

# GEORGIAN MEDICAL NEWS

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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии  
საქართველოს სამედიცინო სიახლენი

## GEORGIAN MEDICAL NEWS

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**GMN: Georgian Medical News** is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

**GMN: Медицинские новости Грузии** - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

**GMN: Georgian Medical News** – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

### WEBSITE

[www.geomednews.com](http://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](http://www.nlm.nih.gov/bsd/uniform_requirements.html) В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

**При нарушении указанных правил статьи не рассматриваются.**

## REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: [http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html)  
[http://www.icmje.org/urm\\_full.pdf](http://www.icmje.org/urm_full.pdf)

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned  
Requirements are not Assigned to be Reviewed.**

## ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

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## SURGICAL TREATMENT OF OLD PELVIC INJURIES

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### Abstract.

The authors of the article carried out a retrospective analysis of the case histories of 43 patients (age from 20 to 66 years) with chronic pelvic injuries, hospitalized in 2010–2019. The damage type was assessed according to the AO classification. At the previous stages of treatment, conservative stabilization of the pelvis was used - 12 (27.9%) patients, external fixation - 21 (48.8%) and unsuccessful internal fixation - 10 (23.3%) cases. Patients were divided into two groups: I - 34 (79.1%) cases with unconsolidated or incorrectly consolidating lesions, which underwent reconstruction of chronic lesions within from 3 weeks to 4 months; II - 9 (20.9%) people with pseudoarthrosis or consolidated with significant deformity, later than 4 months. To determine the type of injury and preoperative planning, clinical and radiological diagnostics, as well as computed tomography, were used. The residual postoperative displacement was assessed according to the Pohlemann classification. To analyze long-term results, the Majeet system of functional assessment of pelvic fractures was used. During surgery, anatomical reduction was achieved in 30 (69.8%) patients, satisfactory - in 8 (18.6%), insufficient reduction more than 10 mm - in 5 (11.6%). Intraoperative bleeding occurred in 5 (11.6%) cases. In the early postoperative period 1 (2.3%) patients died. Postoperative wound inflammation requiring revision occurred in 9 (20.9%) cases. Loss of reduction followed by reosteosynthesis in 4 (9.3%) patients. The performed surgical treatment of chronic pelvic fractures made it possible to achieve excellent and good results in 56.4% of cases; improve the qualitative assessment of health by 74.4% and increase the functional assessment by 24 - 46 points from the initial one.

**Key words.** Old pelvic injury, surgical treatment, trauma, internal fixation.

### Introduction.

There is extensive evidence on how to effectively treat unstable pelvic injuries. The leading causes of death among individuals affected by these injuries are shock and blood loss; however, poor patient outcomes associated with inadequate treatment include pain at rest and during exertion (50%), and neurological (46%), sexual (40-50%), and urological disorders (20%) [1-3].

Concurrently, studies on the surgical treatment of old pelvic injuries are rare although this procedure is complex, presenting several challenges associated with optimal surgical and treatment protocol selection. In fact, few clinics worldwide specialize in treating this type of injuries, making their experience and insight valuable.

A pelvic injury is considered “old” when it has been present for over 21 days [4]. The most common causes of old pelvic injuries include a conservative approach to the treatment of fractures with significant fragment displacement associated

with the incomplete assessment of the trauma or inadequate examination of the patient. Other causes include the use of external fixation methods for rotational or vertically unstable pelvic injuries. Previous studies [5,9] have shown that external fixation is ineffective in 70–90% of cases, as it is not always possible to obtain and maintain the initially achieved reduction over time. Finally, unsuccessful surgical intervention may result in unsatisfactory repositioning or the loss of repositioning with unstable fixation.

Patient outcomes associated with old pelvic injuries cannot be compared with those of fresh pelvic injuries, partly due to the difficulties associated with the former that include the increased risk of neurological and vascular complications, as well as, in some cases, the impossibility of restoring the anatomical reduction of fragments. Indeed, a study by Matta has suggested «open reduction and internal fixation within 21 days were associated with a higher percentage of excellent reductions than in reductions performed after 21 days (70% versus 55%)» [4].

**The aim** of this study was to summarize the experience of the treatment of the old injuries of the pelvic ring, to determine the technical features of surgical interventions that are most likely to result in good patient outcomes, and to assess patient outcomes before and after reconstruction.

