

Abstract

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MANAGEMENT OF LUMBOSACRAL RADICULITIS

Purpose: analysis of management in the patients with discogenic lumbosacral radiculitis.

Materials and methods: 4,000 patients with discogenic lumbosacral radiculitis were treated. 2,000 patients were managed conservatively, 1,000 patients underwent microdiscectomy and 1,000 patients underwent endoscopic discectomy. The authors of the paper compared indications for different types of treatment, effectiveness of treatment, and duration of rehabilitation. The age of patients in both groups ranged 18 to 78 years.

Results. Treatment outcomes were evaluated using the Macnab scale, including the need for additional treatment, duration of rehabilitation treatment, and terms of return to work.

Currently, the results of conservative treatment of lumbar hernias are being discussed in the literature. In general, according to authors, the result of conservative treatment is inversely proportional to the size of hernias: the smaller the hernia, the more successful the treatment results. Moreover, there is no clear correlation with the conservative treatment methods.

At the same time, the results of surgical intervention directly correlate with the size of hernias or sequestrs: the larger the hernia, the better the outcome. Alternatively, microsurgical and endoscopic interventions were used with similar outcomes and relapse rates.

The long-term outcomes were tracked using the Macnab scale. Relapses of hernias in the endoscopic discectomy group were found in 18 patients, which was 1.8%. Relapses of hernias in the microdiscectomy group were found in 11 patients, which was 1.1%.

Conclusions. Modern conservative methods of treatment allow good outcomes for treatment of hernias even up to 8 mm. In patients with hernias 8 mm to 10 mm the results of conservative treatment were generally not satisfactory and relapses occurred quickly. In patients with hernias of more than 10 mm, conservative treatment is not recommended; positive outcomes are possible only with the use of surgical methods.

Key words: removal of herniated discs; peculiarities of surgical treatment; lumbar spine.

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Резюме

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ТАКТИКА ЛІКУВАННЯ ПОПЕРЕКОВО-КРИЖОВИХ РАДИКУЛІТІВ

Мета: аналіз тактики лікування у хворих з дискогенними попереково-крижовими радикулітами.

Матеріали та методи. На лікуванні знаходилось 4000 хворих з дискогенними попереково-крижовими радикуліту.

2000 хворих лікувалися консервативно, 1000 хворим виконана мікродиссектомія, 1000 – ендоскопічна диссектомія. В роботі виконано порівняння показань до різних видів лікування, порівняння ефективності лікування, терміну реабілітації. Вік хворих в обох групах варіював від 18 до 78 років.

Результати. Результати лікування оцінювали з використанням шкали Macnab, необхідності хворому проводити додаткове лікування, терміну реабілітаційного лікування і повернення до трудової діяльності в залежності від терміну.

В даний час в літературі обговорюються результати консервативного лікування гриж поперекового відділу. Звичайно за даними рідних авторів результат консервативного лікування зворотнопропорційно корелює з величиною гриж; чим менше грижі тим успішніші результати лікування. Причому не має чіткої кореляції від методів консервативного лікування.

В той же час результати оперативного втручання прямопропорційно корелюють з розмірами гриж чи секвестрами, чим більше грижа тим краще результат після втручання. Альтернативно застосовують мікрохірургічні та ендоскопічні втручання з близькими результатами та частотою рецидивів.

Віддалені результати простежені за допомогою шкали Макнаб. Рецидиви гриж в групі де виконувалось ендоскопічне видалення були у 18 хворих, що склало 1,8 %. Рецидиви гриж, в групі де виконувалось мікрохірургічне видалення, були у 11 хворих, що склало 1,1 %.

Висновки. Сучасні консервативні методи лікування дозволяють отримати хороші результати при грижах навіть до 8 мм. У хворих з грижами від 8 мм до 10 мм. Результат консервативного лікування в цілому не задовільний, швидко наступають рецидиви. У хворих з грижами більше 10 мм проведення консервативного лікування не доцільне, домогтися позитивного результату можливо тільки із застосуванням оперативних методів лікування.

Ключові слова: видалення гриж дисків; особливості хірургічного лікування; поперековий відділ хребта.

