

Head to Head Comparison of Safety and Effectiveness of Laminectomy and Laminotomy in Lumbar Disc Herniation

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Abstract

Introduction: We compared the clinical effectiveness such as pain relief, duration of hospitalization, time to return to office work, and cost of treatment of micro discectomy and macro discectomy (laminectomy and laminotomy) in patients with lumbar disc herniation performed by a single surgeon.

Methods: 30 patients underwent micro discectomy, 30 underwent laminectomy and remaining 15 laminotomy single-level “virgin” lumbar disc herniation at L4-5 or L5-S1 with unilateral radicular symptoms. Data on demographic, clinical, radiological, complications, time to event data, and cost of treatment (tangible plus intangible) were tabulated.

Results: There was a significant reduction in back pain, leg pain, and numbness before and after surgery in each group. However, no significant differences were observed between the three surgical procedures. Statistically significant differences were observed in the duration of hospitalization and cost of treatment but the differences were not significant in the frequency of use of an analgesic agent after surgery.

Conclusion: For herniotomy for lumbar disc herniation, both macro discectomy and micro discectomy procedures have comparable results in terms of pain reduction at short-term follow-up. However, duration of hospitalization, time to return to office work were less in micro discectomy than other two procedures though the cost of treatment is more.

Key words: Cost effectiveness, Lumbar disc herniation, Macro discectomy, Micro discectomy

INTRODUCTION

Surgical decompression is the conventional surgical treatment modality in patients with lumbar disc herniation and lumbar spinal stenosis.^{1,2} Discectomy and laminectomy are the procedures done to relieve pain associated with trapped spinal nerves, but a discectomy is an operation on the spinal discs, and a laminectomy is an operation on the arched portion of the vertebrae of the spine. As, this later procedure is involved removal of a large amount of normal bone, muscle tissue and sometimes

facet joints which resulted in iatrogenic instabilities to the spine and failed back syndromes.³⁻⁹ However, these conventional techniques were largely replaced by bone-sparing techniques. This study was conducted in an attempt to compare the clinical effectiveness such as pain relief, duration of hospitalization, time to return to office work, and cost of treatment of micro discectomy and macro discectomy (laminectomy and laminotomy) in patients with lumbar disc herniation performed by a single surgeon.

METHODS

A total of 75 patient’s data were evaluated retrospectively from the hospital records during the period March 2015 to October 2015. These patients were in the age group of 20-50 years, having lower back and/or leg pain with magnetic resonance radiology notes either bulging,

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Table 1: Comparison of three different techniques for lumbar disc herniation

Clinical parameters	Laminectomy discectomy (n=30)	Laminotomy discectomy (n=15)	Micro discectomy (n=30)	P value
Age (year)	32±6	36±8	38±7	P>0.05
Male/female	20/10	12/3	12/18	P>0.05
Location				
L4-L5	20	5	14	P>0.05
L5-S1	10	10	16	
MRI				
Bulging	22	11	18	P>0.05
Protrusion	5	2	6	
Extrusion	3	2	4	
Sequestration	0	0	2	
At admission				
Pre-operative back pain (cm)	7.4±1.2	8.1±1.6	7.8±1.1	P>0.05
Pre-operative leg pain (cm)	6.4±2.1	7.6±1.6	8.6±1.4	P>0.05
Pre-operative numbness	30	30	30	P>0.05
At discharge				
Post-operative back pain (cm)	2.4±1.4	2.1±1.2	1.2±1.2	P<0.05
Post-operative leg pain (cm)	1.4±0.8	1.6±1.2	1.1±1.4	P<0.05
Post-operative numbness	4	2	2	P>0.05
Median duration of hospital stay (days)	10	5	3	P<0.05
Cost of treatment (USD)	1000±110	1500±200	2000±340	P<0.05
Median time to normal work (weeks)	8	6	4	P<0.05
Complications				
CSF leak	1	0	0	P>0.05
Infection	1	0	0	P>0.05
Failed back	0	0	0	P>0.05
Motor deficit	0	0	0	P>0.05

CSF: Cerebrospinal fluid

protrusion, extrusion, or sequestration. Patients who had suffered trauma or having systemic inflammatory diseases such as tuberculosis, systemic lupus erythematosus, ankylosing spondylitis, osteoporosis, degenerative disk disease, multiple level disk involvement, and malignancy were excluded. 30 patients underwent micro discectomy, 30 underwent laminectomy, and remaining 15 laminotomy single-level “virgin” lumbar disc herniation at L4-5 or L5-S1 with unilateral radicular symptoms. All surgeries were performed by a single surgeon. Each patient was asked to rate his pain and numbness on a scale from 1 to 10 cm (1 = no pain or deficit and 10 = the most severe pain or deficit) pre-operatively and at discharge from the hospital. Additional findings such as demographic, clinical, radiological, complications, time to event data, and cost of treatment (tangible plus intangible) were also tabulated.¹⁰

Statistical Analysis

Data from case record forms were transferred to Microsoft excel spreadsheet 2007. Data were then cleaned and mined for tabulation. Tables were created using pivotal tables. Continuous data were described as mean ± standard deviation and categorical as numbers and percentages. ANOVA and Chi-square test were used as tests for inferring data between groups. A two-tailed $P < 0.05$ was considered statistically significant.

RESULTS

Demographic and clinical presentations were similar across these three groups (Table 1). There was a significant reduction in back pain, leg pain, and numbness before and after surgery in each group. However, no significant differences were observed between the three surgical procedures. Statistically significant differences were observed in the duration of hospitalization and cost of treatment.^{11,12}

DISCUSSION

Herron and Pheasant,¹³ Lee *et al.*,¹⁴ and Weiner *et al.*¹⁵ have projected a number of persevering surgical techniques (endoscopic or open) to decompress the neural elements while preserving the integrity of important posterior elements. Delank *et al.*¹⁶ in his prospective study clinical and radiologic results of laminectomy were compared with laminotomy found parallel results. Omidi-Kashani *et al.*¹⁷ study also provided sufficient evidence to prefer and recommend laminectomy versus laminotomy over other available surgical decompression methods due to its more simplicity and less operative time. Our study results were similar to Rahman *et al.*¹⁸ report and the results of minimally invasive versus the classic open approach for decompressive lumbar laminectomy in 126 patients with lumbar spinal stenosis.

CONCLUSION

For herniotomy for lumbar disc herniation, both macro discectomy, and micro discectomy procedures have comparable results in terms of pain reduction at short-term follow-up. However, duration of hospitalization, time to return to office work were less in micro discectomy than other two procedures though the cost of treatment is more.

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