Journal of
Head Neck & Spine Surgery
ISSN: 2577-2864

Research Article
Volume 4 Issue 5 - May 2023
DOI: 10.19080/JHNSS.2023.04.555650

J Head Neck Spine Surg

Analysis of the Results of Surgical Treatment of Herniated Intervertebral Discs in the Lumbar Spine using Endoscopic Microdiscectomy and Standard Microdiscectomy

Sh Sh Shatursunov[1], Shomansur Sh Shatursunov[1]*, S A Mirzakhonov[1], D I Eshkulov[1] and Kh A Abdusattarov[2]

[1]*Republican Specialized Scientific and Practical Medical Center of Traumatology and Orthopedics, Tashkent, Uzbekistan*

[2]*Tashkent Medical Academy, Tashkent, Uzbekistan*

Submission: April 05, 2023; **Published: May 09, 2023**

***Corresponding author:** Shomansur Sh Shatursunov, Republican Specialized Scientific and Practical Medical Center of Traumatology and Orthopedics, Tashkent, Uzbekistan Email: shomansur1@gmail.com

Abstract

The results of percutaneous endoscopic and microsurgical discectomy are compared. It was found that the time of surgery, significant bed-days and the period of disability were associated with the group of endoscopic microdiscectomy. The rates of complications and re-arrests as a result of detention were found. The risk of recurrence was 5.4% for the endoscopic group, 5.8% for the microsurgical group. Significant differences in terms of local and radicular pain, quality of life and the physical component of health were not established. The mental health component was the best in the endoscopic group. Good and excellent results according to the Macnub treatment satisfaction scale in the endoscopy group were noted in 88.2% of cases, after microdiscectomy - in 74.9%. Less invasiveness of percutaneous endoscopy was reflected in the reduction of the period of hospitalization and disability. There was a statistically insignificant increase in the risk of hernia recurrence after percutaneous endoscopic discectomy. Indicators of infectious complications in the form of spondylodiscitis and epiduritis were typical for standard microdiscectomy.

Keywords: Herniated Disc; Discogenic Radiculopathy; Lumbar Discectomy; Endoscopic Microdiscectomy; Standard Microdiscectomy; Recurrence of Herniated Disc

Abbreviations: PSLD: Percutaneous Stenoscopic Lumbar Decompression; MD: Microdiscectomy

EMD: Endoscopic Microdiscectomy; ENMG: Electroneuromyography; EOC: Electronic-Optical Converter

Introduction

According to modern literary sources, about 80% of people during their lives suffered at least one episode of low back pain with or without pain in the lower extremities [1,2]. Up to 70% of people at least once in their lives experienced such back pain that made them turn to a neurologist, and 19% of those who applied were forced to resort to surgery due to the lack of a tangible effect from conservative therapy [2,3]. In 5-10% of patients, low back pain is caused by herniated intervertebral discs and is accompanied by radiculopathy and sciatica in 43% of cases [3]. The number of patients with a herniated disc is increasing all over the world, including at the expense of young people. Currently, one of the most effective and at the same time relatively safe methods of treatment of intervertebral hernia of the lumbosacral spine is its endoscopic removal [1,4].

There are several stages in the evolution of endoscopic technologies in medicine, each of which is characterized by the improvement of equipment and the emergence of new diagnostic and treatment methods: fiber optic (1958–1981), digital (1981–2003) and the modern stage of telemedicine technologies. Leaving aside the first attempts at intravital endoscopy of the epidural and subarachnoid spaces of the human spinal cord, undertaken by Pool in 1937, the beginning of the introduction of endoscopic

methods of treating spinal diseases into clinical practice should be considered the 80s. XX century., attributable to the digital period of endoscopy. By that time, modern models of rigid and flexible endoscopes had already been designed, and they were tested in various fields of surgery. Thanks to this, a high level of diagnostic and therapeutic endoscopic interventions on the spine was achieved by the efforts of neurosurgeons and orthopedists in a relatively short time interval.