### Materials and methods.

The method of retrospective analysis data on treatment outcomes of 43 patients (age, 20–66 years) were obtained. The study included 25 (58.1%) men and 18 (41.9%) women with old pelvic injuries, hospitalized during 2010–2019 at our hospital. All patients underwent surgery □21 days after sustaining a pelvic injury. At the initial treatment stage, the techniques used included conservative stabilization of the pelvis in 12 (27.9%), external fixation of the pelvis in 21 (48.8%), and unsuccessful internal fixation of the pelvis in 10 (23.3%) patients. Injuries were sustained in road traffic accidents in 21 (48.8%) patients, in a fall from a height in 8 (18.6%) patients, as a result of compression in 5 (11.6%) patients, and under other circumstances in 9 (20.9%) patients.

The type of damage was assessed according to the AO (Association for Osteosynthesis) classification. Fracture type A, B, and C was diagnosed in 1 (2.3%), 13 (30.2%), and 29 (67.4%) patients, respectively. Concomitant injuries were observed in 28 (65.1%) patients. The patients were divided into two groups; group I, comprising 34 (79.1%) cases with unconsolidated or improperly consolidating lesions, undergoing reconstruction within 3 weeks to 4 months after sustaining the injury; group II, comprising 9 (20.9%) cases with pseudoarthrosis or lesions consolidated with significant deformity, undergoing reconstruction more than 4 months after sustaining the injury.

To determine the type of injury and the optimum preoperative protocol, clinical and radiological (direct radiograph imaging



and the radiograph of the entrance and exit of the pelvis) diagnostics as well as computed tomography (CT) imaging with 3D reconstruction were performed. Concomitant injuries were detected using ultrasound examination, urethrocytography, electroneuromyography, and consultations with the relevant specialists. Laboratory tests included measuring the leukocyte count, erythrocyte sedimentation rate (ESR) levels, and C-reactive protein levels to rule out infection. The assessment of the residual postoperative displacement was performed using the Pohlemann classification, whereby the dislocation of bone fragments of <1 cm was considered satisfactory, and that of >1 cm was considered unsatisfactory [5].

To studying long-term outcomes, we used the Majeet system of functional assessment of pelvic fractures, distinguishing pain, performance, sitting comfort, sexual function, standing comfort, and gait. Compliance with each of the criteria was measured on a scale out of 100 points, which corresponded to a patient well enough to work before injury. Clinically, a score of >85 points was considered excellent, with good, satisfactory, and unsatisfactory performance corresponding to 70–84 points, 55–69 points, and <55 points, respectively. For non-working individuals, the maximum score was 80 points, while excellent, good, satisfactory, and unsatisfactory performance corresponded to the scores of >70 points, 55–69 points, 45–54 points, and that of <45 points.

## Results.

Preliminary analysis revealed symptoms, including pain of varying intensity in 41 (95.3%) patients, severe deformity with the shortening of the limb in 18 (41.9%) patients, instability of the pelvis when walking and exercising in 4 (9.3%) patients, neurological disorders in 13 (30.2%) patients, and urological problems in 11 (25.6%) patients. Finally, the consolidation of the anterior section and the absence of fusion in the posterior section was observed in 6 (13.9%) patients.

During surgery, anatomical reduction was achieved in 30 (69.8%) patients, with satisfactory and insufficient reduction achieved in 8 (18.6%) and 5 (11.6%) patients, respectively. Intraoperative bleeding occurred in 5 (11.6%) cases. In the early postoperative period, 1 (2.3%) patient died. Postoperative wound inflammation requiring revision occurred in 9 (20.9%) cases. The loss of reduction followed by repeat osteosynthesis was observed in 4 (9.3%) patients.

Late complications were rare. In a single patient, the purpose of which was to stabilize the pelvic ring (fracture type C1.3 according to the AO classification), consolidation was not achieved and pseudarthrosis remained. In addition, another patient had chronic osteomyelitis of the ilium alongside a non-union fracture. Both patients continued treatment.

Functional assessment of pelvic bone injuries was performed before surgery in 29 patients. No patient was presented with either excellent or good performance, with satisfactory and unsatisfactory performance observed in 17 (58.6%) and 12 (41.4%) patients.

Data on long-term outcomes (1–2 years after surgery) were obtained from 39 (90.7%) patients; excellent, good, satisfactory, and unsatisfactory functional outcomes were observed in 8 (20.5%), 14 (35.9%), 12 (30.8%), and 5 (12.8%) patients, respectively.

Comparing the indicators before and after the final reconstruction, the observed increase in scores was in the range of 24–46 points. Among 10 (25.6%) patients, the observed excellent and good results were most likely due to the reduction of pain.

