

Original Article

Study of Risk Factors Effects Recurrence of Lumbar Disc Herniation (LDH) after Open Spine Surgery

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Abstract

Background: Low back pain is one of the most common diseases worldwide. Factors such as occupational, personal, and environmental causes affect low back pain development and spread. Lumbar Disc Herniation (LDH) is one of the main causes of low back pain. This study aimed to investigate the risk factors for LDH.

Materials and Methods: This descriptive cross-sectional study examined the recurrence of LDH among 301 patients after lumbar surgery over three years. Demographic and medical information of individuals were obtained using individuals' medical records. People were interviewed for the job and other information. Based on LDH recurrence, individuals were divided into two groups with/without recurrence. SPSS Ver.17 software and appropriate statistical tests were used to analyze the data.

Results: The incidence of LDH recurrence was 28 (9.3%) in the samples. In this study, the number of male samples was 154 (51.2%) with a recurrence of 9.7% and 147 female samples (48.8%) with recurrence of 8.8%, and the mean age of the samples was 48.62 (13.35), with a range of Changes 15-79 years. Based on the results of statistical tests, there was no statistically significant relationship between risk factors and recurrence of LDH.

Conclusion: Factors such as gender, age, smoking, physical characteristics, and occupational conditions cause or accelerate the recurrence of LDH in patients. The low volume of the group with LDH recurrence in this study caused no significant relationship between recurrence and risk factors.

Keywords: LDH, Recurrence, Spine surgery, BMI

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Introduction

Lumbar Disc Herniation (LDH) is one of the leading causes of low back pain¹. According to studies, 80-60% of people have experienced LDH-induced back pain at least once in their lifetime^{2,3}. LDH occurs

mainly in the lower back. In studies performed, 70.12% of patients with low back pain had lumbar LDH⁴.

In addition to the direct costs, the indirect costs of LDH-induce disc herniation are conditions in which the nucleus pulposus protrudes through its fibrous cartilage. Studies show that LDH is the main reason for limiting

activities in people under 45 years of age. However, age, sex, diabetes, family history, strenuous physical activity, trauma, exposure to vibration, and smoking are essential factors in LDH^{3,5,6}. Men are more prone to LDH damage than women⁷. The discs are divided into two parts based on annulus fibrosis and nucleus pulposus and based on this, LDH is divided into three types: 1-Disc Protrusion: In this type of rupture, the annulus fibrosis layer occurs, and this rupture may occur from different parts. The protruding part of the disc can cause pain by putting pressure on nerve roots and ligaments. 2- Disc Extrusion: In this type, the pulp of the disc protrudes more than before. The protrusion is severe and fills more than half of the spinal canal. The extruded disc can remain the same or become a type of sequestration. 3- The third type is the sequestered disc, in which part of the nucleus pulposus separates from the central part of the disc and floats as a complimentary piece inside the spinal canal, which can extend into the spinal cord and compress the spinal nerves^{4,8}.

LDH imposes high costs on communities each year. Annual back pain costs in the United States are estimated at more than \$100 billion, while these costs in Europe are 12 billion pounds. In the Netherlands, back pain costs are reported at 1.7% of GDP^{3,5}. In Iran, musculoskeletal damage is not recorded anywhere in many cases, and their statistics are not reported, so accurate statistics are not available.

Surgical treatment is done in different ways. Standard surgical procedures include the following five procedures. Laminectomy surgery, Micro discectomy, Endoscopic surgery, Laser surgery, Epidural or fast injections^{9,10}. The patient is placed under general anesthesia in a prone position to perform open spine surgery. The surgeon makes an incision in the midline and at the perimeter of the spinal appendages on the involved vertebrae. It removes the spiny appendage and the lamina bone unilaterally or bilaterally to reach the nerve roots and the disc and then removes the protruding parts of the disc¹¹.

Open spine surgery is one of the treatments for LDH. It has been accepted as the standard treatment for about 50 years in patients with lumbar disc herniation who are resistant to medical treatment, and despite methods such as low-risk methods, percutaneous nucleosome surgery, or disk resection by

microendoscopy is still one of the most critical surgical treatment methods among surgeons and the results have been remarkable^{12,13}.

This surgery, like other surgeries, is associated with complications. In addition to the general complications of surgery such as sensitivity to anesthetics, bleeding; other complications such as LDH, dorsal rupture, especially in people Middle-aged and obese, infection at the site of surgery, scar tissue and pressure on the spinal cord, and nerve roots, damage to the spinal ligaments, pain at the site of surgery, tingling and numbness of the lower extremities are associated¹⁴.

