

DOI: <https://doi.org/10.56936/18290825-2022.16.4-36>**MICRODISCECTOMY: AN OBSERVATIONAL STUDY****STEPANYAN N.A.^{1*}, BADALYAN S.H.^{1,2}, ALEKSANYAN V.A.¹, NAZINYAN R.A.¹,
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ABSTRACT

Intervertebral disc herniation, which is an inevitable and aging process due to intervertebral discs unique anatomical and physiologic characteristics and spine biomechanics, can lead to compression of one or more nerve roots, producing radiculopathy. There are two treatment options non-surgical and surgical or the combination of both depending on individual clinical findings for this issue. Surgical management includes several options with different success and complications rate. The options also have different implementation rate. The aim of current study is to show the efficacy and safety of microdiscectomy as a surgical treatment option in our clinical practice. We enrolled 91 patients from 2019 to 2021, who were operated using microdiscectomy technique, discharged within few days and were prescribed to use semi-hard lumbar brace for a month and were followed up until 2022 November. No any patient was considered as a surgical management candidate simply for low back pain. Immediate and complete or nearly-complete pain relief, sensory deficit and motor weakness improvement were the predictors of surgical management success and were achieved in all patients. There were no cases of intraoperative complications and failed back surgery. One patient (1.1%, 1/91) developed cerebrospinal fluid leakage from the wound on postoperative day 7, which resolved with additional dermal sutures. Recurrence rate of disc herniation was 1.1% (1/91). This patient was successfully reoperated without significant quality of life affection.

The implementation of microdiscectomy technique in our clinical practice was successful, and from medical point of view highly effective and safe surgical management option for treatment of disc herniation with radiculopathy in cases where non-surgical management options failed to resolve the issue or there were indications for urgent surgical management. We hope that this technique eventually will become a gold standard for surgical treatment of disc herniation with radiculopathy in Armenia.

KEYWORDS: disc degeneration, disc herniation, radiculopathy, surgical management.**INTRODUCTION**

The function of the intervertebral disc is to permit stable motion of the spine while supporting and distributing loads under movement [Adams M et al., 1988]. The intervertebral disc has been char-

acterized as the largest nonvascularized structure in the human body [Fournier D et al., 2020], which imparts some unique attributes [Wilke H et al., 1999] to it namely intervertebral disc degenera-

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tion, which is an aging process that affects a large portion of the adult population [Fardon D, Milette P, 2001]. The underlying causes of intervertebral disc degeneration are multifactorial and subject to ongoing research [Videman T et al., 1995]. Once the pathologic and radiographic signs of intervertebral disc degeneration have manifested, those changes are irreversible and often progressive. Intervertebral disc degeneration [Amin R et al., 2017] can further lead to discs material herniation outside the normal confines of the disc space which in turn may compress one or more nerve roots, producing radiculopathy [Peng B et al., 2005; 2006] (defined as irradiating dermatomal pain with sensory deficits and motor weakness at various combinations). Because of spine biomechanics disc herniations mostly occur at the lumbar level.

Treatment usually starts with non-surgical management [Nygaard P, 1994; Schoenfeld A, Weiner B, 2010].

Surgical management is indicated when there is a failure of non-surgical management to control pain after 5-8 weeks (over 85% of patients with acute disc herniation will improve without surgical intervention in an average of 6 weeks) [Koebe C et al., 2002].

Surgical management is considered emergent (i.e., before the 5-8 weeks of symptoms have lapsed) in cases listed below [Weinstein J et al., 2006]:

- a) cauda equina syndrome [Spector L et al., 2008]
- b) acute development or progression of motor weakness (e.g. foot drop)
- c) for patients whose pain remains intolerable in spite of adequate narcotic pain medication.

Once it is decided to treat surgically, options include:

1. trans-canal approaches
 - a) standard open lumbar laminectomy and discectomy
 - b) microdiscectomy
 - c) sequestrectomy
2. intradiscal procedures:
 - a) chemonucleolysis
 - b) automated percutaneous lumbar discectomy
 - c) percutaneous endoscopic intradiscal discectomy
 - d) intradiscal endothermal therapy
 - e) laser disc decompression

These options have different success, complication and implementations rates [Bigos S et al., 1994; Puvanesarajah V, Hassanzadeh H, 2017],

detailed description of which is beyond the scope of current study's aims.