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Introduction

Discogenic lumbosacral radiculitis in 99% of cases is caused by compression of the lumbar segmental roots by protrusions, hernias, or stenosis of the vertebral canal or intervertebral foramina [1].

Most often, the pathology of intervertebral discs occurs in the lumbosacral region, in 90% of cases – at L4–L5, L5–S1 disc levels, since these

are characterized by greater mobility and loading as compared to other discs. Therefore, the roots at L5 and S1 levels are compressed most often [2].

We analyzed management and outcomes in patients with discogenic lumbosacral radiculitis.

Materials and methods

Four thousand patients with discogenic lumbosacral radiculitis were treated.

Two thousand patients were managed conservatively, 1,000 patients underwent microdiscectomy and 1,000 patients underwent endoscopic discectomy. The authors of the paper compared indications for different types of treatment, the effectiveness of treatment, and the duration of rehabilitation. The age of patients in both groups ranged 18 to 78 years.

All studied cases were single herniated discs at L2–L3, L3–L4, L4–L5 or L5–S1 levels. The presence of lateral recess stenosis was not a contraindication to both microendoscopic and microsurgical techniques. The size of protrusions or hernias were 4 mm to a maximum of 15 mm in the sagittal plane; the sequester sizes varied from 5 to 18 mm. Clinical symptoms in all patients included at least radicular pain; 181 patients had manifestations of radiculopathy in the form of numbness or weakness in the feet. All patients with hernias or sequestrers of less than 10 mm were in therapy with a neurologist before surgery for at least 6 weeks without any definite clinical improvement. In the case of hernias or sequestrers of more than 10 mm, the patients were directly referred for surgical treatment without prior conservative treatment.

The diagnosis included a general somatic and neurological examination, radiography in two projections, and MRI of the lumbosacral spine. In 217 cases of severe neurological disorders, electroneuromyography was performed.

For different symptoms and different MRI data, different treatment methods were used. However, in cases of a patient's refusal to perform the treatment indicated for the hernia size (mainly surgical treatment), the treatment methods not directly corresponding to standard indications were used. Thus, as a worldwide standard, neurosurgical treatment is indicated for median and paramedian lumbar hernias of more than 6 mm, and for foraminal lumbar hernias of more than 4 mm. A significant part of patients initially refused surgical treatment, despite direct indications for it. In such patients, conservative methods of treatment were usually used at first. Thus, having cases where conservative treatment was performed in patients with hernias of different sizes, we were able to perform this study, namely, to analyze the effectiveness of conservative treatment for hernias of different sizes, as well as surgical treatment. Surgical treatment was performed only according to indications; median and paramedian lumbar

hernias of less than 6 mm, or foraminal hernias of less than 4 mm were not treated surgically.

Study results

Clinical symptoms

Due to the anatomical peculiarities of the lumbar spine, a discal hernia mainly compressed the root located below (for example, the hernia at L4–L5 compressed the root at L5, the hernia at L5–S1 compressed the root at S1). Therefore, according to clinical data, it is possible to determine precisely which of the roots is compressed. L3 root damage syndrome (the hernia at L2–L3) included pain and paresthesia in the L3 dermatome, paresis of the quadriceps femoris, reduction or loss of the patellar reflex. Damage of the L4 root (hernia at the L3–L4 level) was characterized by pain radiating from the lumbar region to the buttock, followed by spreading to the anterior surface of the thigh. Less often, this zone also involved a section of the anteroposterior surface of the thigh. Pain in the anterolateral surface of the thigh was more common. Subsequently, the pain spread to the anterolateral part of the lower leg and the inner ankle, involving the medial surface of the foot (ischialgia). Sensitivity disorders were observed in this area. It was characterized by hypesthesia with hyperpathia in the thigh.