Among 30 patients in group I, the time interval between injury and surgery was within 120 days. Among 18 (60.0%) patients, whose data on long-term outcomes were available, good, and excellent performance was noted, likely due to fewer technical problems during the operation. In group II patients, good and excellent functional outcomes were observed in 3 (33.3%) patients, likely due to the technical challenges associated with the surgery, and the resulting high rate of neurological, urological, and other type of complications due to the trauma.

Finally, anatomical repositioning did not guarantee a good functional result in patients with old pelvic injuries.

## Discussion.

Pre-operative injury assessment requires the evaluation of patient clinical and radiological findings. Such evaluation should include the analysis of the mechanism of injury, presence of any concomitant injuries, and outcomes of any initial treatments. Patients usually report pain at the fracture sites and limited limb function at the initial stages; subsequent complaints include problems with sitting or performing physical activity, urinary disturbances, and vaginal impeachment in women. During a clinical examination, pelvis deformity and limb shortening may be detected, and pelvis instability may be suspected based on the observation of patient's gait and subsequent manual examination.

Pre-operative assessment should include plain radiography imaging of the pelvis, and the pelvic entrance and exit (oblique radiographs may help detect deformities in the iliac and ischial bone, among others). Single-leg X-rays may help detect instability at the non-union site [6]. However, the most complete picture of the injury site is obtained with CT scanning with 3D reconstruction, helping to quantify the extent of the true posterior displacement. However, CT scans should be one of several rather than the only assessment method, as radiographs reveal a different type of detail. In cases that involve old pelvic injuries, access to the archive of the patient's radiographs is required.

The next stage of preoperative preparation is the assessment of the capabilities of the surgeon. The specialist should understand the requirements of such surgery and be able to tell whether his or her experience is sufficient to perform it, and whether he or she is likely to benefit rather than harm the patient.

Ahead of surgery, an explanatory conversation with the patient is necessary. The patient should independently decide whether they wish to undergo the operation; they should be provided with information about their injury and the likely outcomes, including complications (which occur in 20% of all cases) such as bladder, nerve, or blood vessel damage, loss of reduction, non-consolidation, and chronic pain [7]. The patient should also be aware that the postoperative period involves limited physical activity for at least 3 months, and a gradual return of function over 6–12 months.

The aims of the operation include achieving anatomical

reduction of the fracture and stability of osteosynthesis. However, such procedures are associated with a high risk of blood vessels and nerve damage as well as that of infection. Therefore, it is necessary to preliminarily determine the initial (on the stomach) and final (on the back) position of the patient, access, necessity, and places of osteotomy and bone grafting.

The surgical approach should be selected based on the amount of time that has passed since the injury was sustained. When treating a pelvic injury, the patient's position on the table should be observed, taking into account access, first access to the posterior pelvis, then to the anterior pelvis [5]. However, in the case of an old injury, this approach is not always practical, in particular, in cases that involve consolidated fractures. If the operation is performed to correct the non-union of fragments, then it is mandatory to achieve stable fixation of the pelvic ring before seeking access to the fracture sites, which is required for synthesis and bone grafting. In patients with improper injury consolidation or instability, accompanied by a significant deformity, it is first necessary to correct the deformity before aiming to stabilize osteosynthesis. In other words, an osteotomy is performed first, then a resection of the scar tissue and callus, and then osteosynthesis. Such an approach deviates from the Letournel rule and involves a three-step sequence of anterior – posterior – anterior approach.

Surgical approaches for osteosynthesis of chronic pelvic injuries are standard, namely: to the anterior pelvis according to Pfannenstiel or Stopp extended approach, to the sacroiliac joint - posterior extra-pelvic (39 cases) or iliac approach [8,9]. Repositioning of old trauma is more challenging than that of acute fractures. As a result, it is necessary to perform it, using orthopedic instruments, while the patient's healthy side is fixed to the operating table, stabilizing his or her position.

Following reduction, stable fixation of the bone fragments is required. This process can be challenging due to shifting forces after reduction and reduced bone quality due to the lack of load. Such cases require additional steps to achieve auxiliary stabilization of fragments, including the use of large implants, screws, and external fixation, which are selected at the operating surgeon's discretion, making his or her experience at this type of procedure that much more important.

Surgical treatment of pelvic injuries is associated with the risk of errors such as unsuccessful reduction and unstable or insufficient fixation of fragments. Poor reduction tends to be caused by compromised X-ray images, underestimated extent of injury, or inability to complete the procedure. Fixation instability occurs due to undiagnosed line fractures, osteoporosis, or insufficient fixation due to the use of short fixators, a small number of screws, the lack of compression, or the fixation of a single pelvic region.

