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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.

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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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THE FIRST ATTEMPT IN ARMENIA OF EASYGO-TYPE ENDOSCOPIC SURGERY FOR LUMBAR SPINAL CANAL STENOSIS

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Abstract.

Background: Lumbar spinal canal stenosis is a common degenerative pathology, particularly in elderly patients, and often requires surgical treatment when conservative therapy is ineffective. In Armenia, endoscopic decompression using the EasyGo system has not previously been reported.

Objective: To evaluate the feasibility, safety, and effectiveness of EasyGo-type interlaminar endoscopic decompression for lumbar spinal canal stenosis.

Materials and Methods: Forty-one patients underwent surgery at the Neurosurgical Department of Nairi Medical Center. Indications included persistent pain syndrome and/or sensory-motor deficits with radiologically confirmed lumbar stenosis. Pain intensity was assessed pre- and postoperatively using a validated questionnaire. Outcomes were graded as good, satisfactory, or unchanged. Operative time, complications, and hospital stay were also recorded.

Results: Pain intensity decreased by 80–90% on the first postoperative day in 40 patients (97.5%). Sensory symptoms improved by 30–50%. Treatment outcomes were assessed as good in 73.2%, satisfactory in 24.3%, and unchanged in 2.5% (due to diabetic neuropathy). Intraoperative complications included epidural bleeding (2.4%) and dural tears (4.8%), both without clinical consequences. Mean operative time was 40–50 minutes (single level) and 80–90 minutes (two-level/bilateral). All patients ambulated within 6–8 hours and were discharged the following day. No postoperative instability was observed at 2-month follow-up.

Conclusion: EasyGo-type interlaminar endoscopic decompression is a novel and effective technique in Armenian neurosurgery. It provides significant pain relief, shorter operative time, minimal invasiveness, and one-day hospitalization. Compared to transforaminal endoscopy and open surgery, it allows safer decompression, including contralateral and multilevel cases, with fewer complications. Wider application is warranted for both lumbar and cervical spine pathologies.

Key words. Spinal canal stenosis, EasyGo system, endoscopic spine surgery, interlaminar approach, radiculopathy, minimally invasive neurosurgery.

Introduction.

Spinal canal stenosis most frequently occurs in the lumbosacral region. The first data on the clinical manifestations and treatment of this pathology were described in the literature in 1950 [1,2]. According to conducted studies, the occurrence of spinal canal stenosis is strongly associated with age and sex. For example, in the group of individuals under 40 years of age, it was diagnosed in 20% of cases, whereas in the 60–69 age group it was observed in 47% [3-5]. As the disease progresses, it causes a persistent pain syndrome and, in some cases, motor disorders in the lower extremities. In such clinical manifestations, drug therapy and physiotherapy are considered ineffective, and surgical intervention is recommended. Among a cohort of 1900 patients operated on by open surgery, good or satisfactory outcomes were reported in 64% of cases [6-8].

Taking into account that spinal canal stenosis is mainly observed in patients over 60 years of age, the likelihood of postoperative complications with unfavorable outcomes is high after open surgeries, since comorbidities (cardiovascular and others) are common in this age group [9,10].

Considering the above, over the past decade various endoscopic surgical approaches have been actively developed and introduced. Due to their minimal invasiveness, they are considered safer and more effective compared to open surgeries. According to the data of the international literature, many authors have suggested performing the surgery through a transforaminal approach [11-16]. However, the effectiveness of surgeries performed by this method is high only when the stenosis is localized in the foraminal area (lateral stenosis). In cases of central-type spinal canal stenosis, the effectiveness of this approach is significantly lower; therefore, a number of authors have recommended endoscopic surgeries via an interlaminar approach, justifying that they are more effective [17-20].

Thus, taking into account the possible complications of open surgeries, especially in the elderly patient group, we considered it relevant to introduce endoscopic surgeries using the EasyGo type interlaminar approach, to evaluate their effectiveness as well as possible limitations. It should be noted that endoscopic surgeries performed by this method are considered a novelty in the Republic of Armenia, and to date, no publications by other authors on this topic are available.