Percutaneous video endoscopic spine surgery currently includes operations performed from percutaneous access under the control of radiation and video endoscopic imaging methods, using rigid multichannel endoscopes and special instruments. Such a combination of interventional and video endoscopic technologies in spinal surgery is referred to in the English-language literature as a full-endoscopy method (literally - "completely endoscopic"). In the 1990s, a technique was developed that made it possible to use endoscopic discectomy and endoscopic posterior interbody fusion; An original port for interlaminar access was developed and introduced into clinical practice. At the same time, the principles of endoscopic decompression were developed for the treatment of degenerative spinal stenosis [5]. Thus, endoscopic methods for removing intervertebral hernias using the interlaminar PSLD (Percutaneous Stenoscopic Lumbar Decompression) method have been introduced into surgical practice. PSLD has the features and benefits of minimally invasive treatment, including a small incision, little blood loss, atraumaticity, and, as a result, early rehabilitation. PSLD does not disrupt the structure of the spinal canal, does not affect the stability of the spine, and does not lead to significant postoperative fibrosis in the spinal canal [6-8].

The popularization of this technique has accelerated technical progress in this field of medicine. The possibilities of percutaneous endoscopic surgery have increased significantly [9-11]. Access to the spinal canal is no longer absolutely dependent on the presence of interosseous spaces of the spine and their size. In terms of the surgical accessibility of herniated intervertebral discs, percutaneous endoscopy with all the approaches and techniques available to the neurosurgeon is not inferior to standard microdiscectomy (Figure 1). Despite the prevalence of the technique, it remains unclear to this day whether endoscopic microdiscectomy will become the new standard of surgical treatment for discogenic lumboischialgia, while displacing lumbar microdiscectomy. In terms of the surgical accessibility of herniated intervertebral discs, percutaneous endoscopy with all the approaches and techniques available to the neurosurgeon is not inferior to standard microdiscectomy. Despite the prevalence of the technique, it remains unclear to this day whether endoscopic microdiscectomy will become the new standard of surgical treatment for discogenic lumboischialgia, while displacing lumbar microdiscectomy. The final answer- to this question will probably be obtained in the course of randomized controlled trials of clinical efficacy, taking into account all options for the use of intracanal endoscopic approaches and techniques. In connection with the above, there is a need for further comparative prospective studies of microdiscectomy (MD) and endoscopic microdiscectomy (EMD), which was undertaken in this work [12,13] (Figure 1).

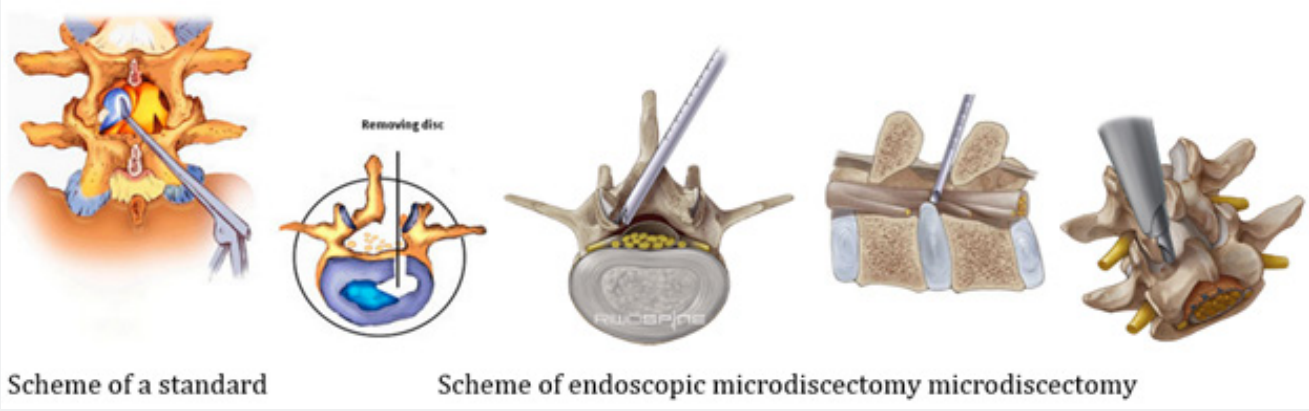

Figure 1: Standard and endoscopic microdiscectomy.

Materials and Methods

A prospective non-randomized study of 156 patients with herniated lumbar intervertebral discs operated in the clinic of vertebrology of the Republican Specialized Scientific and Practical Medical Center of Traumatology and Orthopedics of the Ministry of Health of the Republic of Uzbekistan for the period from 2020 to 2023 was carried out. The study included patients aged 20 to 76 years who had lumboischialgia due to herniated lumbar intervertebral disc hernia. All patients underwent a comprehensive neurological and instrumental examination, including traditional and functional radiography of the lumbosacral spine, MSCT (CT) and MRI, as well as electroneuromyography (ENMG).