However, 20-50% of patients are not satisfied with this type of treatment. In investigating the causes of patients' dissatisfaction, the most common cause of recurrence of LDH is seen in 5-11% of statistics, followed by fibrosis around the nerve and adhesions at the operation site⁶. The need for back surgery increased in the last decade, with studies showing a 15-fold increase over 5 years. Approximately 82% of people return to work after lumbar surgery¹⁵⁻¹⁷.

Today, the primary diagnostic method is the use of lumbar MRI. In the past, CT scan and myelography were used as a diagnostic method, but today MRI has replaced these two methods. MRI can examine the soft tissue and the extent to which the disc leaves the space confined to the annulus fibrosis^{12,13}.

Lumbar disc recurrence occurs when a patient experiences pain in the sciatic nerve pathway (sciatica) in the lower extremities again after a period of pain relief for at least 6 months after surgery, and imaging findings indicate the presence of an intervertebral disc herniation in the same space¹⁸. Several factors are involved in the recurrence of LDH, some of which have been mentioned above. Therefore, this study was performed to investigate the factors affecting the recurrence of LDH in individuals over 3 years.

Methods

This study was a descriptive-analytical cross-sectional. The study population consisted of 301 patients with LDH who underwent open spine surgery at Mortaz Hospital in Yazd for three years (June 2017-2020). Data were collected by the library method, and the initial information was extracted from patients' records. In order to know the latest status of recurrence of LDH and risk factors, the researcher contacted the subjects by

phone and provided additional information.

Conscious written consent was obtained from all eligible patients. After determining the relative frequency of recurrence based on medical records and interview information, the samples were divided into two groups with recurrence and non-recurrence of LDH, and risk factors were compared in the two groups. Inclusion criteria were having a history of open spine surgery within a specified period (three years). The exclusion criteria were the presence of spinal canal stenosis, slippery lumbar vertebrae, patient dissatisfaction to participate in this study, and incomplete medical records.

The IRB has approved this research of the authors' affiliated institution. SPSS Ver.17 software was used for data analysis. The significance level of statistical tests was considered less than 0.05. Analysis of data, if normal, was performed using T-Test and ANOVA tests; if abnormal, the Mann-Whitney-Wilcoxon test was used. The chi-square test will be used in data analysis with a nominal scale.

Results

In this study, 301 patients who were candidates for LDH surgery referred to Mortaz Hospital in Yazd during the study period and underwent surgery were divided into two groups with recurrence and non-recurrence of LDH. The incidence of lumbar disc recurrence was 28 (9.3%) in the samples (CI=95%). In this study, the number of male samples was 154 (51.2%) with a recurrence of 9.7%, and 147 were female (48.8%) with a recurrence of 8.8%, and the mean age of the samples was 48.62, with a range of 15 to 79 years. Table 1 shows the demographic variables affecting LDH recurrence in the study population.

Out of the total number of patients studied, 28 patients with a mean age of 52.14 (11.18) years had recurrent disc herniation. The results of the ANOVA test show that there is no statistically significant relationship between LDH recurrence and age (P-Value = 0.143). The mean age of the other 173 patients without recurrence of LDH was 48.26 (13.52) years. According to Table 1, the mean body mass index in the group with and without recurrence was 26.52 and 26.34, respectively. There was no statistically significant relationship between body mass and recurrence of LDH in them (P-Value = 0.833).

According to the table above, in 301 patients, 154 were male (51.2%), and 147 were female (48.83%). The Chi-Square test assessed the gender risk factor. According to P-Value = 0.789, there is no significant relationship between LDH and gender. In 301 patients who underwent lumbar disc herniation surgery, 36 (11.96%) smoked, of which 2 (5.6%) had a recurrence of LDH. 265 (85.04%) of the subjects did not smoke, of which 26 (9.8%) had a recurrence. The chi-Square test examined this relationship. According to P-Value = 0.409, there is no significant relationship between smoking history and recurrence of LDH.

Based on the number of 148 people (49.16%) of the studied people are aged 15-49 years, and 153 people (50.83%) are aged 50-79 years. The chi-Square test examined the relationship between age groups and LDH. According to P-Value = 0.272, there is no significant relationship between age and recurrence of intervertebral disc herniation.

Figure 1 shows the division of LDH recurrence according to the job classification of individuals. By reviewing medical records and interviewing individuals, the occupations of 301 patients studied included workers, homemakers, freelancers, employees, retirees, and others (including students and the unemployed). According to Figure 1, in 301 patients who underwent lumbar disc herniation surgery, 28 (9.3%) of these patients had recurrence due to the occupations studied. The Fisher test examined this relationship. According to P-Value = 0.178, there is no significant relationship between job and LDH recurrence.

