

Risk factors of recurrent lumbar disk herniation

Mohammad Shimia, Arash Babaei-Ghazani¹, Bina Eftekhar Sadat¹, Behnaz Habibi, Afshin Habibzadeh²

Departments of Neurosurgery, ¹Physical Medicine and Rehabilitation, Physical Medicine and Rehabilitation Research Centre, ²Cardiology, Cardiovascular Research Centre, Tabriz University of Medical Sciences, Tabriz, Iran

ABSTRACT

Background: Recurrent lumbar disc herniation (LDH) is a common cause of poor outcomes after lumbar discectomy surgery. Studies focused on risk factors of true recurrent disk herniation at the same level and side, are few. The aim of current study is to evaluate risk factors of recurrent disc herniation in Iranian population.

Materials and Methods: We retrospectively reviewed 40 patients with recurrent disc herniation and 120 patients without recurrence to evaluate possible risk factors for herniation recurrence. A clinically significant recurrent herniation was defined as a disc herniation causing leg pain with radiographic (MRI) evidence of disc material at the same side and level of the index surgery causing impingement, compression, or deviation of nerve tissue. A series of patients without recurrence was used for comparison to identify possible risk factors for recurrent LDH.

Results: There was significant difference between groups with and without LDH in sex ($P = 0.003$), smoking habit ($P = 0.004$), height ($P = 0.04$), weight ($P = 0.006$) and occupational characteristic ($P < 0.001$). By putting these differences in logistic regression analysis, it showed that gender (male), taller height, heavy works and being smoker could predict lumbar disc herniation recurrence.

Conclusion: Considering sex, smoking and heavy works as predictors of recurrent LDH, surgeons should advice their patients to limit hard work and put away smoking especially in tall and male ones to prevent LDH recurrence.

Key words: Lumbar disc herniation, recurrence, risk factors

Introduction

Eighty to 90% of operations for herniated lumbar disc attain good results during the first postoperative year.^[1,2] Recurrent lumbar disc herniation (LDH) is a common cause of poor outcomes after lumbar discectomy surgery. Reported of recurrent disc herniation is 5% to 15%.^[3-7] The overall rate of unsatisfactory outcomes after primary lumbar discectomy is 5% to 20%, making recurrent herniation a major cause of pain, disability, and reoperation.^[8-10]

A major reason for recurrent disc herniations after a

discectomy is that the annular rent does not seal completely, thus allowing a weakened defect to continue to be exposed to mechanical intradiscal pressure changes. Risk factors for recurrent disc herniation previously reported in the literature include constitutional weakness of the annular tissue, exposure to repetitive lifting or vibration, heavy lifting, advanced age, smoking, the preoperative size and level of the disc herniation, and the appearance of the herniation at the time of surgery.^[5,11-14]

The aim of current study is to evaluate risk factors of recurrent disc herniation in Iranian population.

Materials and Methods

Study design

In this retrospective study, 40 patients with recurrent herniated lumbar disc (group I) and 120 patients without recurrence after surgery (group II) were randomly selected among patients who had herniated lumbar discectomy in Imam Reza and Shohada hospitals, Tabriz, Iran to evaluate possible risk factors for herniation recurrence. Group I included patients with recurrent lumbar disc herniation at the same side and level before eighteen months postoperatively and group II included patients without herniation at the same or other side and level

Access this article online

Quick Response Code:



Website:

www.asianjns.org

DOI:

10.4103/1793-5482.116384

Address for correspondence:

Dr. Bina Eftekhar Sadat, Physical Medicine and Rehabilitation Research Centre, Tabriz University (Medical Sciences), Golgasht Ave, Tabriz, Iran. E-mail: binasadat@yahoo.com

for more than 18 months after operation. Patients were chosen among those with the same neurosurgery team. The surgery technique was not considered in this study.

A magnetic resonance imaging (MRI) was recommended for all postoperative patients experiencing persistent or recurrent leg pain. Consequently, due to higher costs of imaging in this area, not all patients in the study received a postoperative MRI and only those with suspected signs and symptoms had MRI. A clinically significant recurrent herniation was defined as a disc herniation causing leg pain with radiographic (MRI) evidence of disc material at the same side and level of the index surgery causing impingement, compression, or deviation of nerve tissue (as reported by an attending radiologist). Patients with herniation recurrence at other side and level, inability to have MRI exam, recent cerebrovascular arrest or psychological and cognitive disorders, amputation history, severe back arthritis and neuropathic disease other than diabetes were excluded.