How to cite this article: Sh Sh Shatursunov, Shomansur Sh Shatursunov, S A Mirzakhonov, D I Eshkulov, Kh A A. Analysis of the Results of Surgical Treatment of Herniated Intervertebral Discs in the Lumbar Spine using Endoscopic Microdiscectomy and Standard Microdiscectomy. J Head Neck Spine Surg. 2023; 4(5): 555650. DOI: 10.19080/JHNSS.2023.04.555650

The criteria for selecting patients for the study were the ineffectiveness of conservative therapy for more than 3 months, frequent recurrences of pain (more than 3 times a year), the presence of neurological symptoms in the lower extremities, MRI or CT verification of a herniated disc at the level of L3-L4, L4-L5 or L5–S1, as well as electroneuromyography confirmation of root compression. The study did not include patients operated on for repeated disc herniation, who had more than one level of lesions, degenerative spinal canal stenosis, instability of the spinal segments, as well as patients with severe concomitant somatic pathology. The inclusion of patients in one of the groups was carried out in accordance with the technique of the performed operation. The first group consisted of patients operated on by microsurgical discectomy (n = 64), the second - patients who underwent endoscopic discectomy using the PSLD (Percutaneous Stenoscopic Lumbar Decompression) technique (n = 92). All patients were operated on by the same surgical team. Each technique used a standard set of instruments. The choice of the surgical technique was based on the preference of the patient and the availability of the necessary equipment at the time of the operation. Patients became more active on the first-fourth day after the operation and observed the orthopedic regimen for a month after the operation.

A comparative analysis of the outcome was performed on the basis of self-assessment of the functional state according to the Oswestry quality of life scale 3 and 6 months after the operation. The following indicators were also assessed: the severity of the pain syndrome according to the 100-mm visual analog pain scale (VAS), the subjective outcome of the treatment according to the Macnub criterion [2]. Statistical processing was carried out using the Statistica 8.0 program (StatSoft Inc.). The statistical significance of the differences was established for repeated measurements (3 and 6 months after the operation).

Operations were performed under spinal or general anesthesia. The thoracic-knee position was used to reduce intraoperative bleeding from epidural veins [9], as well as to reduce the necessary resection of bone structures during access due to the positional increase in the interlaminar gap. The first stage of the operation is fluoroscopic control of the level of intervention using an image intensifier tube (electronic-optical converter-EOC) (Figure 2).

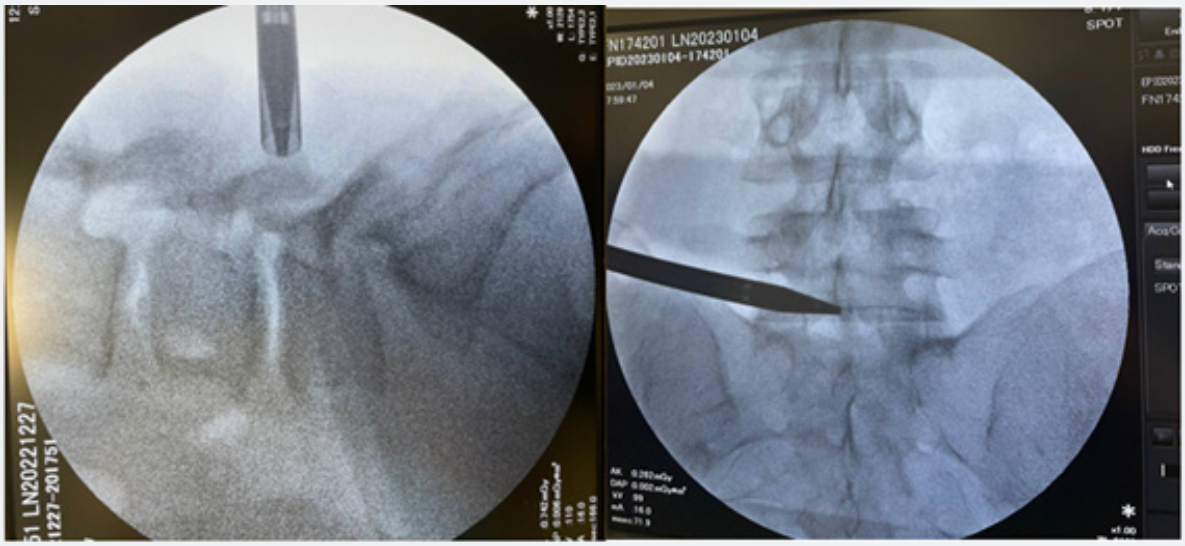

Figure 2: Controlling endoscope via EOC.