Quite often, hypotension, weakness, and hypotrophy of the quadriceps femoris and the anterior tibialis muscle developed; the knee reflex decreased and subsequently disappeared. When the L5 root was affected (the hernia at L5–L5), the pain localized in the upper gluteal region, spreading to the external surface of the thigh and lower leg, sometimes involving the back of the foot and the second and/or third toe(s). In the same area, sensitivity disorders developed; paresthesia, weakness of the peroneal muscle group could occur, which often turned into atrophy and loss of function in these muscles. The dorsal flexion of the first toe (paresis of the long extensor of the big toe and the short extensor of the toes) was noticeably weakened; posterior tibial reflex was absent. Knee and Achilles reflexes were preserved. When the S1 root was affected (the hernia at L5–S1), the pain localized in the middle gluteal region, along the posterior external surface of the thigh, lower leg, and the external surface of the heel, spreading to the lateral border of the foot and involving the fifth and sometimes the fourth toe. Sensitivity disorders affected the middle part

of the gluteal region, the posterior external surface of the thigh, lower leg, and a part of the foot. Motor disorders usually developed after paresis of the gluteal muscles. The gluteal fold gradually smoothed out and later disappeared.

Afterward, paresis of the triceps tibia and weakness of toe flexor muscles appeared. The Achilles reflex decreased and often disappeared. The plantar reflex decreased or disappeared.

Table 1 – Symptoms of lateral lumbar disc herniation

Disc	Root	Area of pain and paresthesia	Area of hypesthesia	Paresis	Loss of reflexes
L3–L4	L4	Anterior surface of the thigh, inner surface of the lower leg	Anterior inner surface of the thigh, inner surface of the lower leg	Quadriceps femoris	Knee reflex
L4–L5	L5	Radiation along external surface of the thigh and lower leg through the back of the foot to the big toe	External surface of the lower leg and big toe	Long extensor of the big toe, less often – dorsal flexors of the foot and pronators of the foot	Reflexes are preserved
L5–S1	S1	Radiation along posterior surface of the thigh and posterior-external surface of the lower leg to the foot and the 4-th and 5-th toes	External surface of the lower leg, lateral border of the foot and the 4-th and 5-th toes, less often – posterior surface of the thigh	Calf muscle, sometimes foot pronators	Achilles reflex

Conservative treatment was used according to indications, if lumbago, lumbalgia, irritative syndromes, acute pain in the leg (in case of disc protrusion of up to 6 mm), and the absence of sequesters prevailed. In some cases, at the patient's request, conservative treatment was carried out with hernias of up to 10 mm or sequesters of up to 10 mm, or manifestations of radiculopathy. Patients with relative spinal stenosis with a vertebral canal of more than 12 mm were also included in this group. Treatment regimens included non-steroidal anti-inflammatory drugs, diuretics, and painkillers. For significant pain syndromes, short-term hormone therapy was available. Various types of traction and physiotherapy procedures were used.

For moderate manifestations of pain syndromes and hernias of up to 7 mm, we used: 1) Diclofenac 3.0 QD for 10 days, 2) Xefocam 8 mg QD for 5 days (mainly at the bedtime) 3) Sirdalud or Tisalud 2 mg QD or BID depending on arterial pressure (the drug lowers blood pressure), 4) Mydocalm 150 mg QD for 10 days, 5) Verospiron 100 g QD for 10 days, 6) Omez 1 tablet BID for 20 days, 7) amplipulse and magnet therapy on the lumbar region (both are possible on the same day) 15 times, 8) traction of the lumbar spine (underwater traction or using the Yevminov's prophylactic board), 9) physical therapy. For patients engaged in physical therapy and sessions using the Yevminov's

prophylactic board, it was recommended to have physical therapy in the evenings, followed by a session using the Yevminov's prophylactic board, and then to adopt a horizontal position.

For significant clinical manifestations of pain and hernias of more than 7 mm and sequesters, we used: 1) Diclofenac 3.0 QD for 10 days, 2) Movalis 15 mg QD, or Nimesulide 1 tab BID for 10 days (two non-steroidal anti-inflammatory drugs with different action) 3) Sirdalud or Tisalud 2 mg QD or BID depending on arterial pressure (the drug lowers blood pressure), 4) Mydocalm 150 mg QD for 10 days, 5) Verospiron 100 g QD for 10 days, 6) Dexamethasone 4 mg BID for 5 days, 7) Proxium 1 tab BID for 20 days, 8) amplipulse and magnet therapy on the lumbar region (both are possible on the same day) 15 times. When the patient's state improved, traction of the lumbar spine (underwater traction or sessions on the Yevminov's prophylactic board) and physical therapy was performed.