Materials and Methods.

The present study included the surgical treatment outcomes of 41 patients who underwent inpatient care at the Neurosurgical Department of "Nairi" Medical Center. The indication for surgical treatment was the presence of persistent pain syndrome or motor and sensory disturbances caused by nerve root compression, in the context of radiologically confirmed lumbar spinal canal stenosis.

The severity of pain syndrome in the preoperative period, as well as the degree of pain reduction after surgery, was assessed using a questionnaire developed by our team (published in

Erebouni Medical Journal, Issue 1, 2015, pp. 45–50). This tool enables an objective evaluation of surgical outcomes. The questionnaire was completed by patients preoperatively and immediately after surgery. Treatment outcomes were classified as good, satisfactory, or unchanged.

The spinal canal stenosis was caused by hypertrophy of the facet joints and ligamentum flavum, as well as intervertebral disc protrusion. All patients demonstrated facet joint hypertrophy and ligamentum flavum thickening, resulting in dorsal spinal canal stenosis. Intervertebral disc protrusion of medial localization was present in 28 patients (68.3%). According to the degree of stenosis, 34 patients (83%) were classified as having absolute stenosis, while 7 (17%) had relative stenosis. Bilateral spinal canal stenosis was observed in all cases; however, nerve root compression syndrome was not always bilateral. Specifically, in 18 patients (44%) it was unilateral, in 20 patients (48.7%) it was bilateral but with predominance on one side, and in only 3 patients (7.3%) it was equally expressed bilaterally.

Of the study group, 30 patients (73.2%) were male and 11 (26.8%) were female. The youngest patient was 26 years old, and the oldest was 78.

Regarding the level of involvement, 3 patients (7.3%) had lesions at L2–L3, 8 patients (19.5%) at L3–L4, 11 patients (26.8%) at L4–L5, and 12 patients (29.3%) at L5–S1. Two-level stenosis was observed in 6 patients (14.6%), and three-level stenosis in 1 patient (2.5%).

Depending on the clinical presentation, surgeries were performed using either monoportal or biportal approaches. In cases where nerve root compression syndrome was predominantly unilateral, a unilateral surgical approach was employed. In patients with bilateral radiculopathy, surgeries were performed via parallel bilateral surgical approaches.

Surgical Procedure:

All surgeries were performed under general anesthesia with the patient positioned in the prone position. Prior to surgery, the target intervertebral disc level was identified using lateral projection X-ray imaging. A linear skin incision was made approximately 1.5–2 cm lateral to the midline, corresponding to the medial border of the facet joint, which was confirmed intraoperatively by control X-ray imaging in the anteroposterior projection.

The planning of the surgical approach is demonstrated in Figures 1 and 2.

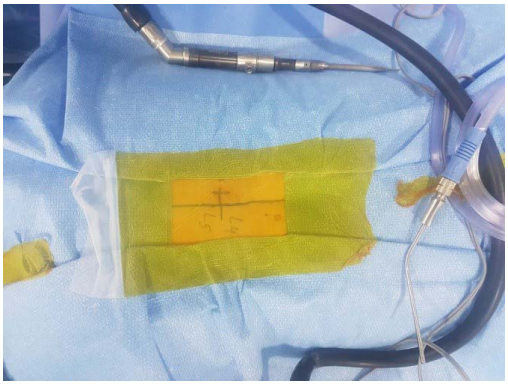

Figure 1. *Intraoperative photograph. Linear skin incision (~1.5 cm) for L4–L5 interlaminar decompression (indicated by arrow).*