The medical records for all patients were evaluated for demographic features including age, sex and body mass index (BMI) [calculated by dividing weight into height² (kilograms per meter)] and education. In addition, all patients were also assessed for the presence of comorbid conditions possibly predispose to recurrence (for instance, tobacco use, or diabetes). Smoking status and employment were based on data recorded in the patient's chart at the time of index surgery.

Statistical analysis

All the analyses were performed applying SPSS statistical software version 13 (SPSS Inc, Chicago, Ill). Student *t*-tests were performed for continuous variables, whereas Chi square analyses and Fisher exact tests (contingency table analyses) were used for categorical variables depending on sample size. In the multivariate analysis, the difference among the two groups was tested with logistic regression for each variable separately. Two-sided *P* < 0.05 were considered significant.

Results

Patients' sociodemographic characteristics are presented in Table 1. Smoker men and patients with higher height and weight had significantly higher recurrence. However, in terms of age, education, BMI, diabetes and hypertension, there was no difference between groups.

Occupational characteristic was divided into three parts as light (sitting and constant posture), housework (medium strenuous work), and heavy work (lifting or carrying heavy objects, forward bending) [Table 2]. Heavy work was significantly higher in patients with recurrent herniation.

The logistic regression analysis showed that gender (male), taller height, heavy works and being smoker could predict recurrent lumbar disc herniation [Table 3].

Discussion

Recurrent herniation following disc excision has been reported in 5-15% of patients. The definition of recurrent disc herniation has varied among the different authors. In most studies, recurrent lumbar disc herniation was defined as disc herniation at the same level, regardless of ipsilateral or contralateral herniation, with a pain-free interval greater than 6 months.^[7,15-18] Studies focused on true recurrent disk herniation at the same level and side, are found with relatively less frequency.^[18-25]

Table 1: Patients' sociodemographic characteristics

| | Recurrence (n=40) | No recurrence (n=120) | P value |
|-------------------|-------------------|-----------------------|---------|
| Age (mean±SD) | 45.82±11.23 | 43.17±13.28 | 0.25 |
| Gender (male) | 29 (72.5) | 54 (45) | 0.003* |
| Height | 1.68±0.98 | 1.64±0.69 | 0.04* |
| Weight | 77.2±17.49 | 70.13±12.52 | 0.006* |
| BMI | 27.4±6.6 | 25.9±5.13 | 0.14 |
| Smoking | 14 (35) | 16 (13.3) | 0.004* |
| Diabetes | 6 (15) | 9 (7.5) | 0.2 |
| Hypertension | 5 (12.5) | 10 (8.3) | 0.53 |
| Education | | | |
| Illiterate | 14 (35) | 41 (34.2) | 0.35 |
| Elementary school | 12 (30) | 31 (25.8) | |
| High school | 14 (35) | 39 (32.5) | |
| University | 0 (0) | 9 (7.5) | |

Figures in parenthesis are in percentage; SD – Standard deviation; BMI – Body mass index; **p* is 2-tailed significant

Table 2: Distribution of patients according to occupational load

| Occupational work load | Case group | | Control group | | P value |
|------------------------|------------|------|---------------|------|---------|
| | n | % | n | % | |
| Light work | 3 | 7.5 | 13 | 10.8 | <0.001* |
| Medium strenuous work | 10 | 25 | 69 | 57.5 | |
| Heavy work | 27 | 67.5 | 38 | 31.7 | |

**p* is 2-tailed significant

Table 3: Predictors of recurrent lumbar disc herniation

| | OR | 95% CI | | P value |
|------------|-------|--------|-------|---------|
| | | Lower | Upper | |
| Gender | 0.15 | 0.02 | 0.24 | 0.01 |
| Weight | 0.02 | -0.80 | 0.98 | 0.84 |
| Height | -0.14 | -0.01 | 0.00 | 0.03 |
| Occupation | -0.6 | -0.56 | -0.24 | <0.001 |
| Smoking | 0.56 | 0.43 | 0.80 | <0.001 |

OR – Odds ratio; CI – Confidence interval

In our study, we retrospectively evaluated lumbar disc herniation recurrence considering at the same level and side like prior discectomy in 160 patients undergoing primary lumbar disc herniation. We observed that gender (male), taller height, heavy works and being smoker could predict recurrent lumbar disc herniation.