It is very important to position the needle strictly perpendicular to the patient's skin, so we get a clear vector, relative to which we plan the skin incision. With the help of an image intensifier tube, the needle is placed in the direction of the desired intervertebral disc. After determining the access level, the position of the intervertebral disc relative to the specified access trajectory is noted on the x-ray. If, at the same time, the vertebral arch is visualized on the access trajectory, it is advisable to shift the incision center somewhat caudally, for better visualization of the ligament flavum and ease of work in the interlaminar space. We also consider it necessary at this stage to assess the location of the herniated disc in relation to the bone structures that will be in the area of access (intervertebral joint, pedicle, edge of the underlying vertebral body). The next step is an incision in the skin and subcutaneous tissue 0.5 cm lateral to the midline. Next, the aponeurosis of the muscles that straighten the spine is opened with a linear incision and dilators are installed, which form access through the muscles for the working port (Figure 3).

How to cite this article: Sh Sh Shatursunov, Shomansur Sh Shatursunov, S A Mirzakhonov, D I Eshkulov, Kh A A. Analysis of the Results of Surgical Treatment of Herniated Intervertebral Discs in the Lumbar Spine using Endoscopic Microdiscectomy and Standard Microdiscectomy. J Head Neck Spine Surg. 2023; 4(5): 555650. DOI: 10.19080/JHNSS.2023.04.555650

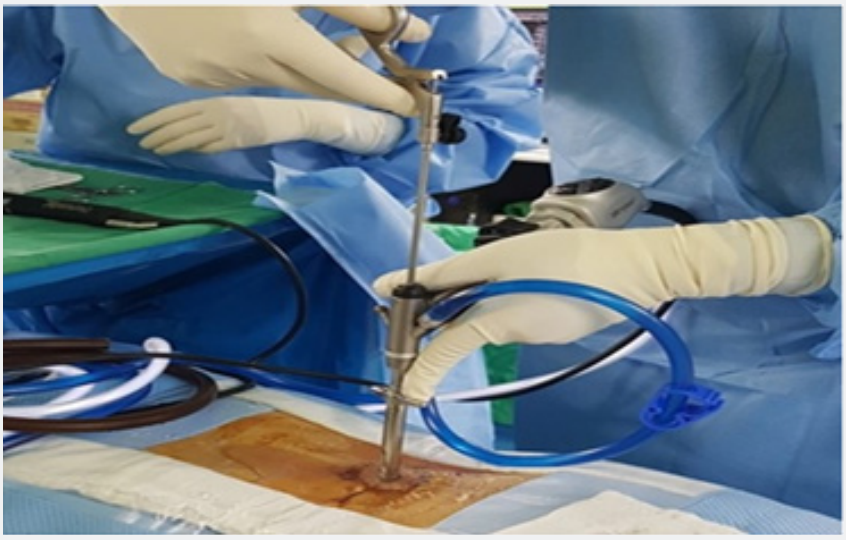

Figure 3: Endoscopic approach to the lumbar spine herniated disc.

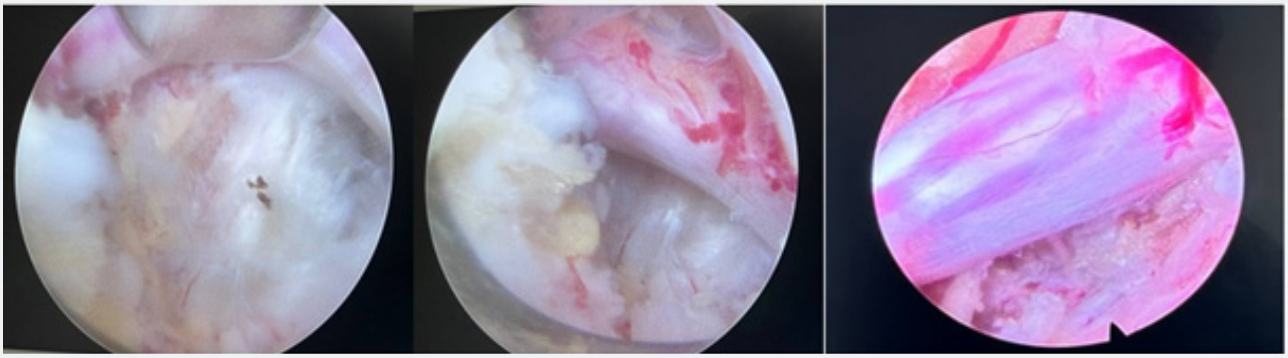

Figure 4: Intraoperative view of spinal nerves.