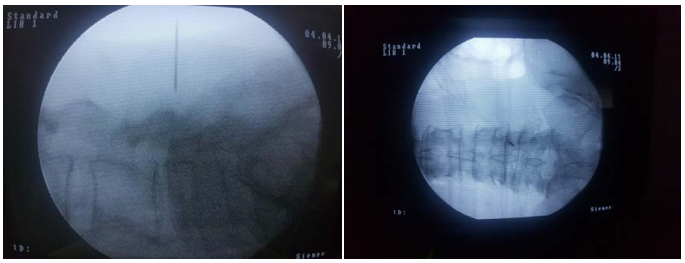

Figure 2. *Intraoperative fluoroscopic images for surgical approach planning.*
a. *Lateral view – needle positioned at the L4–L5 level.*
b. *Anteroposterior view – needle tip located at the medial margin of the facet joint.*

Figure 3. *Intraoperative photographs showing the working tube.*
a. *Fluoroscopic confirmation of the working tube at the correct level (L4–L5).*
b. *Working tube fixed with a holder; endoscope inserted inside the tube.*

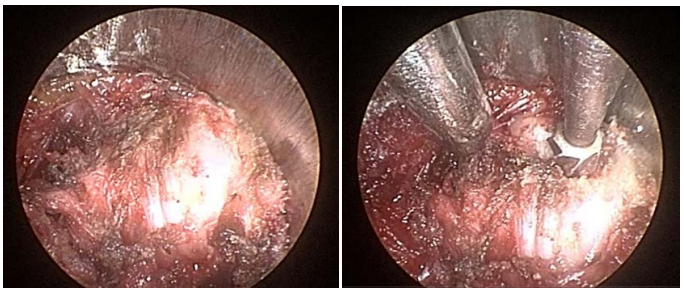

Figure 4. *Intraoperative endoscopic views.*
a. *Facet joint exposed after soft tissue dissection.*
b. *Drilling phase of the vertebral lamina.*

After the above-described steps, a linear incision of the soft tissues approximately 1.5 cm in length was made. Sequential insertion of cylindrical dilators (4–15 mm) through the soft tissues created the surgical pathway to the target level. A working channel was then placed, the stable positioning of which was ensured by a rotatable holder with three-dimensional adjustment, allowing fixation in the desired orientation. One end of the holder was secured to the operating table, while the other end was attached to the working tube.

Figure 3. The working channel positioned at the target level, stabilized by the holder, and the endoscope with a 150° viewing angle inserted into the working channel.

Following these steps, the vertebral arch was identified and separated from the surrounding soft tissues using forceps and electrocautery. Subsequently, a portion of the vertebral arch was drilled away with the aid of a high-speed pneumatic drill. In cases where foraminal stenosis was also present due to hypertrophy of the facet joint, the superior articular process (pars superior articularis) was resected.

Figure 4. Resection of the hypertrophied superior articular process in the presence of foraminal stenosis.

After creating the bony window, its margins were further enlarged with rongeurs to approximately 1.5–2.0 cm, effectively performing an endoscopically controlled hemilaminectomy. During these steps, the integrity of the ligamentum flavum was preserved, serving a protective function by preventing potential dural injury caused by the drill or rongeurs.

Figure 5. Formation of the bony window under endoscopic control.

The next step was considered the most critical stage of the surgery. At this point, the ligamentum flavum was separated from the dura mater using a hook with a rounded tip. During this maneuver, it was essential to avoid injury to the dura mater or the epidural venous plexus, as bleeding from the latter is difficult to control. Initially, the dura mater was dissected medially toward the midline, after which retrograde dissection was performed laterally to expose the border of the spinal canal. The nerve root was then identified and freed from the compressive tissues along a length of approximately 1.5 cm.

Figure 6. Dissection of the ligamentum flavum from the dura mater and mobilization of the nerve root under endoscopic control.

After dissection of the dural sac and the nerve root, a control X-ray examination was performed to compare the size and localization of the drilled bony window with the preoperative MRI findings at the level of spinal canal stenosis. An example of this comparison is shown in Figure 7.

At this stage, the surgery was considered complete in patients presenting with a unilaterally expressed radicular syndrome.