In our practice, we have encountered cases with these kinds of complications when performing repeat osteosynthesis for patients previously treated elsewhere. In three of such patients, we observed the insufficient repositioning of fragments. In five patients, short fixators were used, resulting in the loss of reduction during the postoperative period, and in two patients, primary unstable fixation of bones was performed. In the first step, we removed the constructs. The reasons for unsuccessful

reduction include the misunderstanding of the anatomy of the pelvis or the type of injury, the inability to assess the extent of the reduction, limited visualization during the procedure, or the absence of a complete CT or X-ray imaging assessment. In some cases, these complications may occur due to the surgical error associated with using a fixator to achieve reduction, mistakenly expecting to thus achieve fracture healing. The loss of the achieved reduction may be due to the improper use of fixators, the underestimated extent of the fracture, or the presence of osteoporosis or infection.

## **Conclusion.**

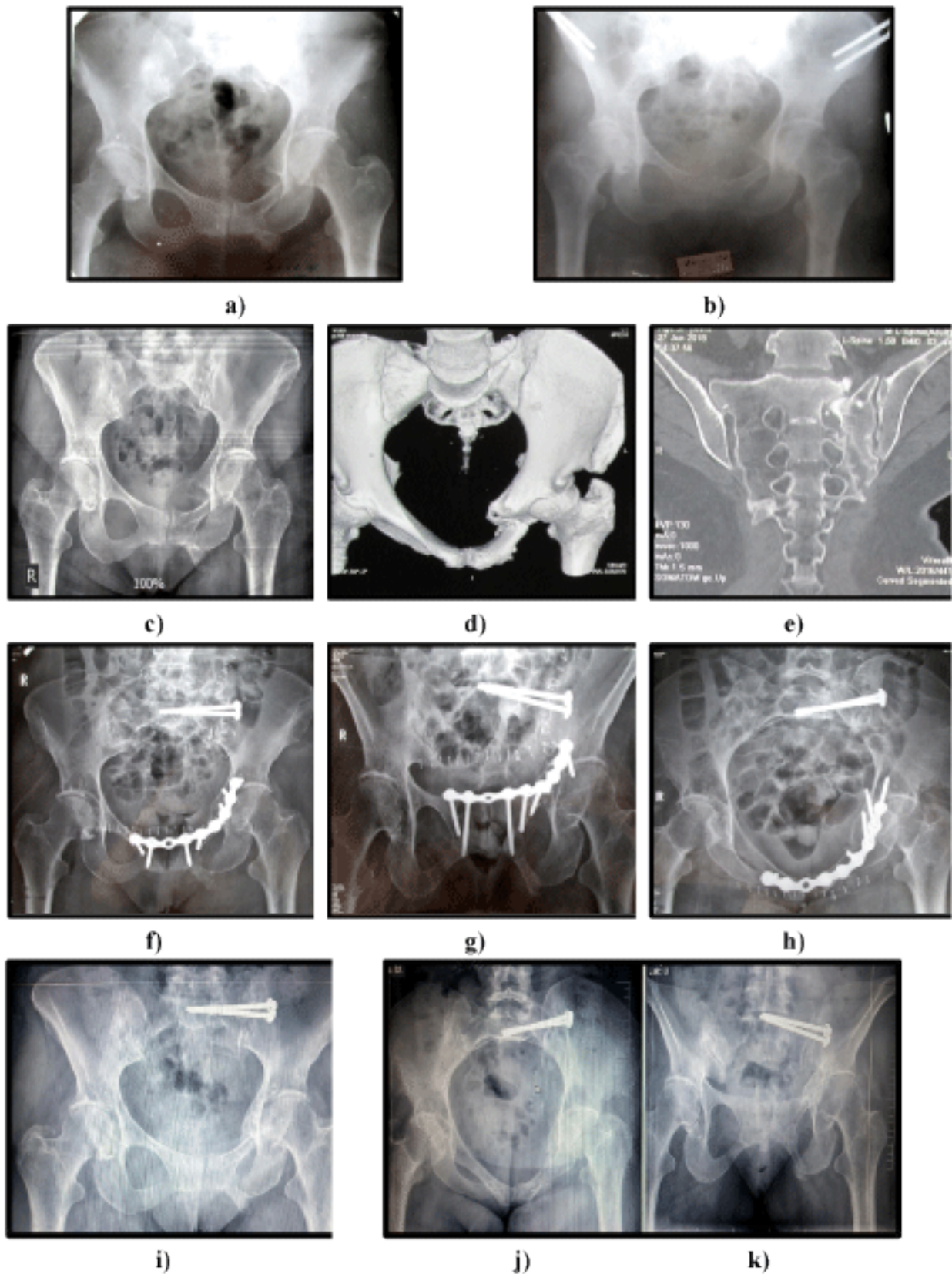
Surgical reconstruction of old pelvic injuries is challenging and associated with a higher complication rate than is emergency treatment of acute injuries. Good patient outcomes are more likely when the procedure is performed by a surgeon with extensive experience and a team of relevant specialists, working in a well-equipped setting. The surgical treatment of old pelvic fractures can help achieve excellent and good functional outcomes in 56.4% of cases, improve the outcomes of the qualitative health assessment by 74.4%, and increase the functional assessment scores by 24–46 points relative to baseline. Finally, the surgical treatment of unconsolidated pelvic injuries within 4 months of the injury increases the likelihood of good outcomes (60.0%) compared with pseudarthrosis and consolidated fractures with a significant deformity of 33.3%.