The aim of current study is to show the effectiveness and superiority of microdiscectomy as a choice modality for surgical treatment of disc herniation with radiculopathy in general and also its successful implementation in our clinic.

As a surgical method microdiscectomy with the use of microscope was first used by Yasargil and Caspar independently in Europe in 1977. In 1978 Williams R. popularized the technique in USA. Since then, studies demonstrated the safety and efficacy of the technique which in time became as a gold standard for herniated disc surgery [Williams R, 1978; Caspar W et al., 1991; Postacchini F, Postacchini R, 2011].

MATERIALS AND METHODS

We enrolled 91 patients from 2019 to 2021, who met the criteria (radiographically identified herniated disc with corresponding radiculopathy and failed non-surgical management). Male to female ratio was 1.5:1. The mean age was 51 years old; the youngest patient was 29 years old and the oldest – 80 years old (Fig. 1).

The diagnosis was confirmed by clinical and radiologic (MRI with 1.5T resolution) findings. In case of conflicting findings needle electromyography was also used. All patients in the sample had disc herniation at the lumbar spine level.

The cauda equina syndrome, acute or progressive motor weakness and pain intolerance with narcotic analgesics were considered as an emergency. Non-emergent patients received non-surgical management with or without physical therapy program within one or two weeks (depending on pain tolerance) as a first step of treatment. Patients who failed non-surgical management were considered as surgical candidates. No any patient was considered as surgical management candidate simply for low back pain. Microdiscectomy with posterior midline approach and

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is possible, due to the
uniting the knowledge and
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general anesthesia was performed as a surgical management option for all patients. Intraoperative radiography was used to confirm the target level. Microscope was used for visualization. Ligamentum flavum along with small inferior part of superior laminae was removed for neural structures clear identification. Facet joint capsule was preserved. The successful identification and removal of herniated disc material was achieved in all patients. All patients received prophylactic antibiotics and pain killers for operative regions local pain postoperatively for few days.

Patients were activated after 24h from surgery with the use of lumbar semi-hard brace and discharged within next few days. Lumbar brace was indicated to use within a month after surgery while ambulation and advised to restrict heavy physical work. The primary endpoints of successful surgery were immediate and complete or nearly-complete pain relief, sensory deficit and motor weakness improvements. There were no cases of intraoperative complications or failed back surgery, probably because of the current sample size. All patients after discharge were followed until 2022 November.

RESULTS AND DISCUSSION

Immediate and complete or nearly-complete pain relief was achieved in all patients, although there were reports of legs muscle spasms and light residual pain within the next few days which were resolved spontaneously. In cases where there were sensory deficit and motor weakness, improvements were registered within following months. The degree of improvements was dependent on radiculopathy duration and severity preoperatively. There wasn't any case of unchanged or worsened sensory deficit and motor weakness postoperatively, although some cases take several months to make

improvements. Heavy physical work restrictions were not possible to achieve in all patients. During the follow-up period additional treatment was not used. There were no cases of intraoperative complications and failed back surgery. One patient (1.1%, 1/91) developed cerebrospinal fluid leakage from the wound on postoperative day 7, which resolved with additional dermal sutures. Recurrence rate of disc herniation was found in one patient (1.1% ,1/91) during follow-up period. This patient was successfully reoperated without significant quality of life affection.