In the group of patients with partial bilateral radicular syndrome, the procedure was continued as follows: a rongeur was placed on the dural sac, and bone and ligamentous tissues were removed from its ventral surface. By adjusting the working channel at a specific medial angle, it was possible to reach the contralateral border of the spinal canal with forceps or rongeurs and perform decompression on the opposite side (Figure 8).

In the group of patients with severe bilateral radicular syndrome, surgery was performed using a biportal approach, with hemilaminectomy carried out simultaneously from both sides.

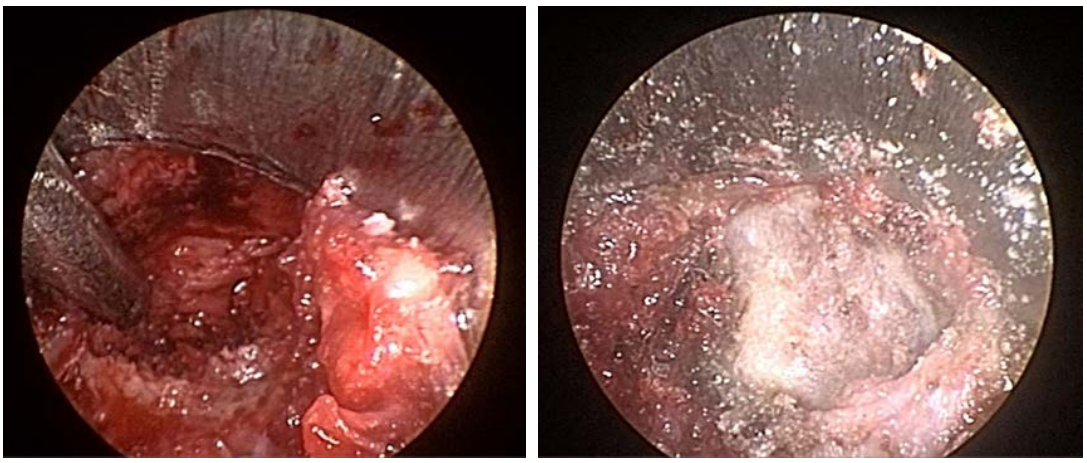

Figure 5. *Bone window formation under endoscopic control.*
a. *Partial bone defect after drilling (indicated by arrow).*
b. *Formed bone window with preserved integrity of the ligamentum flavum (indicated by arrow).*

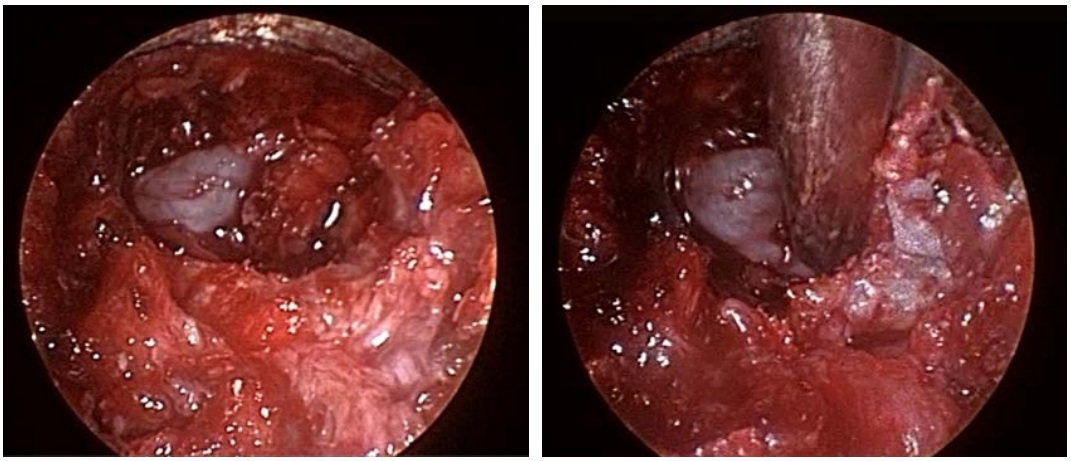

Figure 6. *Dural sac exposure.*
a. *Dura mater dissected medially (indicated by arrow).*
b. *Decompressed nerve root clearly visualized (indicated by arrow).*