Different types of blockades were performed under the same conditions as conservative treatment, if the effect of conservative treatment was insignificant. Nerve root blockades were performed using Diprosan. They were performed in 185 patients. These were patients from the conservative treatment group: blockades were performed in case of no effect or insignificant effect of conservative treatment.

If conservative treatment proved to be ineffective for 6–8 weeks, surgical intervention was considered. However, if the patient refused surgical treatment, conservative treatment was continued and supplemented with root blockades.

For certain indications, the following surgical procedures were used.

Endoscopic discectomy was performed for the hernias larger than 6 mm in size, with no significant manifestations of degenerative processes in the spine and with relatively wide spaces between vertebral arches. In the presence of sequestrations, endoscopic discectomy was also indicated. This group included patients who had previously undergone conservative treatment with no proper effect. This surgical intervention was available for the patients who had not previously had spinal surgery. The surgery was performed under general anesthesia. A small dilator of 4-5 mm in diameter

was inserted under X-ray guidance. After that, several larger dilators were sequentially inserted through the small dilator. Afterward, an endoscope tube was inserted and fixed to the table. Subsequently, the entire surgical procedure was performed under visual control via an endoscope monitor. The lower part of the upper arch, the yellow ligament, the upper part of the lower arch, and the medial articular process were exposed. Then special endoscopic 2 mm Kerrison rongeurs were used. The lower part of the above-located arch, the upper part of the below-located arch, and, if necessary, the medial articular process were removed. The root and dural sac were identified. With the help of a special hook and endoscopic retractor, the root and dural sac were displaced. With an endoscopic conchotome the central part of the pulposus nucleus was removed (Fig. 1). The wound was closed in layers.