We compare our results to other studies, which were done by different authors outside of our country [Dohrmann G, Mansour N, 2015; Bombieri F et al., 2022]. According to these studies 84.3% (range: 73-96%) of 3400 patients, who were operated using microdiscectomy technique with mean follow-up of 4.1 years (range: 1.5-20.7 years), achieved good/excellent results. 79.5% (range: 77-95%) of 1101 patients, who were operated using endoscopic microdiscectomy technique with mean follow-up of 2.9 years (range: 2.3-6.4 years), achieved good/excellent results. 78.3% (range: 63-96%) of 34.547 patients, who were operated using standard discectomy technique with mean follow-up of 6.3 years (range: 1.5-27.8 years), achieved good/excellent results (excellence degree was measured by patients' overall satisfaction of surgery). The overall results also showed that the rate of efficacy decreased during follow-up years. In the microdiscectomy group, durotomy-related complications were reported at a frequency of 2.3% (number of included patients: 2730), recurrent disc herniation was 5.1% (number of included patients: 3092), nerve root injury was 0.3% (number of included patients: 1777), wound complications were 3.5% (number of included patients: 2942). In the endoscopic microdiscectomy group, durotomy-related complications were reported at a frequency of 4.4% (number of included patients: 1526), recurrent disc herniation was 3.9% (number of included patients: 1392), nerve root injury was 0.8% (number of included patients: 1241), wound complications were 1.2% (number of included patients: 1526). In the standard discectomy group, durotomy-related complications were reported at a frequency of 6.6% (number of included patients: 227), recurrent disc herniation was 4.1% (number

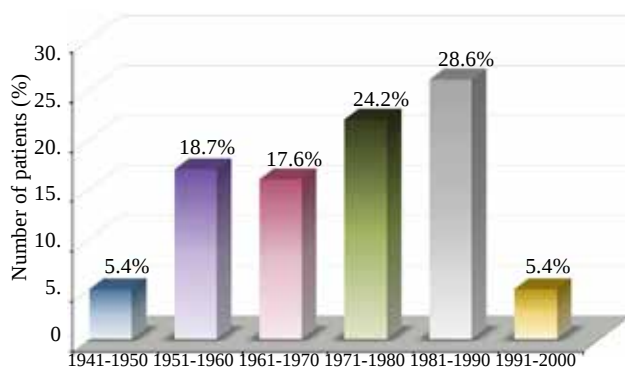


FIGURE. Distribution of patients by age groups.

of included patients: 227), there were no nerve root injury, wound complications were 3.5% (number of included patients: 227).

Our sample included only 91 patients with 1 year of follow-up, and showed 100% of good/excellent results with a very low complication and recurrence rate. For more accurate results, we need bigger sample and longer follow-up period on which we are working currently.

Overall, our study showed that it was possible for us, after microdiscectomy technique implementation in our clinical practice, to achieve satisfactory results which are comparable to developed countries provided healthcare level in current issue.

Currently in Armenia the exact epidemiology of disc herniation with radiculopathy is unknown and treatment options vary between hospitals. We lack the information regarding treatment option choices, their efficacy, complication rates in different hospitals. Not all patients can afford to receive the treatment they need because of lack of insurance policy at the governmental level and inability to pay for treatment. There are difficulties regarding the radiographic examinations too, because of high prices. It is also difficult to achieve healthy lifestyle at populations level because of countries development level in general, which with the number of heavy physical workers makes the population more prone to development of disc herniation with radiculopathy. So, we need to develop unified recommendations for

healthcare of these patients and to make it safe and effective whenever it is possible.

CONCLUSION

The implementation of microdiscectomy in our clinical practice was technically successful, and from medical point of view highly effective and safe surgical management option for treatment of disc herniation with radiculopathy. Comparison with other studies also showed satisfactory results. Taking into account the level of economic development in Armenia, including healthcare system, and also lack of data regarding epidemiology and treatment details in different hospitals, currently there is a lack of unified recommendations regarding treatment options of disc herniation with radiculopathy. Overall, our study showed that it was possible for us to achieve satisfactory results which are comparable to developed countries provided healthcare level in current issue using microdiscectomy technique. We hope that within time this technique will become as a choice modality for surgical management of disc herniation with radiculopathy in Armenia. Further randomized controlled trials are required to compare microdiscectomy technique effectiveness and safety with other surgical options, and to improve postoperative results and decrease recurrence rates. There are also requirements to study and develop non-surgical treatment options and physical therapy program.

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