Figure 7. *Comparative pre- and postoperative imaging.*
a. *Preoperative MRI (axial view) showing severe lumbar canal stenosis at L4–L5.*
b. *Preoperative MRI (sagittal view).*
c. *Intraoperative fluoroscopy demonstrating bony defect at the same level corresponding to the MRI-confirmed stenosis (indicated by arrow).*

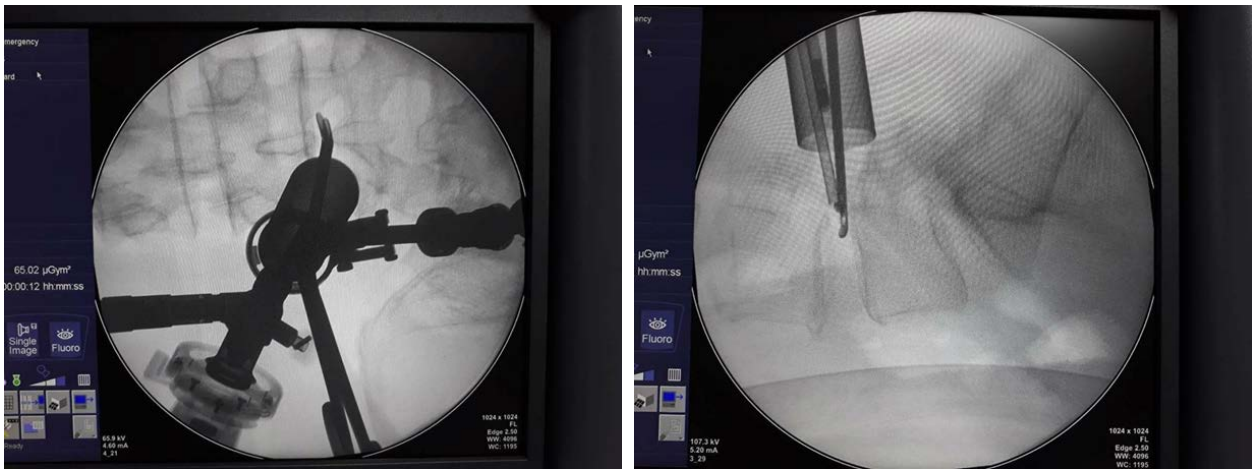

Figure 8. *Contralateral decompression of the spinal canal.*
a. *Intraoperative fluoroscopy (anteroposterior view): tips of forceps introduced from the left-sided approach reaching the contralateral (right) side of the spinal canal.*
b. *Intraoperative fluoroscopy (lateral view): tips of forceps located at the margin of the intervertebral disc without penetration.*

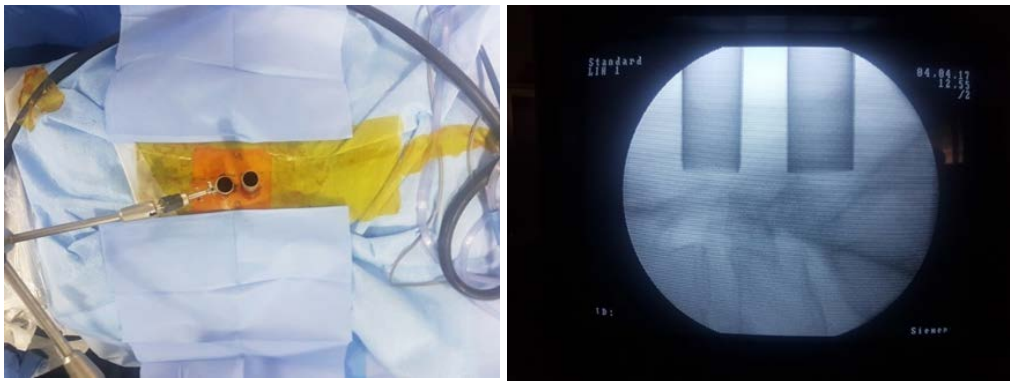

Figure 9. *Intraoperative views of two-level endoscopic decompression.*
a. *Two parallel working tubes placed.*
b. *Intraoperative fluoroscopy (lateral view) showing parallel working tubes.*