### **Example 1: Patient B, age 58 years**

The injury was sustained on January 31, 2018. The patient was admitted to our hospital on August 21, 2018 with a diagnosis of pseudarthrosis of the sacrum at the S1–S3 level, an incorrectly consolidating fracture of the upper branch of the left pubic bone closer to the anterior column, an angular displacement of intrapelvic fragments, an incorrectly consolidating fracture of the ischium on the left side with the signs of a callus formation, and the entry of bone fragments along the axis (fracture type B2.2 according to the AO classification). On August 23, 2018, osteotomy was performed in the consolidation zones in the anterior section, including open repositioning of the fragments of sacral masses on the left side, bone autoplasty, metal osteosynthesis using screws, open repositioning of the pubic bone, and osteosynthesis using a reconstructive plate and screws. On April 5, 2019, we removed the metal fixators from the anterior pelvis due to their migration. At follow-up, the patient scored 87 points on the Majeet scale (Figure 1).

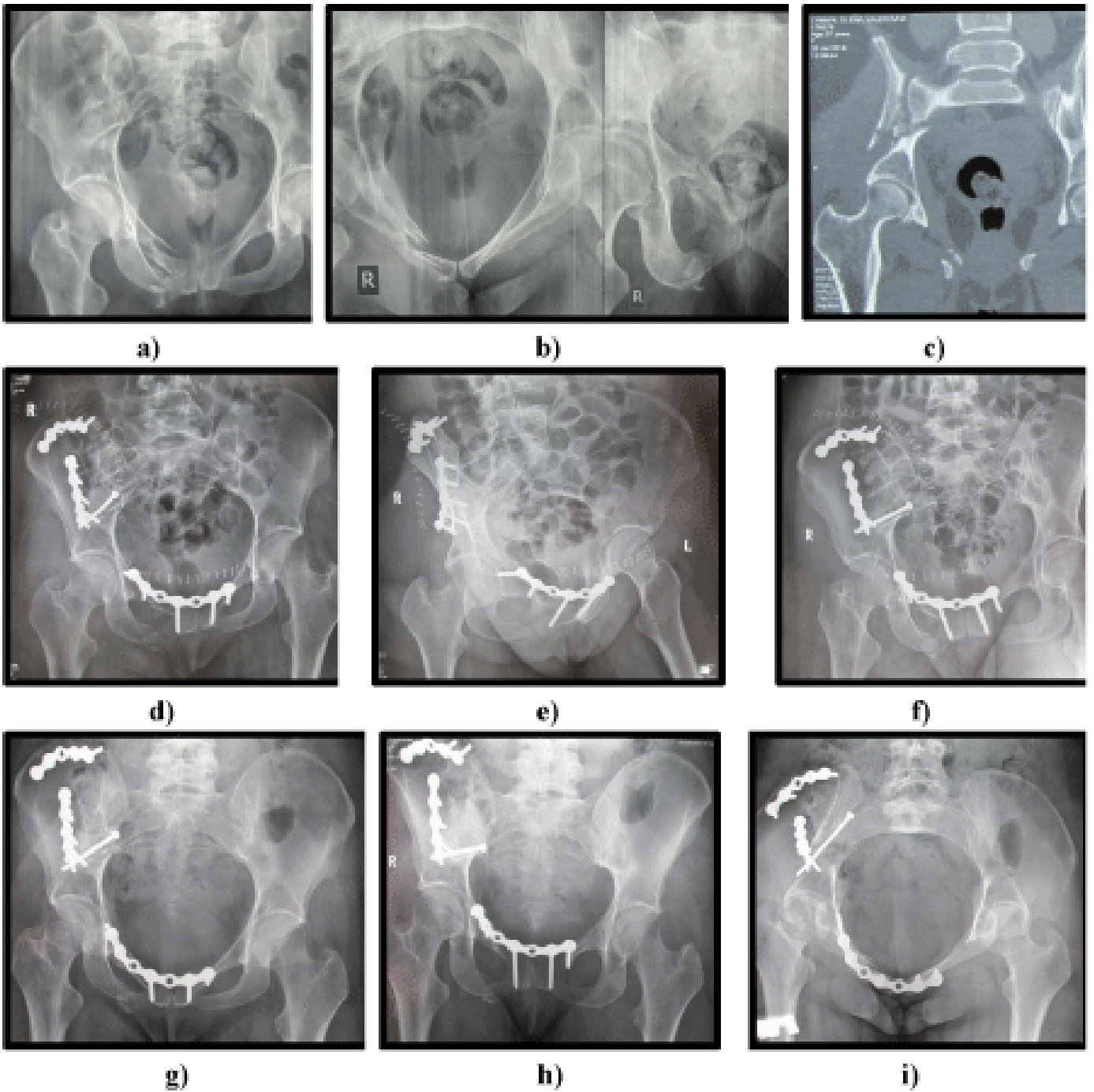
### **Example 2: Patient L, aged 37 years.**