From this point on, manipulations are performed under endoscopic control. The interlaminar gap is freed from fiber and soft tissues, then the yellow ligament is opened. We recommend blunt opening of the ligamentum flavum due to the lack of three-dimensionality of the endoscopic picture and the high probability of damage to the dura when opening the ligamentum flavum with a sharp instrument. After partial resection of the ligamentum flavum, we consider it most appropriate to visualize the origin of the spinal nerve (Figure 4).

After the nerve is displaced medially, a herniated disc is isolated. Particular attention at this stage of the operation should be given to hemostasis, since the aggressive removal of a herniated disc usually causes damage to the ventrally located veins, which significantly complicates further manipulations in the narrow space of endoscopic access. Opening and removal of a herniated disc is not the last stage of the operation. It is necessary to open the posterior longitudinal ligament, inspect the ventral surface of the dural sac, using the possibility of rotating the endoscope and changing the angle of the port. Next, free fragments of the intervertebral disc are removed and excessive hydraulic pressure is created in the disc cavity to check the completeness of the hernia removal and prevent the development of acute recurrence. As a final step, we always perform an economical foraminotomy to increase the reserve space for the spinal nerve.

Results and Discussion

The neurological status of patients before surgery varied according to the intensity of the radicular pain syndrome and

How to cite this article: Sh Sh Shatursunov, Shomansur Sh Shatursunov, S A Mirzakhonov, D I Eshkulov, Kh A A. Analysis of the Results of Surgical Treatment of Herniated Intervertebral Discs in the Lumbar Spine using Endoscopic Microdiscectomy and Standard Microdiscectomy. J Head Neck Spine Surg. 2023; 4(5): 555650. DOI: 10.19080/JHNSS.2023.04.555650

the duration of the disease. Immediately after the operation, the majority of patients experienced a complete regression of radicular pain syndrome, and all patients were subjected to the same activity restrictions - restriction of axial loads and strictly mandatory wearing of an orthopedic lumbar corset for 1 month after the intervention. Of the 92 patients in the endoscopic group, 5 (5.4%) had a relapse, which required a second operation. In 4 (3.4%) patients, prolonged pain was observed within 1 month after discharge, which corresponded to an unsatisfactory result on the Macnub scale. In 7 (7.6%) patients, short-term pain of a pulling nature was observed for no more than 1 week after surgery. Another 6 (6.5%) patients had short-term sensations, qualified by patients as aching pain in the same dermatome as before the operation, but regressed on the 1st–2nd day after the operation. The remaining patients noted the complete disappearance of all symptoms and returned to normal life soon after discharge. Thus, the efficiency of the endoscopic method was 88.2%. In group 1 of patients, where standard microdiscectomy was performed, excellent and good results occurred in 74.9% of cases.

The frequency of complications - damage to the dura mater, spondylodiscitis and damage to the roots was 3.2%, the frequency of reoperations for recurrent disc herniation was 5.8%. In the process of performing the work, an analysis was made of the technical characteristics and use of the endoscopic discectomy method in comparison with the microsurgical method. It is noted that with the endoscopic method it is possible to use standard microsurgical instruments; due to the technical possibility of rotating the endoscope around the port, a more efficient use of the access space during endoscopic interventions has been achieved. Analysis of the results of removal of herniated intervertebral discs by the portal endoscopic method 6 months after the operation showed that portal endoscopic techniques are highly effective and less traumatic. According to our data, the efficiency of endoscopic microdiscectomy in the removal of herniated intervertebral discs is 95.9%, while in microsurgical discectomy it is 85.5%.

The most significant complication of both types of operations was the recurrence of herniated intervertebral discs. In the 1st group of patients, relapse was in 5.8% of cases, and in the 2nd group - in 5.4%. Similar results may be associated with more significant aggression during surgery and destabilization of the segment in the postoperative period with subsequent development of recurrent disc herniation in the operated segment. In 1.1% of cases with endoscopic microdiscectomy, damage to the dura mater was noted, which did not lead to any symptoms.

An analysis of the technical capabilities of endoscopic microdiscectomy showed the possibility of using all standard microsurgical instruments during the operation without impairing the visibility of the surgical intervention area. When applying this method, the space created during the access is used much more efficiently. Given the less traumatic approach and the effective use of a plasma coagulator, less pronounced bleeding was noted throughout the operation.