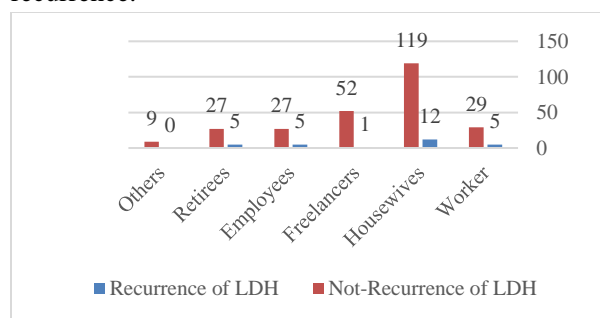


Figure 1. Division of LDH recurrence (n) according to the job classification.

In another classification, the occupations of the studied patients were divided into two categories: standing and sitting occupations. In 301 patients who underwent lumbar disc herniation surgery, a total of 228 (75%) people had occupations with long-standing, and 73

(25%) of them had occupations with long sitting. The frequency of LDH recurrence was 13.7 ($n = 10$) in sitting occupations and 7.9 ($n = 18$) in standing occupations. The Fisher test examined this relationship. According to $P\text{-Value} = 0.137$, there is no significant relationship between job (based on sitting and standing for a long time) and recurrence of intervertebral disc herniation.

Discussion

Recurrence of lumbar LDH is one of the most important and common complications in lumbar disc herniation surgery that can lead the patient to physical, mental, and even severe complications. Therefore, considering these cases, it is necessary to control the risk factors affecting the recurrence of LDH, including the surgical method. In this study, we investigated the factors affecting LDH recurrence.

In this study, 301 patients, 154 men, and 147 women, who were candidates for lumbar disc herniation surgery and underwent surgery, were divided into two groups with recurrence and no recurrence of LDH. The incidence of LDH recurrence was 28 (9.3%) in the samples. The mean age of the samples was 48.62 (13.35), with an age range of 15 to 79 years. The present study results show that there is no significant relationship between age groups and LDH recurrence ($P\text{-Value} = 0.272$). The study was conducted by Shayan et al. (2014) to investigate the risk factors for recurrence of LDH in patients referred to hospitals over 7 years. In this study, the mean age of patients in the case and control groups was 45.9 and 46.9 years, respectively. Based on the study's findings, no significant relationship was observed between age and recurrence of LDH⁴.

Based on the results, no correlation was observed between BMI ($P\text{-Value} = 0.477$) and smoking ($P\text{-Value} = 0.409$) with recurrence of LDH in patients. However, the study results by Withanage et al. (2020) show that BMI and smoking are two important and significant factors in the recurrence of LDH, which is not consistent with the results of the present study. The recurrence rate of LDH in this study was 35.6%³. Also, the results of a study by Shimia et al. (2013), which was conducted to investigate the factors affecting LDH recurrence, show that smoking, height, and weight are the risk factors for LDH recurrence.

The relationship between these factors and recurrence is significant ($P\text{-Value} < 0.05$)¹⁹. However, the study results show that there is no significant relationship between smoking and recurrence of LDH⁴.

Men are more prone to LDH damage than women³. However, the present study results did not show a significant difference between recurrences of LDH by gender ($P\text{-Value} = 0.789$). The results of a study by Shayan et al. show no association between gender and recurrence of LDH⁴. However, studies have identified gender as one of the risk factors for recurrence of LDH^{19,20}.

According to the present study results, the occupations of the patients studied in this study included worker, housewife, freelance, employee, retiree, and others (including students and unemployed). The present study results show no significant relationship between job and prevalence of LDH, which is consistent with the results of the study by Shayan et al.⁴. A study conducted to investigate the risk factors for LDH recurrence in 160 patients shows that occupation is one of the factors affecting LDH recurrence. The results of this study show a significant relationship between job factors and LDH recurrence ($P\text{-Value} < 0.001$)¹⁹. Other studies have suggested that occupational factors play a role in the recurrence of LDH²⁰. The highest number of LDH recurrences was observed in the housewife occupational group (9 cases) based on job grouping. In addition, jobs were divided into standing and sitting groups in another division.

The study results show that the frequency of LDH recurrence in the group of sitting occupations is higher than in standing occupations. However, no significant relationship was observed between job type (standing or sitting) and recurrence of LDH ($P\text{-Value} = 0.137$). However, the results of studies show that the type of work and the difficulty of work are among the significant risk factors for the development and spread of LDH²¹.

The small sample size and consequently the small number of people in the group with LDH recurrence, the study of patients referred to only one hospital, and the unknown ergonomic and mechanical exposures based on the occupation of individuals are some of the limitations of this study. In addition, future studies with a wider period are recommended.

Conclusion

Factors such as gender, age, smoking, physical characteristics, and occupational conditions cause or accelerate the recurrence of LDH in patients. The low volume of the group with LDH recurrence in this study caused no significant relationship between recurrence and risk factors.

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