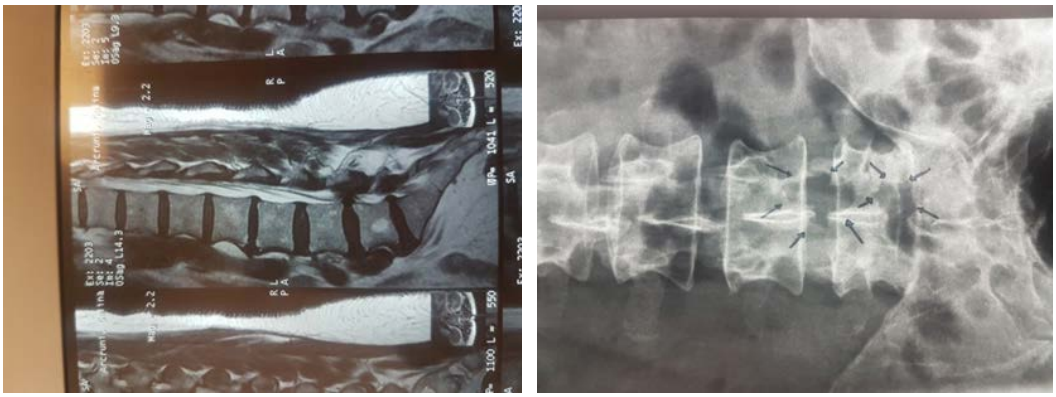

Figure 10. *Pre- and postoperative imaging of two-level lumbar spinal canal stenosis.*
a. *Preoperative MRI showing stenosis at both L4–L5 and L5–S1 levels (indicated by arrow).*
b. *Postoperative radiograph demonstrating partial removal of the vertebral arches at L4–L5 and L5–S1, corresponding to the decompressed levels (indicated by arrow).*

The applied endoscopic technique allowed surgeries to be performed even in cases of two- or three-level spinal canal stenosis. The peculiarity of the procedure was that separate small incisions were made at each stenotic level, after which two working channels were placed simultaneously, and step-by-step decompression of the affected segments was performed. This process is illustrated in Figure 9.

The effectiveness of such surgeries is demonstrated in Figure 10, which presents a comparison of preoperative and postoperative imaging studies.

On average, the duration of surgery was 40–50 minutes for single-level stenosis and 80–90 minutes for bilateral or two-level stenosis.

The main intraoperative complication was bleeding from the epidural venous plexus, which in rare cases could not be controlled by electrocautery and required the use of a hemostatic sponge for hemostasis.

At the end of the procedure, sutures were placed on the aponeurosis and soft tissues. Patients were allowed to ambulate 6–8 hours after surgery. In all cases, patients were discharged from the hospital the following day.

Results.

In all patients, complaints were associated with compression of the corresponding nerve root, manifested by pain syndrome or sensory disturbances. On the first postoperative day, pain intensity decreased by 80–90% in all patients except one. This reduction was calculated by comparing the pain scale scores reported by patients preoperatively and on the first postoperative day. Numbness decreased by approximately 30–50%, which corresponds to data from the literature indicating that sensory deficits tend to regress more slowly after surgery.

Thus, in the operated group, treatment outcomes on the first postoperative day were assessed as good in 30 patients (73.2%), satisfactory in 10 patients (24.3%), and unchanged in 1 patient (2.5%), the latter being attributed to the manifestation of pre-existing diabetic neuropathy.

