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SHORT-TERM OUTCOMES OF THREE DIFFERENT SURGICAL PRACTICES IN LUMBAR DISC HERNIATION

Hülagü Kaptan[1], Ömür Kasımcan[2], Murat Yılmaz[1]

[1]*Dokuz Eylül University, MedicalFaculty, Department of Neurosurgery, İzmir, Türkiye*
[2]*Istinye University, Medical School, Department of Neurosurgery, İstanbul, Türkiye*

ABSTRACT

Objective: *Many surgical protocols are used for surgical treatment of lumbar disc herniation. Here, we discussed the postoperative short-term outcomes of patients with lumbar disc herniation who underwent three different surgical protocols.*

Material and Method: *This study included patients who underwent simple discectomy, microdiscectomy, and discectomy+implantapproaches to treat lumbar disc herniation. We then compared patient demographics, lumbar segment, and the duration of postoperative hospital stay between the three procedures.*

Results: *There were no statistically significant differences between the simple discectomy and implant groups in terms of the visual analogue pain scale (VAS) and Oswestry disability index (ODI) results ($p>0.05$). Themicrodiscectomy group also had the best Oswestry disability index results for the third month compared with other groups ($p<0.05$).*

Conclusion: *The microdiscectomy group was the most advantageous in terms of VAS score, Oswestry scale and duration of hospital stay. As microdiscectomy is a minimally invasive procedure, it is the preferred method for the surgical management of lumbar disc herniation.*

Keywords: *Simple discectomy, microdiscectomy, discectomy +implant, lumbar disc herniation*

CORRESPONDING AUTHOR: Hülagü Kaptan Department of Neurosurgery, Dokuz Eylül University, Medical Faculty, İzmir, Türkiye hulagukaptan@yahoo.com

HK https://orcid.org/0000-0002-6539-1204 **ÖK https:**//orcid.org/0000-0001-7253-5379 **MY https:**//orcid.org/0000-0002-2912-0386

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LOMBER DİSK HERNİSİNDE ÜÇ FARKLI CERRAHİ UYGULAMANIN KISA DÖNEM SONUÇLARI

ÖZET

Amaç: Lomber disk hernisinin cerrahi tedavisi için birçok cerrahi protokol kullanılmaktadır. Burada lomber disk hernisi olan ve üç farklı cerrahi protokol uygulanan hastaların postoperative kısa dönem sonuçlarını tartıştık.

Materyal ve Metot: Bu çalışma lomber disk hernisini tedavi etmek için basit diskektomi, mikrodiskektomi ve diskektomi+implant yaklaşımları uygulanan hastaları içermektedir. Daha sonra hasta demografisini, lomber segmenti ve ameliyat sonrası hastanede kalış süresini üç prosedür arasında karşılaştırdık.

Bulgular: Görsel analog ağrı skalası (VAS) ve Oswestry disabilite indeksi (ODI) sonuçları açısından basit diskektomi ve implant grupları arasında istatistiksel olarak anlamlı fark yoktu (p>0,05). Mikrodiskektomi grubu ayrıca diğer gruplarla karşılaştırıldığında üçüncü ay için en iyi ODI sonuçlarına sahipti (p<0,05).

Sonuç: VAS skoru, Oswestry skalası ve hastanede kalış süresi açısından mikrodiskektomi grubu en avantajlı gruptu. Mikrodiskektomi minimal invaziv bir işlem olduğundan lomber disk hernisinin cerrahi tedavisinde tercih edilen yöntemdir.

Anahtar kelimeler: Basit diskektomi, mikrodiskektomi, diskektomi+implant, lomber disk hernisi.

INTRODUCTION

Mixter and Barr first described herniated discs as a cause of neural compression in the lumbar spinal canal in 1934.[1] Lumbar disc herniation represents a common medical problem and symptoms; include intractable pain or severe neurological symptoms related to nerve root compression. If radiculopathy and/or neurological deficits occur and persist after six weeks of conservative therapy, lumbar discectomy for carefully selected patients with sciatica due to lumbar disc prolapse provides faster relief.[1-4]

In 1977, Yasargil and Caspar introduced new technology involving the use of an operating microscope for discectomy via the interlaminar approach with partial resection of bony structures, facet joints, and the ligamentum flavum, followed by removal of intervertebral disc material.[5,6] They independently described microsurgical techniques that provided excellent lighting and magnification of the operative field.

The aims of developed methods includemaximizing utilization with minimal invasiveness, translaminar approach, and flavum ligament preservation.[5,7] The use of non-fusion dynamic stabilization systems especially in patients with spinal stenosis in recent years has become a subject of many articles. They are commonly used in interspinous fusion implants.[7] In this study, we compared the short-term outcomes of three different surgical treatment approaches to treat lumbar disc hernias, including simple discectomy, microdiscectomy, and discectomy+interspinous implant (implant).