This patient was injured in an accident that took place on June 30, 2018. The patient was admitted to our hospital on July 30, 2018, with a diagnosis of the pubic and ischial bone fracture, and that of the right iliac body fracture (fracture type C1.1 according to the AO classification). On August 2, 2018, the patient underwent open reduction of the right iliac bone fragments, metal osteosynthesis with plates and screws, open reduction of fragments of the pubic bone, metal osteosynthesis with a plate, and pubic articulation fixation with screws. At 12-month follow-up, the patient achieved 94 points on the Majeet scale (Figure 2).



**Figure 1.** Radiographs and computed tomography images of the pelvic bones of patient B

*a-e) Pseudarthrosis of the sacrum at the level S1–S3, incorrectly consolidating fractures of the upper branch of the left pubic bone closer to the anterior column with angular displacement of fragments and ischial bone on the left can be seen; the signs of callus formation in the form of a marginal formation overlapping with bone fragments along the axis are present (fracture type B2.2 according to the AO classification). f-h) Open reduction of fragments of sacral masses on the left side, osteosynthesis using screws, open reduction of the pubic articulation, and metal osteosynthesis using a plate and screws were performed. i-k) Metal fixators were removed from the anterior pelvis after 8 months.*



**Figure 2.** Radiographs and computed tomography images of the pelvic bones of patient L. a-c) Fracture of the pubic and ischial bones on the right, and that of the body of the right iliac bone are captured (fracture type C1.1 according to the AO classification). d-f) Open reduction of fragments of the right iliac bone, metal osteosynthesis using plates and screws, open reduction of the pubic bone fragments, metal osteosynthesis using a plate and screws with fixation of the pubic articulation were.

**Example 3: Patient B, aged 27 years.**

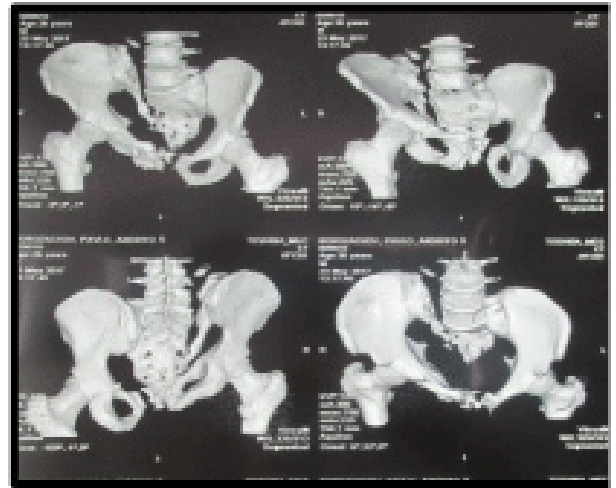
The injury was sustained as a result of catatrauma in 2011. The patient was diagnosed with pseudarthrosis of the right of the sacral bone and of the superior branch of the left pubic bone, the rupture of the pubic articulation, and the consolidated fracture of the sacral mass on the left side (fracture type C1.3 according to the AO classification). The patient was admitted to our hospital on June 08, 2017. On June 13, 2017, the patient underwent open reduction of fragments of the sacral masses

on the right side, osteosynthesis with two cancellous screws with free bone autoplasty, and an iliac wing block with plate fixation. Finally, the patient underwent open repositioning of the pubic articulation fragments, and metal osteosynthesis using a reconstructive plate and screws.