Intraoperative complications included uncontrolled bleeding from epidural vessels in 1 case (2.4%) and dural tears in 2 cases (4.8%). All complications resolved without any clinical consequences. In 6 patients (14.6%), due to marked hypertrophy of the facet joint, resection of its superior portion was performed. No signs of spinal instability developed during the two-month postoperative follow-up. All patients were advised to wear a supporting corset for 14 days, after which they were allowed to return to work and daily activities.

The mean duration of surgery was 40–50 minutes for single-level stenosis and 80–90 minutes for bilateral or two-level stenosis. Patients were allowed to ambulate 6–8 hours after surgery, and in all cases discharged from the hospital on the first postoperative day.

Discussion.

Our series (n=41) demonstrated rapid pain reduction (80–90%) and partial regression of sensory disturbances (30–50%) within the first postoperative day, short operative time (40–50 minutes for single-level; 80–90 minutes for two-level or bilateral), and short hospitalization (1 day). Intraoperative complications were limited to epidural bleeding (2.4%) and dural tears (4.8%), both manageable and without clinical sequelae. These findings are concordant with recent endoscopic series showing marked VAS/ODI improvements and brief hospital stays after full-endoscopic interlaminar bilateral decompression via a unilateral approach and related techniques [21,22].

These outcomes are in line with recent studies (2023–2025) evaluating full-endoscopic (FE) and unilateral biportal endoscopic (UBE) decompression for lumbar stenosis. In a 2023 clinical series of uniportal endoscopic bilateral decompression, significant pain reduction and functional improvement comparable to our cohort were reported [21]. Similarly, meta-analyses and comparative studies in 2024–2025 confirmed the effectiveness of both UBE and FE, often noting shorter operative time and rapid recovery, with hospital stay advantages over non-endoscopic techniques [22-25].

The choice of approach depends on the type of stenosis. Transforaminal (TFT) decompression is most effective in foraminal/lateral stenosis, whereas interlaminar (ILT) approaches provide superior decompression in central stenosis; comparative analyses from 2023–2025 support this practical stratification [23-25]. Our experience aligns with this literature: EasyGo ILT endoscopic procedures offered efficient central canal decompression with early symptom relief.

In elderly patients (including ≥80 years), FE and UBE decompression have been shown to be safe and effective despite comorbidities, without excess complications; early ambulation and short stays are typical and mirror our pathway with one-day hospitalization [26,27].

From a health-systems perspective, large-cohort and database-driven comparisons indicate that endoscopic approaches are associated with reduced perioperative morbidity, shorter length of stay, and lower 30-day readmission versus non-endoscopic techniques, supporting outpatient care models [23,28-30].

The complication profile is also comparable. Recent reviews and meta-analyses report dural tear rates around ~1–3% in lumbar endoscopic decompressions—e.g., 1.07% across 64,470 lumbar endoscopies and ~2.7% pooled—with low rates of clinically significant sequelae [31,32]. Our 4.8% dural tear rate, with no clinical consequences, is within the expected range for a small cohort during technique maturation.

In complex cases (bilateral symptoms or multilevel stenosis), contralateral and multilevel decompressions via UBE achieve wide decompression while preserving stability; contemporary series document facet-preserving contralateral/bilateral strategies as effective alternatives to more destabilizing procedures [22,33,34]. Our contralateral decompression through a monoportal approach corresponds to these trends.

Finally, advances in instrumentation and navigation are improving outcomes and workflow. Learning-curve analyses for UBE/FE show measurable performance gains after the initial cases, with improved efficiency and decreasing drains/operative times; adjunct navigation (2D/3D optical or CT-based) reduces fluoroscopy use and radiation exposure while enhancing accuracy [25,33-35].

Overall, our data—rapid pain relief, short operative time, low blood loss, manageable complications, and single-day hospitalization—are consistent with international reports from 2023–2025 and support the EasyGo interlaminar endoscopic approach as a safe and effective alternative for lumbar stenosis, including in elderly and comorbid patients.