MATERIAL AND METHOD

Most of the acute sciatica attacks are corrected with the treatment protocols applied. In most patients, analgesic and muscle relaxant drugs, therapy, physiotherapy and spinal injections are sufficient to relieve pain. However, Surgery is required for patients with resistant pain (6 weeks) despite conservative treatment, current clinical findings are worsening (radicular pain, motor weakness, etc.) or acute cauda equida findings.

Study Design and Subjects

Our study group consisted of patients whose pain did not improve or worsened despite conservative treatment. Main complaint of our patients was radicular pain in lower extremities after conservative treatment. Exclusion criteria were only buttock or low back pain, previous spinal surgery, spinal tumors, spinal fracture, spinal stenosis and infection in this study.

Every patient was evaluated with clinical examination and radiological evaluation. All patients were assessed by neurological examination along with Visual Analog Scale (VAS) and Oswestry Disability Index (ODI) preoperatively and at the third month postoperatively. Radiological evaluation was included direct X-ray (lateral and AP grapy) and lumbar Magnetic Resonance Imaging (MRI). We proved that there were no fracture, spondylolisthesis and other bone pathology on the lumbar area with direct X-ray in every patient. We used MRI for evidence of disc herniation for lumbar area after positive clinical examination in the presence of radiculopathy.

Surgical decision was included first; positive clinical examination, second; every patient took regularly conservative treatment before surgery, third; any patient has exclusion criteria and forth; radiological confirmation for only lumbar disc herniation.

We separated patients incidentally for three surgical procedures under the spotlight of information above. This study was included patients underwent simple discectomy, Microdiscectomy and implant due to lumbar disc herniation. We used to implant for reduce incidence recurrent disc herniation, discogenic low back pain; prevent narrowing of foramina and simple fusion.

Demographics of the patients (age, gender), lumbar segment and the duration of postoperative hospital stay (HSD) were compared. Pre- and post op treatment outcome score results were statistically analysed by the Student t test. The determination of statistically differences (post hoc evaluation with Bonferroni) between the groups used the Oneway ANOVA. p values lower than 0.05 were considered to be significant. All data were analysed using SPSS 23 software (SPSS Inc., Chicago, Ill., USA).

All surgical techniques realized under generalized anesthesia with endotracheal intubation. Simple discectomy includes laminotomy and discectomy is the traditional method of removing the herniation of disc. This procedure allows greater room and exposure for the surgeon to take out part of the disc. Midline incision is bigger than microdiscectomy. Microdiscectomy performs with a surgical microscope. Approximately one or two-centimeters incision is made on the midline. It has been minimal incision, retraction and bleeding. But surgeon needs surgical microscope for deep studying. Implant implication was used for prevent foramina height and reduce discogenic pain. This technique was included simple discectomy with interspinous devices (ISD).

The study was conducted in accordance with the ethical standards of participating institutions and with the Helsinki Declaration.

This retrospective study was approved by the ethics review board Selçuk University, 2017-318.

RESULTS

A total of 48 patients were assessed for this study. Each group initially comprised 16 patients. Due to loss to follow-up, patient distribution was as follows: 14 patients in the simple discectomy group, 16 patients in the microdiscectomy group and 15 patients in the implant group. Three patients could not be reached for follow-up.

The mean ages of the patients in the three groups were 50.07±2.8 years, 51.62±11.38 years; 49±10.81 years, respectively. Results of the one-way ANOVA revealed no differences in age (p=0.820) and gender (p=0.947) between the three groups (Table 1). When the preoperative VAS values were compared, the p values for the ODI score were 0.674 and 0.804, respectively. The preoperative VAS and ODI scores did not significantly differ among the three groups (Table 2). The results of the Student's t test revealed a significant difference between the preoperative and postoperative VAS and ODI scores (p<0.05). Three months postoperatively, the results of the one-way ANOVA revealed a significant difference in the VAS, ODI, and HSD values (p<0.05). There was a significant difference in the postoperative VAS, ODI and HSD values between simple discectomy with microdiscectomy. Table 3 presents results of the post-hoc comparison.

The microdiscectomy group had the lowest mean postoperative VAS score (Table 2).[1,6] The results of the post-hoc comparison revealed no significant differences in the VAS and ODI scores between the basic discectomy and implant groups (p>0.05). The microdiscectomy group also had the best three-month postoperative ODI scores compared with other groups (p<0.05; Table 3). There were no perioperative complications. With regard to the duration of hospital stay, the microdiscectomy group was associated with the shortest hospital stay of 1.3 days, while the implant group had the longest hospital stay of 2.5 days. There were no complications due to surgical procedures in our patients in this study. Table 4 presents the levels of hernia in the patients from each group. There was no case at the L5–S1 level for the implant group. There was no case at the L2–3 level for both the microdiscectomy and implant groups.