There are numerous risk factors for recurrent disc herniation. Age and sex differences are demonstrated as risk factors of LDH.^[26,27] Young age and male gender are defined as risk factors for LDH recurrence.^[7,15] However, some other studies reported that sex and age were not associated with higher rates of recurrence.^[5-7,16,28] In the studies considering open discectomy or microdiscectomy, age and gender were not significantly different between recurrence and non recurrent LDH groups.^[29-31] In our study, LDH recurrence was higher in male gender, but no difference observed according to age. Opposite to our study, Keskimaki and coworkers did not found any differences between genders, but patients younger than 50 years had a somewhat higher risk of reoperation than the older patients.^[32]

It is shown that higher BMI and obesity is associated with recurrent LDH.^[30,33] However, in our study, although significantly higher weight and height in recurrent LDH, the BMI was not significantly different between groups. Like our study, Kara and coworkers^[34] did not find any significance between BMI and LDH recurrence. Surprisingly, Moliterno *et al.*^[31] found that non obese patients with a relatively lower body mass index, in particular, appear to be at greater risk for recurrence.

Smoking has been previously shown to be predictors of recurrent LDH.^[12-14] In the study of Kim and coworkers,^[35] they observed smoking was related to lumbar disc herniation recurrence. Likewise in our study, smoking habit was significantly higher in patients with recurrent LDH. Also, smoking is showed to be an important predictor of symptomatic disc herniation.^[13,36] The exact mechanism by which smoking contributes to disc degeneration is still incompletely understood, but may be related to disc annulus nutrition and oxygenation,^[37] as well as increases in intradiscal pressure due to excessive coughing.^[38,39] Vascular insufficiency as a result of atheromas should also be considered. These presumptions could be the reason of smoking effect on LDH recurrence. Unlike these findings, some studies found no relation between smoking and LDH recurrence.^[29,30,34]

In addition to overall worse outcomes and prolonged hospitalizations, diabetic patients have also been found to have a much higher incidence of LDH recurrence, estimated to be 28% in one comparison study.^[6] This may be attributable to lower quality of life indicators in diabetic compared with non diabetic individuals. In our study population, diabetes was not significantly related to LDH recurrence. Like our findings,

in the study of Kim and coworkers,^[35] they found no relation between diabetes and LDH recurrence.

Cardiovascular risk factors including hypertension are significantly and independently associated with symptomatic lumbar disc herniation. As hypertension is known to increase risk for peripheral and coronary vascular disease, it seems reasonable that they should also be associated with occlusion of small caliber vessels arising from the distal aorta.^[40] Considering these findings, we hypothesized that hypertension could affect recurrent lumbar disc herniation; however, our results did not support this hypothesis and the difference between groups was not significant.

Hard labor and heavy work is another important predictor of recurrent LDH. Manual labor, including repetitive lifting or vibration, has been previously shown to be predictors of recurrent LDH.^[12-14] Kara and coworkers^[34] observed that the lack of regular physical exercise was a significant predictor for reoperation, whereas occupation did not indicate so much significance as regular exercise. Heavy work was significantly higher in patients with recurrent herniation in our study and predicted its occurrence. However, in the study of Meredith and coworkers,^[30] being a manual laborer was not significantly associated with recurrent LDH. In another study, although work type and profession were not found to be risk factors, patients filing Workers' Compensation claims experienced poorer outcomes than those not making claims.^[5]

Conclusion

Considering sex, smoking and heavy works as predictors of recurrent LDH, surgeons should advice their patients to limit hard work and put away smoking especially in tall and male ones to prevent LDH recurrence.

Limitations

This study has some limitations. This is a small study and is limited by the number for statistical reasons and therefore in addition to the retrospective nature the results could to be questioned. Furthermore, the study may be biased with interfering variables as disk herniations are more common in men, men are taller than women, men smoke more than women and men do hard labor more than women. Therefore, it is possible that the results would not be a true reflection of risks for disk herniation.