Conclusion

Based on the study, we can say that the efficiency of endoscopic discectomy is comparable to the microsurgical technique. Considering that this method is comparable to microdiscectomy in terms of its technical characteristics and capabilities, this technology can be used to remove herniated intervertebral discs. In some cases, the technical capabilities of the method allow decompression of nerve structures, which can be used in the treatment of non-discogenic spinal canal stenoses.

References

1. Arestov SO (2006) Endoscopic neurosurgery in the treatment of herniated intervertebral discs of the thoracic and lumbosacral spine. Cand honey Sciences p. 24.
2. Byvaltsev VA, Belykh EG, Sorokovikov VA, Arsenteva NI (2011) Use of scales and questionnaires in vertebrology. Zhurnal nevrologii i psikhiatrii imeni S S Korsakova 111(9): 51-56.
3. Byvaltsev VA, Sorokovikov VA, Kalinin AA, Panasenkov SY, Belykh EG, et al. (2010) Comparative analysis of effectiveness of endoscopic, microsurgical and endoscopic-assisted diskectomy in treatment of patients with lumbar intervertebral disk herniations. Zh Vopr Neirokhir Im N N Burdenko 4: 20-26.
4. Volkov IV (2017) Results of transforaminal endoscopic discectomy in herniated intervertebral discs of the lumbosacral spine. Traumatol. and a podiatrist. Russia 23(3): 32-42.
5. Kravtsov MN (2021) Historical aspects of videoendoscopic surgery of the lumbar spine. Spinal surgery 18(1): 70-77.
6. Chen Z, Zhang L, Dong J, Xie P, Liu B, et al. (2018) Percutaneous transforaminal endoscopic discectomy compared with micro endoscopic discectomy for lumbar disc herniation: 1-year results of an ongoing randomized controlled trial. Journal of Neurosurgery 28(3): 300-310.
7. Heo DH, Lee N, Park CW, Kim HS, Chung HJ (2020) Endoscopic unilateral laminotomy with bilateral discectomy using biportal endoscopic approach: technical report and preliminary clinical results. World Neurosurgery 137: 31-37.
8. Kim JE, Yoo HS, Choi DJ, Park EJ, Jee SM (2021) Comparison of minimal invasive versus biportal endoscopic transforaminal lumbar interbody fusion for single-level lumbar disease. Clinical Spine Surgery 34(2): 64-71.
9. Ruetten S, Komp M, Merk H, Godolias G (2007) Use of newly developed instruments and endoscopes: full-endoscopic resection of lumbar disc herniations via the interlaminar and lateral transforaminal approach. Journal of Neurosurgery Spine 6(6): 521-530.
10. Schubert M, Hoogland T (2005) Endoscopic transforaminal nucleotomy with foraminoplasty for lumbar disk herniation. Oper Orthop Traumatol 17(6): 641-661.
11. Wang H, Song Y, Cai L (2017) Effect of percutaneous transforaminal lumbar spine endoscopic discectomy on lumbar disc herniation and its influence on indexes of oxidative stress. Biomedical Research 28(21): 9464-9469.
12. Macnab D, Fitzsimmons G, Casserly C (1987) Development of the life roles inventory – values scale. Canadian J. Counselling 21(2-3): 86-98.
13. Zorin NA (2014) Comparative assessment of the effectiveness of endoscopic transforaminal microdiscectomy and open microdiscectomy in the treatment of herniated intervertebral discs of the lumbar spine. Ukr Neurochir Journ 3: 61-65.

How to cite this article: Sh Sh Shatursunov, Shomansur Sh Shatursunov, S A Mirzakhonov, D I Eshkulov, Kh A A. Analysis of the Results of Surgical Treatment of Herniated Intervertebral Discs in the Lumbar Spine using Endoscopic Microdiscectomy and Standard Microdiscectomy. J Head Neck Spine Surg. 2023; 4(5): 555650. DOI: 10.19080/JHNSS.2023.04.555650

DOI: 10.19080/JHNSS.2023.04.555649

How to cite this article: Sh Sh Shatursunov, Shomansur Sh Shatursunov, S A Mirzakhonov, D I Eshkulov, Kh A A. Analysis of the Results of Surgical Treatment of Herniated Intervertebral Discs in the Lumbar Spine using Endoscopic Microdiscectomy and Standard Microdiscectomy. J Head Neck Spine Surg. 2023; 4(5): 555650. DOI: 10.19080/JHNSS.2023.04.555650