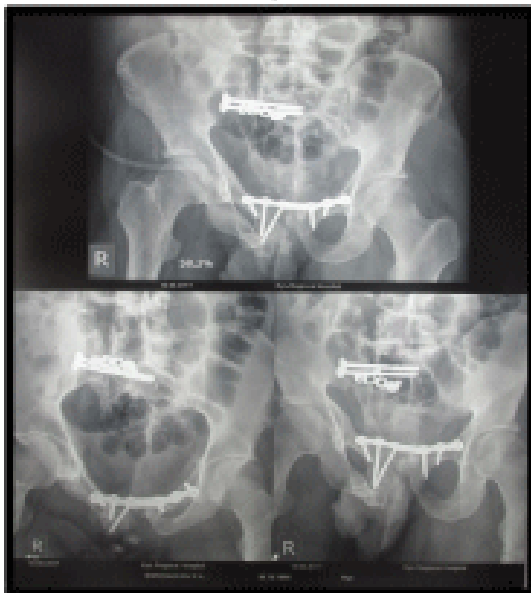
On September 8, 2017, a second surgical intervention was performed due to the instability of the primary fixation, involving metal repeat osteosynthesis of the sacroiliac joint on the right side, and metal repeat osteosynthesis of the pubic



a)



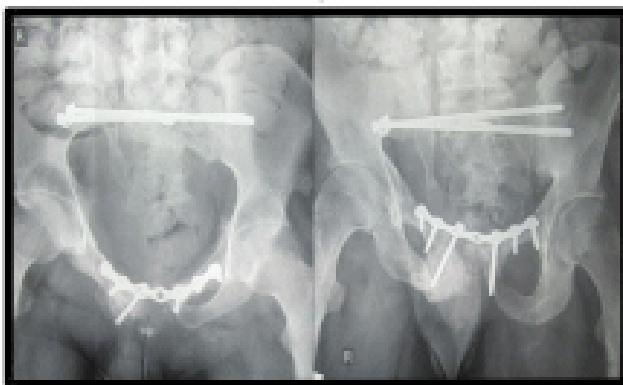
b)



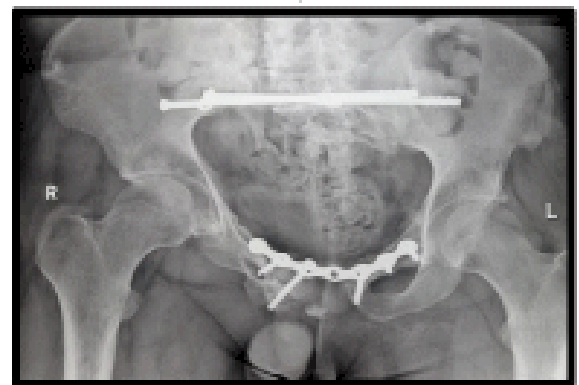
c)



d)



e)



f)

**Figure 3.** Radiographs and computed tomography scans of the pelvic bones of patient B.

a-b) Pseudarthrosis of the sacral bone on the right and upper branch of the left pubic bone with the rupture of the pubic articulation were observed (fracture type C1.3 according to the classification of AO). c-d) Open reposition of fragments of sacral masses on the right side, metal osteosynthesis with two cancellous screws and free bone autoplasty, and an iliac wing block fixated with a plate can be seen, open reduction of the pubic articulation fragments, and osteosynthesis using a reconstructive plate and screws were performed. f-g) Repeat osteosynthesis of the sacroiliac joint on the right side, repeat metal osteosynthesis of the pubic articulation with bone autoplasty and plasma enriched with growth factors (PRGF) in both zones were performed. g-h) Follow-up X-ray obtained a year after surgery.



articulation with bone autoplasty and plasma enriched with growth factors (PRGF) in both zones. At 12-month follow-up, the patient achieved a score of 84 points on the Majeet scale (Figure 3).

