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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.

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

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

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

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и http://www.nlm.nih.gov/bsd/uniform_requirements.html В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

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

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

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

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

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

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

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

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

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

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

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

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

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

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

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

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

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

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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ADVANCES IN MINIMALLY INVASIVE SURGERY FOR PECTUS EXCAVATUM: ENHANCING OUTCOMES AND PATIENT CARE

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Abstract.

Pectus excavatum, also called sunken chest, is the most common deformation of the sternum (90%). The deformation is caused by the depression of the sternum and costal cartilages, which causes reduction of the chest cavity and dysfunction of cardio-pulmonary systems in it. Sunken chest is more common in males than females, prevalence is 5/1. Most of the cases appear in the first year of life, however severity of the pathology is formed during puberty. Etiopathogenesis, genetic factors, and associated diseases of Pectus Excavatum are various and are still the subject of study. The manifestation of the disease is determined by the degree of chest deformation, which is calculated using the "Haller index". Providing that a high degree of deformation can lead to pathological functioning of the cardiovascular and respiratory systems. The treatment of this condition is an urgent, complex, and developing issue. The main method of treatment for sunken chest is surgical intervention; However, in cases of mild degrees of the mentioned deformation, different approaches are used. Our goal is to discuss contrasting treatment techniques and present our improved repairing technique for sunken chest, which is performed in Georgia.

Key words. Pectus Excavatum, treatment methods, surgery, modified surgery technique.

Treatment methods for Pectus excavatum.

Over the past two centuries, many surgical techniques have been developed, and some of them are still used today.

Invasive interventions: Ravitch's technique (1949) - modified by Eric W. Fonkalsrud is an open surgical method of treatment [1-4]. It is described 375 patients over 30-year period. The mean pectus severity score was 4.65. Repair was performed with subperiosteal resection of the abnormal cartilages, transverse wedge osteotomy of the anterior sternum, and internal support with a steel strut for 6 months. Repair was performed on 177 children before age 11 years (47.2 %) All patients with preoperative respiratory symptoms, exercise limitations and chest pain experienced improved results without fatal outcomes. The main intraoperative complication was pneumothorax, while post-operative complications included hypertrophic scar formation in 9.3%, atelectasis or pneumonitis in 3.2%, pleural effusion in 3.4%, recurrent depression in 1.3%, protrusion of the second or third costal cartilages in 5.6%, within 6 years after surgery, and pericarditis in 0.5%. Surgical technique has provided excellent results in more than 97% of patients. It is important to note that this technique involves massive invasive approach to treatment, requiring more time, personnel, and medication resources. Additionally, patients typically require an extended recovery period after the operation. The extensive invasive interventions in infants and preschool-age children have

led a notably rigid and corrugated chest wall, along with damage to growth centers. Consequently, this has been associated with the onset of acquired asphyxiating chondrodystrophy in later years [5].

Minimally invasive intervention: Nuss technique [6]. In the mid 1980's Donald Nuss pioneered an improved operative approach for treating pectus excavatum. Recognizing the pliability of young children's chests, he introduced a surgical innovation that involved inserting a bar beneath the sternum without cartilage resection or sternal osteotomy. The surgical technique includes the thoroscopic insertion, sternal elevation, and the creation of bilateral skin incisions at the predetermined sites delineated between the anterior and mid-axillary lines. Subcutaneous tunnels are meticulously crafted superior to the origin of the pectoralis muscles, ensuring subsequent passage beneath this muscle. A retractor is carefully inserted into the tunnel and the introducer is gradually advanced upward along the tunnel with its tip oriented posteriorly. Subsequently, the introducer is gently maneuvered through the intercostal muscles and into the intercostal space. Once the introducer is positioned, it is lifted on both sides in an anterior direction to raise the sternum out of its depressed position. This maneuver achieves chest wall elevation. Following this step, umbilical tape is affixed to the introducer, which is then gradually withdrawn from the chest cavity under thoroscopic guidance. Once the introducer is removed from the chest, the tape is severed and fastened to the pectus bar. Subsequently, the bar is carefully drawn through the mediastinal tunnel with its convexity oriented posteriorly, all under thoroscopic supervision. Following this, rotation of the pectus bar is executed. Finally, the metal bar is securely affixed in place using non-adsorbable suture. The removal of the bar should be scheduled between 2 to 4 years post-implantation.

Early complications observed prior to discharge from hospital in 1,463 primary repairs conducted between 1987 and 2012 include: Pneumothorax (3.8%), Drug reaction (2.9%), Suture site infection (1.9%), Pneumonia (0.9%), Pleural effusion (req drainage) (0.9%), Pericarditis (0.6%), Hemothorax (0.3%), Temporary paralysis (0.1%).

Late post-operative complications: Bar displacements requiring revision (3.7%), Over-correction (3.1%), Bar allergy (2.7%), Wound infection (1.5%), Recurrence (0.9%).

Total number post bar removal is 1,385 (n) patients. Excellent result in 90.5% (n=1,254) [7].