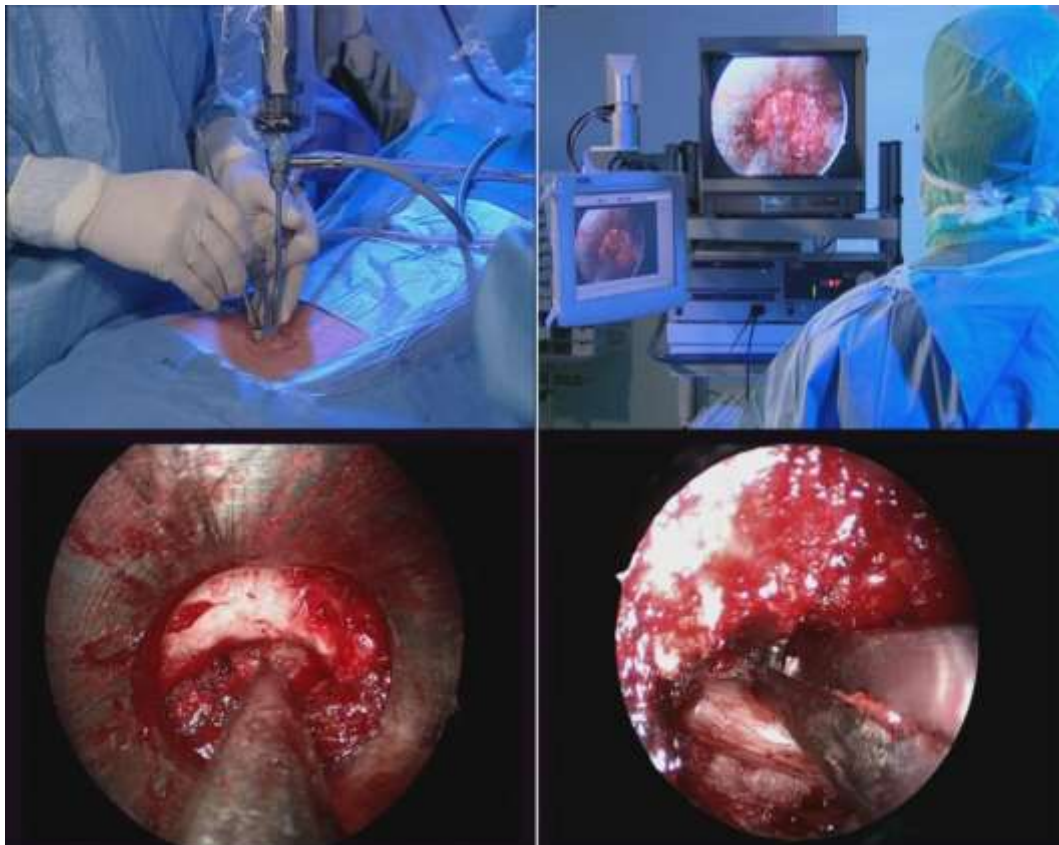


Figure 1 – Stages of endoscopic microdiscectomy

Microdiscectomy was performed for hernias of any size larger than 6 mm, irrespective of manifestations of degenerative processes in the spine and the width of spaces between vertebral arches. Foraminal, extraforaminal lateral herniated discs

were also indications for microdiscectomy, but via paravertebral, distant lateral, or extremely lateral access. A soft tissue incision of up to 30 mm was performed. The lumbar dorsal fascia was cut off from its attachment to the spinous processes.

Subperiosteal dissection was performed. The lower part of the upper arch, the yellow ligament, the upper part of the lower arch, and the medial articular process were exposed. The wound was expanded with a Williams retractor (branch width 1 to 2 cm and length 5 to 7 cm) or a Caspar retractor of similar size. A yellow ligament was exposed after surgical release with a narrow raspatorily laterally to the outer edge of the intervertebral joint. Then a microscope magnification of 8–10 was used with a lens focal length of 300 mm. After that, 2–3 mm Kerrison rongeurs were used. The lower part of the above-

located arch, the upper part of the below-located arch, and, if necessary, the medial articular process were removed. Epidural veins were coagulated using low-energy microcoagulation. The hernia and root were identified. Subsequently, root traction was performed in the medial direction. The herniated disc was excised along with the posterior longitudinal ligament, removing free fragments of the disc. The remains of the nucleus pulposus were removed from the disc cavity using conchotome. The last step was to suture the fascia, subcutaneous tissue, and skin (Fig. 2).