Acknowledgments

This research was financially supported by Vice Chancellor for Research, Tabriz University of Medical Sciences, Iran.

References

1. Hanley EN Jr, Shapiro DE. The development of low-back pain after excision of a lumbar disc. *J Bone Joint Surg* 1989;71:719-21.
2. Spangler DM. Lumbar discectomy: Results with limited disc excision and selected foraminotomy. *Spine (Phila Pa 1976)* 1982;7:604-7.

3. Gaston P, Marshall RW. Survival analysis is a better estimate of recurrent disc herniation. *J Bone Joint Surg Br* 2003;85:535-7.
4. Babar S, Saifuddin A. MRI of the post-discectomy lumbar spine. *Clin Radiol* 2002;57:969-81.
5. Carragee EJ, Han MY, Suen PW, Kim D. Clinical outcomes after lumbar discectomy for sciatica: The effects of fragment type and anular competence. *J Bone Joint Surg Am* 2003;85:102-08.
6. Mobbs RJ, Newcombe RL, Chandran KN. Lumbar discectomy and the diabetic patient: Incidence and outcome. *J Clin Neurosci* 2001;8:10-3.
7. Suk KS, Lee HM, Moon SH, Kim NH. Recurrent lumbar disc herniation: Results of operative management. *Spine (Phila Pa 1976)* 2001;26:672-76.
8. Cooper DF, Feuer H. Lumbar microdiscectomy. *J Indiana State Med Assoc* 1982;74:674-5.
9. Ebeling U, Reichenberg W, Reulen HJ. Results of microsurgical lumbar discectomy. Review of 485 patients. *Acta Neurochir (Wien)* 1986;81:45-52.
10. Goadl HJ. Microlumbar discectomy. follow-up of 477 patients. *J Neurosurg* 1980;2:95-100.
11. Matsui H, Terahata N, Tsuji H, Hirano N, Naruse Y. Familial predisposition and clustering for juvenile lumbar disc herniation. *Spine (Phila Pa 1976)* 1992;17:1323-8.
12. An HS, Silveri CP, Simpson JM, File P, Simmons C, Simeone FA, et al. Comparison of smoking habits between patients with surgically confirmed herniated lumbar and cervical disc disease and controls. *J Spinal Disord* 1984;7:369-73.
13. Kelsey JL, Githens PB, O'Connor T, Weil U, Calogero JA, Holford TR, et al. Acute prolapsed lumbar intervertebral disc: An epidemiologic study with special reference to driving automobiles and cigarette smoking. *Spine (Phila Pa 1976)* 1984;9:608-13.
14. Mundt DJ, Kelsey JL, Golden AL, Pastides H, Berg AT, Sklar J, et al. An epidemiologic study of non-occupational lifting as a risk factor for herniated lumbar intervertebral disc. *Spine (Phila Pa 1976)* 1993;18:595-602.
15. Cinotti G, Gumina S, Giannicola G, Postacchini F. Contralateral recurrent lumbar disc herniation: Results of discectomy compared with those in primary herniation. *Spine (Phila Pa 1976)* 1999;24:800-6.
16. Cinotti G, Roysam S, Eisenstein SM, Postacchini F. Ipsilateral recurrent lumbar disc herniation: A prospective, controlled study. *J Bone Joint Surg Br* 1998;80:825-32.
17. Fandino J, Botana C, Viladrich A, Gomez-Bueno J. Reoperation after lumbar disc surgery: Results in 130 cases. *Acta Neurochir (Wien)* 1993;122:102-4.
18. O'Sullivan MG, Connolly AE, Buckley TF. Recurrent lumbar disc protrusion. *Br J Neurosurg* 1990;4:319-26.
19. Connolly ES. Surgery for recurrent lumbar disc herniation. *Clin Neurosurg* 1992;39:211-6.
20. Dai LY, Zhou Q, Yao WF, Shen L. Recurrent lumbar disc herniation after discectomy: Outcome of repeat discectomy. *Surg Neurol* 2005;64:226-31.
21. Haglund MM, Moore AJ, Marsh H, Uttley D. Outcome after repeat lumbar microdiscectomy. *Br J Neurosurg* 1995;9:487-95.