The non-invasive intervention known as the Vacuum Bell was introduced by engineer E. Klobe in 1992 [8]. This technique involves the utilization of an aspiration cup placed on the chest. Connected to a hand pump, the device allows the patient to control pressure. By applying a vacuum, the pressure is reduced by 15% compared to the atmospheric pressure, resulting in chest elevation. In 2005, Schier and Bahr in cooperation with Klobe,



Figure 1. Case N1: Patient J.K. Picture before surgery.



Figure 4. Case N2: Patient A.A. Picture before surgery.



Figure 2. Case N1: Patient J.K. Picture after surgery.



Figure 5. Case N2: Patient A.A. Picture after surgery.

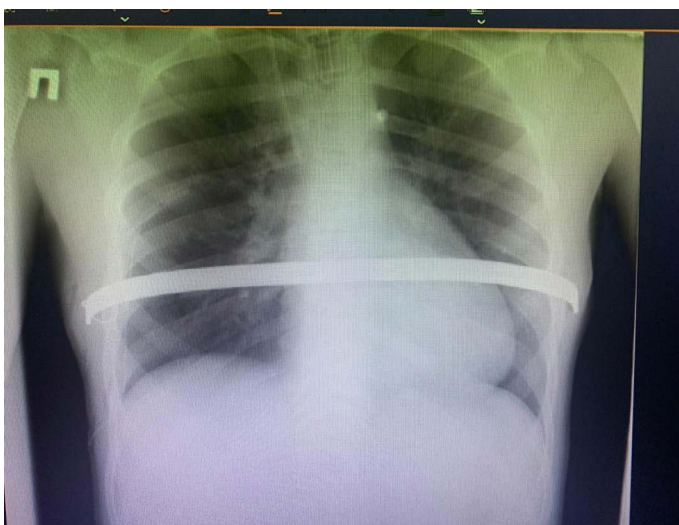


Figure 3. Case N1: Patient J.K. X-ray picture with metal implant after surgery.



Figure 6. Case N2: Patient A.A. Complication: Rotated implant. X-ray.

tested vacuum technique on 60 patients, with an average age of 14.8 years. The technique requires a minimum of 30 minutes of vacuum application twice a day, with a maximum of 5 hours daily (averaging 90 minutes). Within one month of treatment initiation, chest elevation of 1 cm was observed in 85% of cases. After 5 months, the sternum was lifted to a normal level in 12 patients (20%) when evaluated immediately after using the suction cup. All patients exhibited moderate subcutaneous hematoma, although the skin was not injured. Transient paresthesia in the right arm and leg (0.6%). Orthostatic disturbances during the first application of the suction (1.2%) [9].



Figure 7. Case N2: Patient A.A. Complication: Rotated implant. X-ray.

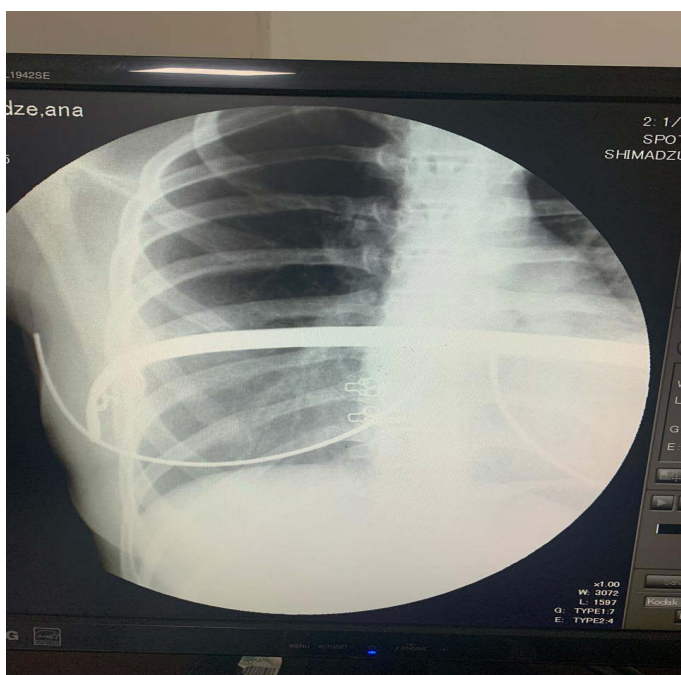


Figure 8. Case N2: Patient A.A. Complication: Rotated implant. X-ray.



Figure 9. Case N2: Patient A.A. Picture after surgery.

Further studies indicated that patients, on average 11 years old, with a concavity depth of 1.5 cm and a flexible chest, are ideal candidates for this technique [10].

Modification of a minimally invasive surgical technique for pectus excavatum, which is performed in Georgia.

In Georgia, surgical interventions for sunken chest are performed at the I. Tsitsishvili Children's Clinic. The treatment method represents an advancement in minimally invasive surgical technique. It is a modified version of the operative intervention proposed by Nuss. In 2016-2024, over a period of 8 years, we had a total of 76 patients with pectus excavatum: 35 underwent surgery, 4 refused despite medical indications, and 37 were treated conservatively using the vacuum technique. 35 patients were operated on. 80% of these patients are male (28 patients), 20% are female (7 patients). Average age of the patients are 14 years. Patients before puberty are recommended to use a vacuum device under the supervision of a doctor, based on the degree of chest deformation. The patient with the mentioned deformity undergoes evaluation by a doctor. This evaluation typically includes studies such as spirometry, ultrasound examination of the heart, and computed tomography of the chest. A Haller index is calculated, and a score of 3.2 or above typically indicates the need for surgery.