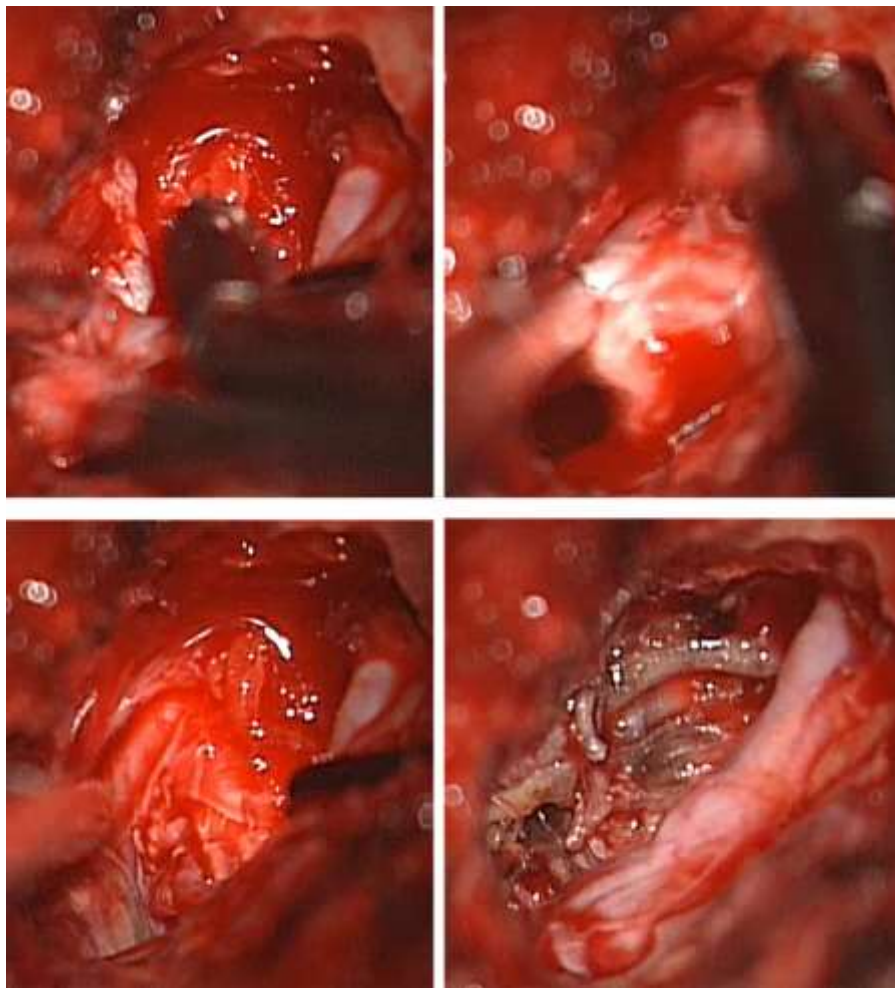


Figure 2 – Stages of endoscopic microdiscectomy

With both methods, patients were mobilized on the next day.

Treatment outcomes were evaluated using the Macnab scale, including the need for additional treatment, duration of rehabilitation treatment, and terms of return to work (Table 2).

Conservative treatment group (2000 patients) was divided into subgroups: 473 patients with hernias or protrusions of ≤ 6 mm, sequesters of ≤ 6 mm in the largest dimension. 544 patients with

hernias of ≤ 7 mm, sequesters of ≤ 7 mm in the largest dimension. 374 patients with hernias of ≤ 8 mm, sequesters of ≤ 8 mm in the largest dimension. 317 patients with hernias of ≤ 9 mm, sequesters of ≤ 9 mm in the largest dimension. 208 patients with hernias of ≤ 10 mm, sequesters of ≤ 10 mm in the largest dimension. 84 patients with hernias of over 10 mm, sequesters of over 10 mm in the largest dimension.

Table 2 – Macnab scale evaluation criteria

Result		Evaluation criteria
4	Excellent	No pain No restriction of mobility Ability to return to normal work and activities
3	Good	Rare non-radicular pain Relief of symptoms. Ability to return to light work
2	Satisfactory	Some improvement in functionality. However – disability, or inability to work.
1	Unsatisfactory	No relief, the symptoms of compression of nerve root(s) persist, and surgical treatment at this level is required. If the intervention has already been performed, repeated surgical treatment is required.

In 473 patients with hernias/disc protrusions of up to 6 mm, conservative treatment was effective and none of them was referred for surgical treatment. Some patients did not stop working during treatment, while the remaining 184 subjects returned to work in less than 2 weeks after being on sick leave.

27 of 544 patients with hernias of ≤ 7 mm required surgical treatment. 82 of 374 patients with hernias of ≤ 8 mm were surgically treated. 242 of 317 patients with hernias of ≤ 9 mm were

surgically treated. 174 of 208 patients with hernias of ≤ 10 mm required surgical treatment. Out of 84 patients with hernias over 10 mm, surgical treatment was performed in 78 patients.

However, the result of conservative treatment did not remain stable. After a certain period of time, patients experienced relapses, or there was a gradual deterioration in symptoms. The long-term period in the conservative group of patients was analyzed using the Macnab scale.