22. Herron L. Recurrent lumbar disc herniation: Results of repeat laminectomy and discectomy. *J Spinal Disord* 1994;7:161-6.
23. Hirabayashi S, Kumano K, Ogawa Y, Aota Y, Maehiro S. Microdiscectomy and second operation for lumbar disc herniation. *Spine (Phila Pa 1976)* 1993;18:2206-11.
24. Silvers HR, Lewis PJ, Asch HL, Clabeaux DE. Lumbar diskectomy for recurrent disk herniation. *J Spinal Disord* 1994;7:408-19.
25. Swartz KR, Trost GR. Recurrent lumbar disc herniation. *Neurosurg Focus* 2003;15:E10.
26. Yoshimura N, Dennison E, Wilman C, Hashimoto T, Cooper C. Epidemiology of chronic disc degeneration and osteoarthritis of the lumbar spine in Britain and Japan: A comparative study. *J Rheumatol* 2000;27:429-33.
27. O'Neill TW, McCloskey EV, Kanis JA, Bhalla AK, Reeve J, Reid DM, et al. The distribution, determinants, and clinical correlates of vertebral osteophytosis: A population based survey. *J Rheumatol* 1999;26:842-8.
28. Graver V, Haaland AK, Magnaes B, Loeb M. Seven-year clinical follow-up after lumbar disc surgery: Results and predictors of outcome. *Br J Neurosurg* 1999;13:178-84.
29. Palma L, Carangelo B, Muzii VF, Mariottini A, Zaffi A, Capitani S. Microsurgery for recurrent lumbar disk herniation at the same level and side: Do patients fare worse? Experience with 95 consecutive cases. *Surg Neurol* 2008;70:619-21.
30. Meredith DS, Huang RC, Nguyen J, Lymas S. Obesity increases the risk of recurrent herniated nucleus pulposus after lumbar microdiscectomy. *Spine J* 2010;10:575-80.
31. Moliterno JA, Knopman J, Parikh K, Cohan JA, Huang QD, Aaker GD, et al. Results and risk factors for recurrence following single-level tubular lumbar microdiscectomy Clinical article. *J Neurosurg Spine* 2010;12:680-6.
32. Keskimaki I, Seitsalo S, Osterman H, Rissanen P. Reoperations after lumbar disc surgery. *Spine (Phila Pa 1976)* 2000;25:1500-8.
33. Kim JM, Lee SH, Ahn Y, Yoon DH, Lee CD, Lim ST. Recurrence after successful percutaneous endoscopic lumbar discectomy. *Minim Invasive Neurosurg* 2007;50:82-5.
34. Kara B, Tulum Z, Acar U. Functional results and the risk factors of reoperations after lumbar disc surgery. *Eur Spine J* 2005;14:43-8.
35. Kim KT, Park SW, Kim YB. Disc height and segmental motion as risk factors for recurrent lumbar disc herniation. *Spine (Phila Pa 1976)* 2009;34:2674-8.
36. Kelsey JL. An epidemiological study of the relationship between occupations and acute herniated lumbar intervertebral discs. *Int J Epidemiol* 1975;4:197-205.
37. Stairmand JW, Holm S, Urban JP. Factors influencing oxygen concentration gradients in the intervertebral disc: A theoretical analysis. *Spine (Phila Pa 1976)* 1991;16:444-9.
38. Frymoyer JW, Pope MH, Costanza MC, Rosen JC, Goggin JE, Wilder DG. Epidemiologic studies of low-back pain. *Spine (Phila Pa 1976)* 1980;5:419-23.
39. Heliövaara M, Knekt P, Aromaa A. Incidence and risk factors of herniated lumbar intervertebral disc or sciatica leading to hospitalization. *J Chronic Dis* 1987;40:251-8.
40. Jhavar BS, Fuchs CS, Colditz GA, Stampfer MJ. Cardiovascular risk factors for physician-diagnosed lumbar disc herniation. *Spine J* 2006;6684-91.

How to cite this article: Shimia M, Babaei-Ghazani A, Sadat BE, Habibi B, Habibzadeh A. Risk factors of recurrent lumbar disk herniation. *Asian J Neurosurg* 2013;8:93-6.

Source of Support: Vice Chancellor, Tabriz University of Medical Sciences, Iran, **Conflict of Interest:** None declared.