Operative technique: The operation is conducted under general anesthesia, with an average duration of surgical intervention ranging from 40-50 minutes. A small transverse incision of approximately 2-3 cm is made in the chest area between the anterior and mid-axillary lines on both sides. A 5mm video port is placed in the 8th-9th intercostal space. A metal plate is positioned in the chest cavity between the sternum and the pericardium, starting from the highest point at the front of the chest. It is then anchored to the right side of the rib by passing a metal implant. The fixation wire is placed in a silicone sleeve, so as not to damage the surrounding soft tissue during fixation. The need for repeated surgery to remove the metal plate typically arises after 3-4 years.

Result: The average hospital stay for patients is 5 days, with a relatively short postoperative recovery period of 2-3 days following repeated surgery. Indications and recommendations include avoiding heavy lifting, managing pain with analgesics if necessary, scheduling a chest X-ray in 5-6 weeks, and initiating swimming activities after 3 months.

Intraoperative complications included mechanical damage to the organs within the chest cavity (0.35%), with subsequent mechanical damage to the pericardium. Fortunately, this injury did not necessitate additional intervention.

Post-operative complications included fixation wire breakage 1-2 years after surgery in 1.1%, although there was no dislocation or rotation of the implant. No wound infection was observed.

A contraindication to surgery includes the presence of another serious medical condition that might heighten the risk of surgical complications. Additionally, a lack of sufficient patient motivation to adhere to postoperative recommendations, such as physical rehabilitation and pain management, is considered a contraindication. Furthermore, the absence of consensus between the patient and their healthcare provider regarding the suitability of surgery as the best solution for the case is also a factor to be considered.

Case N1.

Patient J.K. At the age of 16, he sought treatment at the Tsitsishvili Children's Clinic for sunken chest. Pre-operative studies were conducted, and surgery was subsequently planned. On May 5, 2022, the first operation was successfully performed without complications. Rehabilitation is progressing well. The second operation is scheduled to take place in three years.

Case N2.

Patient A.A. sought treatment at the Tsitsishvili Children's Clinic on February 11, 2020, for sunken chest. Her initial operation occurred at the age of 11, and it proceeded without complications. Two years later, on July 21, 2022, a follow-up operation was necessary due to the breakage of the fixation wire and a slight rotation of fixator. The patient remains under the supervision of a doctor. Post-operation follow-up appointments were scheduled for three months, six months, and we anticipate a final visit one year after the last appointment. The patient's condition is satisfactory.

Conclusion.

Sunken chest is the most prevalent among chest deformities globally. The reduction of the chest cavity and displacement of organs within, it can lead to the development of cardiovascular and respiratory system disorder. Beyond physical discomfort, even mild deformities can cause psychological distress due to the associated cosmetic defect. The treatment of this defect is of paramount importance. To date, many treatment methods have been developed to eliminate this problem. Despite the surgical popularity of the Ravitch technique for 40 years, a few surgeons recognized the necessity to develop alternative techniques that avoid the removal of costal cartilages and re-evaluate the optimal age for repairing these malformations. In 1996, Haller and colleagues published a paper that was titled: „Chest Wall Constriction after too extensive and too

early operations for pectus excavatum“. Recognizing the pliability of young children's chest, Nuss introduced a surgical innovation involving the insertion of a bar beneath the sternum without the need for cartilage resection or sternal osteotomy. When comparing the Ravitch invasive method to MIRPE – Minimally Invasive Repair of Pectus Excavatum, significant differences were observed. Following the invasive method, scar hypertrophy occurred in 9.3%, protrusion of costal cartilages in 5.6%, atelectasis in 3.2% and recurrent surgery in 0.8% of cases. However, with the introduction of the Nuss intervention, all these complications were completely eliminated. The frequency of pleural effusion after performing MIRPE is reduced by 11 % compared to invasive surgical intervention.

The minimally invasive technique, initially developed by Nuss and subsequently updated and refined, has become the gold standard for the treating sunken chest. In the Children's Clinic named after I. Tsitsishvili in Tbilisi, Georgia, pediatric surgeon Erekle Mosidze performs a modified version of this technique. In the article, “Advances in Minimally Invasive Surgery for Pectus Excavatum: Enhancing Outcomes and Patient Care”, we explore both surgical (invasive and minimally invasive) and non-surgical approaches used worldwide today. The primary focus of this article is to introduce the improved and modified version of the minimally invasive technique utilized in Georgia. It is noteworthy that there were very few complications both during and after the operation. One of the main advantages of our method compared to others is the safe passage of the metal fixation wire into the chest cavity. This technique, characterized by a positive prognosis, offers significant benefits for patient safety and recovery.

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