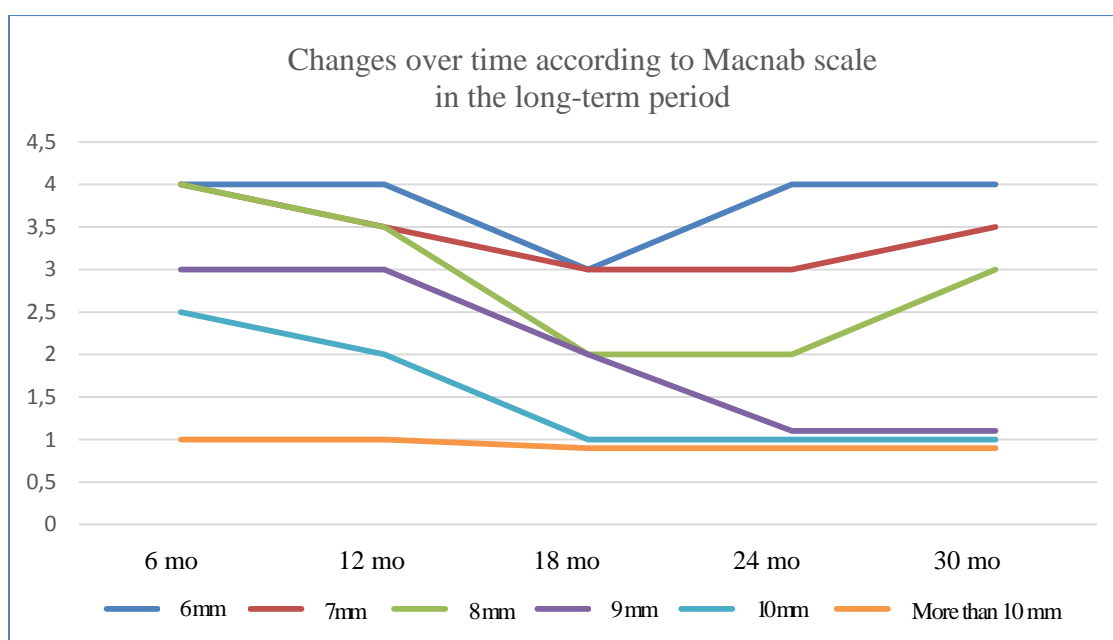


Figure 3 – Changes over time according to Macnab scale in the long-term period

The long-term period is shown in Figure 3. The vertical axis represents groups based on Macnab scale, the horizontal axis represents months after

hernia appearance, colored lines are for groups of patients depending on the size of hernias. As can be seen, relapses occurred in the groups of patients

with 6 mm and 7 mm hernias, but after treatment, their state improved again. Patients with 8 mm hernias had prolonged periods of exacerbation. In patients with hernias of ≥ 9 mm, even though having primary improvement, long-term deterioration eventually occurred.

In the microendoscopic discectomy group, 900 of 1000 patients had excellent results, 60 had good results, 20 had satisfactory results, and 20 had unsatisfactory results. In general, the overall success rate was 98 %. The surgery time ranged from 210 to 60 minutes, averaging 45 minutes. In the microdiscectomy group, 930 of 1000 patients had excellent results according to Macnab scale, 50 had good results, 10 had satisfactory results, and 10 had unsatisfactory results. The overall success rate was 99 %. The surgery time ranged from 120 to 18 minutes, averaging 35 minutes.

Long-term results in this group of patients were also followed up and assessed using the Macnab scale. Relapses of hernias in the endoscopic

discectomy group were found in 18 patients, which was 1.8%. Relapses of hernias in the microsurgical removal group occurred in 11 patients, which was 1.1%.

Discussion

Currently, the results of conservative treatment of lumbar hernias are being discussed in the literature. In general, according to the authors, the result of conservative treatment is inversely proportional to the size of hernias: the smaller the hernia, the more successful the treatment results [1, 2]. Moreover, there is no clear correlation with conservative treatment methods [3].

At the same time, the results of surgical intervention directly correlate with the size of hernias or sequesters: the larger the hernia, the better the outcome [4, 5, 6]. Alternatively, microsurgical and endoscopic interventions were used with similar outcomes and relapse rates [7, 8].

Conclusions

Modern conservative methods of treatment allow obtaining good outcomes with hernias of even ≤ 8 mm. In patients with hernias of 8 mm to 10 mm the results of conservative treatment are generally not satisfactory and relapses occur

quickly. In patients with hernias of over 10 mm, conservative treatment is not recommended; positive outcomes are possible only with the use of surgical methods.

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Conflict of interest

The authors declare no conflict of interest.

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