DISCUSSION

Elective single level discectomies are one of the most common procedures performed by spine surgeons. Practice patterns continue to vary based on case and surgeon preference with regards to application of the intraoperative microscope. Pioneers and proponents of the microsurgical technique argue for its superiority over the macroscopic technique secondary to improved visualization and illumination. These enhancements are thought to decrease tissue disruption and facet trauma resulting in lower complication rates and equivalent or superior patient outcomes.[5-8] Microdiscectomy group

was had lowest VAS score in our study. There was no difference between simple discectomy and implant groups for VAS score. These results are showed that the minimally invasive approach is more effective on the postoperative VAS score for lumbar disc surgery.

We aimed reduce incidence recurrent disc herniation, discogenic low back pain; prevent narrowing of foramina after lumbar disc surgery in our implant group. Also, studies are showed that ISD reduces the increased segmental flexion-extension and lateral bending motions observed after discectomy, restabilisation of spinal segments and reduction of intradiscal pressure and mechanical goal of distracting the interspinous space thus increasing intervertebral space height.[9-15] Kim *et al*. reported no difference in VAS or MacNab outcome scores between groups treated with or without ISD implants over a mean 1 year follow-up period, particularly when the ISD was used to alleviate low-back pain.[16] They noted that its relative advantage was improvement in lordosis after microdiscectomy, albeit minimal. Our study is demonstrated that implant group had long hospital stay after the operation and higher VAS score at the postoperative follow up examination for first three months than other groups. Also, implant group added extra cost to total price. It is necessary to investigate whether the extra cost has an effect on the total price for long-term results.

In recent years, several meta-analyses were performed to evaluate the efficacy of minimally invasion (MI) for treating LDH. Chang *et al.* and Dasenbrock *et al.* leaded the metanalysis that focused on the benefits of MI treatments for LDH, compared with standard discectomy.[17,18] Similar clinical results were acquired by both studies.The continued review and reporting of adverse events is essential to a full understanding of the effectiveness of these procedures. Other procedures are technically more involved, of longer duration, and require more extensive soft tissue destruction. The results of our study are showed that microdiscetomy had a significant effect on hospital stay day, VAS score and ODI score. Microdiscectomy technique for lumbar disc hernia has the lowest score in follow-up than other groups. This is statistically significant in this study. Accordingly, application of a minimally invasive approach to these procedures may very well demonstrate even greater therapeutic gains over the standard open approaches.

This study has some pitfalls. First, we have short follow up period. But it is preliminary results. We still follow up same patients for long-term results. Second, our study groups are small. But it is enough size for statically evaluation. It needs large groups and multicenter studies in future plan. Last one, cost affectivity can investigate for three groups in follow up period. However, we did not design previously for cost effective in this study. But we took cost effective for long-term follow up in next study.

Table 1. Descriptive statistics for groups

	n	Sex (m/f)	Age		HSD	
			Mean	Standart Deviation	Mean	Standart Deviation
Simple discectomy	14	7/7	50.07	12.80	2.21	0.69
Microdiscectomy	16	9/7	49	10.81	1.31	0.17
Implant	15	6/9	51.62	11.38	3.66	0.97

HSD: Hospital stay day

Table 2. Descriptive results for visual analog scale and Oswestry scores

	n	VAS preop		VAS 3th Month		Oswestry preop		Oswestry 3th month	
		Mean	Standart Deviation	Mean	Standart Deviation	Mean	Standart Deviation	Mean	Standart Deviation
Simple discectomy	14	73.57	10.08	17.14	11.38	78.85	7.92	20.14	8.53
Microdiscectomy	16	73.12	8.73	8.12	7.5	80.37	6.8	10.43	7.26
Implant	15	76	9.85	18	9.41	78.86	7.32	24.26	8.13

VAS: Visual analog scale

Table 3. Post op 3th month statistics with Post Hoc Tests for visual analog scale, Oswestry and hospital stay*

Groups	VAS *p* value	Ostwestry *p* value	HSD *p* value
Simple discectomy - Microdiscectomy	0,038	0,005	0,006
Simple discectomy - Implant	1	0,513	0,001
Microdiscectomy - Implant	0,018	0,001	0,001

VAS: Visual analog scale, ***:** Post Hoc test was done with Bonferroni, **HSD:** hospital stay

Table 4. Distribution of cases for lumbar levels

Groups	L2-3	L3-4	L4-5	L5-S1
Simple discectomy	1	2	7	4
Microdiscectomy	0	3	5	8
Implant	0	6	8	0

CONCLUSIONS

Of the three groups studied, the microdiscectomy group was the most advantageous in terms of VAS and ODI scores the duration of hospital stay. Therefore, microdiscectomy as a minimally invasive surgical procedure is the method of choice in the surgical management of lumbar disc herniation. The implant method increases the cost of surgical treatment due to longer duration of hospital stay and the cost of the implant itself.

*The authors declare that there are no conflicts of interest.

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