Conclusion.

Endoscopic surgeries for lumbar spinal canal stenosis using the EasyGo system represent a novelty in Armenian neurosurgery. The outcomes of the performed surgeries already demonstrate the high effectiveness of this method. Until now, transforaminal endoscopic surgeries in our department have shown excellent results in the removal of intervertebral disc herniations; however, this method had certain limitations for decompression in spinal canal stenosis. The introduction of the EasyGo-type interlaminar endoscopic approach fills this gap.

Thus, in cases of spinal canal stenosis, the presented method is more effective than transforaminal endoscopic surgeries. Compared with open surgeries, it avoids postoperative complications such as paraspinal muscle atrophy or prolonged pain due to extensive muscle retraction.

The use of endoscopic technique provides superior magnification and illumination of the surgical field, minimizing intraoperative bleeding and other complications. The incision length is reduced to no more than 1.5 cm, operative time shortened to ~40 minutes (single level), and hospitalization reduced to one day.

In patients with partial bilateral radicular syndrome, the endoscopic technique makes it possible to achieve contralateral decompression through a monoportal approach, which is not feasible with open surgery that requires laminectomy—a more extensive intervention.

Given its high effectiveness, further introduction and broader application of this method are warranted not only for the lumbar but also for the cervical spine.

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Аннотация

Введение: Стеноз поясничного позвоночного канала является распространённой дегенеративной патологией, особенно у пациентов пожилого возраста, и нередко требует хирургического вмешательства при неэффективности консервативной терапии. В Армении эндоскопическая декомпрессия с использованием системы *EasyGo* ранее не применялась.

Цель: Оценить осуществимость, безопасность и эффективность интерламинарной эндоскопической декомпрессии поясничного позвоночного канала с применением системы *EasyGo*.

Материалы и методы: В Нейрохирургическом отделении Медицинского центра «Наири» было прооперировано 41 пациент. Показания включали персистирующий болевой синдром и/или сенсомоторные нарушения при радиологически подтверждённом стенозе поясничного отдела. Интенсивность боли оценивалась до и после операции с использованием валидированного опросника. Результаты классифицировались как хорошие, удовлетворительные или без изменений. Дополнительно учитывались продолжительность операции, осложнения и длительность госпитализации.

Результаты: Интенсивность боли снизилась на 80–90% уже в первый послеоперационный день у 40 пациентов (97,5%). Сенсорная симптоматика регрессировала на 30–50%. Общая эффективность лечения была оценена как хорошая у 73,2% больных, удовлетворительная — у 24,3% и без изменений — у 2,5% (в связи с диабетической нейропатией). Интраоперационные осложнения включали эпидуральное кровотечение (2,4%) и дуральные разрывы (4,8%), не имевшие клинических последствий. Средняя продолжительность операции составила 40–50 минут при вмешательстве на одном уровне и 80–90 минут — при двухуровневых или билатеральных вмешательствах. Все пациенты были ակտիվիտովանի через 6–8 часов и выписаны

на следующие сутки. При наблюдении в течение 2 месяцев послеоперационной нестабильности не выявлено.

Заключение: Интерламинарная эндоскопическая декомпрессия с применением системы *EasyGo* является новой и эффективной методикой в нейрохирургии Армении. Она обеспечивает выраженное снижение болевого синдрома, сокращение времени операции, минимальную инвазивность и возможность однодневной госпитализации. По сравнению с трансфораминальной эндоскопией и открытой хирургией метод позволяет более безопасную декомпрессию, включая контралатеральные и многоуровневые случаи, с меньшим числом осложнений. Расширение применения данной технологии представляется перспективным как для поясничного, так и для шейного отдела позвоночника.

Ключевые слова:
стеноз позвоночного канала, система EasyGo, эндоскопическая хирургия позвоночника, интерламинарный доступ, радикулопатия, малоинвазивная нейрохирургия.