**REFERENCES**

1. Fang C, Alabdulrahman H, Pfeifer R, et al. Late reconstruction of severe open-book deformities of the pelvis — tips and tricks. *International Orthopaedics*. 2017;41:1777-1784.
2. Hauschild O, Strohm PC, Culemann U, et al. Mortality in patients with pelvic fractures: results from the German pelvic injury register. *J Trauma*. 2008;64:449-455.
3. Lee K-J, Min B-W, Oh G-M, et al. Surgical Correction of Pelvic Malunion and Nonunion. *Clin Orthop Surg*. 2015;7:396-401.
4. Matta JM, Tornetta P 3rd. Internal fixation of unstable pelvic ring injuries. *Clin Orthop Rel Res*. 1996;329:129-140.
5. Letournel E, Judet R. Fractures of the acetabulum. Springer Science & Business Media, Springer-Verlag. 2012:723.
6. Lefavre KA, Blachut PA, Starr AJ, et al. Radiographic displacement in pelvic ring disruption: reliability of 3 previously described measurement techniques. *Journal of orthopaedic trauma*. 2014;3:160-166.
7. Matta JM, Dickson KF, Markovich GD. Surgical treatment of pelvic nonunions and malunions. *Clin Orthop Relat Res*. 1996;329:199-206.
8. Gautier E, Rommens PM, Matta JM. Late reconstruction after pelvic ring injuries. *Injury*. 1996;27:39-46.
9. Oransky M, Tortora M. Nonunions and malunions after pelvic fractures: why they occur and what can be done?. *Injury*. 2007;4:489-496.

ძველი მენჯის დაზიანებების ქირურგიული მკურნალობა ბსტრაქტული სტატიის ავტორებმა ჩაატარეს 2010-2019 წლებში ჰოსპიტალიზებული 43 პაციენტის (ასაკი 20-დან 66 წლამდე) შემთხვევების რეტროსპექტული ანალიზი

მენჯის ქრონიკული დაზიანებებით. ზიანის ტიპი შეფასდა AO კლასიფიკაციის მიხედვით. მკურნალობის წინა ეტაპებზე გამოიყენებოდა მენჯის კონსერვატიული სტაბილიზაცია - 12 (27.9%) პაციენტი, გარე ფიქსაცია - 21 (48.8%) და წარუმატებელი შიდა ფიქსაცია - 10 (23.3%) შემთხვევა. პაციენტები დაიყო ორ ჯგუფად: I - 34 (79.1%) შემთხვევა არაკონსოლიდირებული ან არასწორად კონსოლიდირებული დაზიანებებით, რომლებსაც ჩატარდა ქრონიკული დაზიანების რეკონსტრუქცია 3 კვირიდან 4 თვემდე; II - 9 (20,9%) პირი ფსევდოართროზით ან კონსოლიდირებული მნიშვნელოვანი დეფორმაციით, 4 თვეზე გვიან. დაზიანების ტიპისა და წინასაოპერაციო დაგეგმვის დასადგენად გამოიყენებოდა კლინიკური და რადიოლოგიური დიაგნოსტიკა, ასევე კომპიუტერული ტომოგრაფია. ნარჩენი პოსტოპერაციული გადაადგილება შეფასდა პოპლემანის კლასიფიკაციის მიხედვით. გრძელვადიანი შედეგების გასაანალიზებლად გამოყენებული იქნა მენჯის მოტეხილობების ფუნქციური შეფასების Majeet სისტემა. ოპერაციის დროს ანატომიური შემცირებამიღწეული იქნა 30 (69.8%) პაციენტში, დამაკმაყოფილებელი - 8 (18.6%), არასაკმარისი შემცირება 10 მმ-ზე მეტი - 5-ში (11.6%). ინტრაოპერაციული სისხლდენა დაფიქსირდა 5 (11.6%) შემთხვევაში. ადრეულ პოსტოპერაციულ პერიოდში გარდაიცვალა 1 (2.3%) პაციენტი. პოსტოპერაციული ჭრილობის ანთეზა, რომელიც საჭიროებდა რევიზიას, დაფიქსირდა 9 (20.9%) შემთხვევაში. შემცირების დაკარგვა, რასაც მოჰყვა რეოსტეოსინთეზი 4 (9.3%) პაციენტში. მენჯის ქრონიკული მოტეხილობების შესრულებულმა ქირურგიულმა მკურნალობამ შესაძლებელი გახადა შესანიშნავი და კარგი შედეგების მიღწევა შემთხვევათა 56,4%-ში; გააუმჯობესოს ჯანმრთელობის ხარისხობრივი შეფასება 74,4%-ით და გაზარდოს ფუნქციური შეფასება საწყისიდან 24-46 ქულით.

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