized approach including intensive care and step-by-step multimodal use of new methods of mini-invasive treatment. An important principle of surgical policy for the treatment of ANP should be a delayed surgical procedure to the time when necrotic accumulations are well separated. Mini- invasive transcutaneous or endoscopic punction/drainage should be used as a first step in surgical treatment, especially if it is needed during the first weeks of the disease [10]. If such mini-invasive surgery is not effective enough, it should be repeated using another alternative approach. If it is not possible to control the focus of infection effectively, mini-invasive necrosectomy as the next step should be used. During the first 4 weeks, trans lumbar video-controlled sanation by means of nephroscope should be preferred. Endoscopic and combined methods of mini-invasive necrosectomy may also be used after separation of the necrotic foci. The further step of the surgical treatment in small pathological foci is the use of selective mini-laparo and mini-lumbotomy necrosectomies. If, despite the consistent application of the previously mentioned steps of mini- invasive surgical treatment, the disease continues to develop or reduced stages of ANP with rapid formation of retroperitoneal suppuration, increased severity of intoxication, occurrence of surgical complications are observed, a widespread laparotomy should be initiated as the last step.

The introduction of our developed technique contributed to the separation of pathological process, allowed to perform delayed open pancreatic necrosectomy with a minimal risk for the patient, which helped to reduce the incidence of the postoperative complications and mortality.

Conclusions.

1. Interventional treatment of patients with ANP based on elaborated algorithmic step-up approach is followed by acceptable complication and mortality level.
2. Mini invasive punction/drainages should be applied as the first step of invasive treatment of patients with ANP, mini-invasive necrosectomies – as next more invasive step, whereas open laparotomic operation have to be performed only in case of inefficacy of the previous steps.
3. In patients with acute necrotic collections transcutaneous approach is followed by less complications rate whereas in case of walled-off pancreatic necrosis endoscopic route is preferable.

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ЭФФЕКТИВНОСТЬ АЛГОРИТМИЧЕСКОГО ПОЭТАПНОГО ПОДХОДА ИНТЕРВЕНЦИОННОГО ЛЕЧЕНИЯ БОЛЬНЫХ ОСТРЫМ НЕКРОТИЧЕСКИМ ПАНКРЕАТИТОМ

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Цель: оценить эффективность алгоритмического поэтапного подхода интервенционного лечения острого некротического панкреатита (ОНП).

Материалы и методы. Проведено проспективное когортное исследование эффективности разработанного способа хирургического лечения 317 больных с различными морфологическими формами ОНП. Для каждого эпизода собирались следующие параметры: продолжительность пребывания в стационаре, смертность, возникновение органной недостаточности и местные осложнения.

Результаты. Чрескожные пункции/дренирование применялись в качестве первого шага у 37 пациентов с острыми некротическими скоплениями (ОНС). При наличии отграниченного панкреонекроза (ОТПН) предпочтение отдавалось эндоскопическим вмешательствам при их близкой локализации к желудку или двенадцатиперстной кишке в 65 наблюдениях. Первичное оперативное лечение было неэффективным в 18,8% случаев, применялась видео-

ассистированная забрюшинная некрсеквестрэктомия у больных с ОНС или некрсквестрэктомия под эндоскопическим контролем в случаях ОТПН. Вынужденные лапаротомные некрсквестрэктомии произведены у 14,5% больных и являлись завершающим этапом предложенного алгоритмического подхода. В послеоперационном периоде осложнения возникли у 28,3% больных. Они включали 7 новых эпизодов органной недостаточности, 4 случая кровотечений и 5 наблюдений панкреатических и дуоденальных свищей. Общая летальность составила 3,3%, после лапаротомных вмешательств – 6,5%.

Выводы. Хирургическое лечение больных с ОНП на основе разработанного алгоритмического ступенчатого подхода сопровождается приемлемым уровнем осложнений и летальности.