

IS PREOPERATIVE OCCUPATION RELATED TO LONG-TERM PAIN IN PATIENTS OPERATED FOR LUMBAR DISC HERNIATION?

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ABSTRACT - Lumbar disc herniation (LDH) is a common cause of back and sciatic pain. When clinical treatment fails, surgery may be indicated in selected patients. Although surgery is effective in most cases, some of these patients may have a poor outcome. Different factors may influence these results and poor adaptation at work is one well-known cause of treatment failure. This study examines 350 patients on long-term follow-up after surgery for first-time LDH. The relationship was analyzed between occupation before surgery and outcome (maintenance of lumbar and leg pain, satisfaction with the surgical treatment and return to work). The preoperative occupation (employed in public or private services, autonomous, unemployed, housewife, retired or student) and the exertion at work were analyzed as prognostic factors for different clinical outcomes. Although unemployed people had higher numerical analog scale for lumbar pain and retired patients had a higher leg pain, this difference was not statistically significant. Retired people were significantly less satisfied with the surgical result. Higher exertion at work showed a statistically insignificant higher level of pain and lower degree of satisfaction. The authors conclude that preoperative occupation was not a statistically significant factor in this series of patients.

KEY WORDS: lumbar disc herniation, occupation, failed back syndrome, outcome, discectomy.

Cirurgia de hérnia de disco lombar: existe relação entre a profissão e a persistência de dor?

RESUMO - A hérnia de disco lombar (HDL) é uma causa comum de dor lombar e ciática. Quando o tratamento clínico não oferece melhora dos sintomas, a cirurgia pode ser proposta em casos selecionados. Apesar de ser efetiva, uma pequena, porém significativa parcela dos pacientes operados podem não melhorar. Diversos fatores podem influenciar tais resultados. A insatisfação no ambiente de trabalho é relacionada com um maior índice de maus resultados. Neste estudo, 350 pacientes no pós-operatório tardio da primeira cirurgia de HDL foram estudados, analisando a possível relação entre tipo de profissão antes da cirurgia e evolução clínica (persistência de dor lombar e em membro inferior, satisfação com a cirurgia e retorno ao trabalho). Os pacientes foram classificados quanto à profissão em empregados públicos, empregados em órgãos privados, autônomos, desempregados, donas de casa, aposentados e estudantes. Também o grau de esforço no ambiente de trabalho foi analisado como fator prognóstico. Os desempregados relataram índices de dor lombar maiores e os aposentados tiveram maiores índices de dor irradiada, apesar de que estatisticamente os valores não foram significativos. Os aposentados ficaram significativamente menos satisfeitos com o tratamento no longo prazo. Um maior esforço no ambiente de trabalho não se correlacionou estatisticamente com o grau de dor e satisfação. Concluímos que o tipo de profissão não foi fator estatisticamente significativo na evolução destes pacientes. Os aposentados tiveram menor grau de satisfação com o procedimento cirúrgico.

PALAVRAS-CHAVE: hérnia de disco lombar, profissão, dor lombar, dor irradiada, dor ciática.

Lumbar disc herniations (LDH) are abnormal displacements of the intervertebral disc. When directed backwards through the spinal canal, they can compress neural structures, triggering an inflammatory reaction involving the dural sac and spinal root¹⁻³. LDHs are common causes of lumbar and sciatic pain, causing disability and economic losses worldwide⁴.

The treatment is initially conservative in most cases, including a rehabilitation program and medications such as antiinflammatories, muscle relaxants and opioids^{5,6}. Despite correct clinical treatment, the painful symptoms will not improve for a significant number of patients. Surgery is usually indicated when there is a clear correlation between LDH and

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the persistence of pain, after appropriate clinical and radiological investigation.

When rigorous selection criteria are used and when a skilled surgical team performs the operation, the postoperative results are often good. Nevertheless, a significant number of patients don't get better. Those patients, known as failed-back surgery syndrome, may experience persistent pain due to multiple factors such as additional clinical disorders, technical problems, instability, poor indication criteria, excessive fibrosis and psychosocial disturbances^{7,8}.

Beyond physical findings and technical procedures, psychological and occupational disturbances relate to a poorer outcome. There is an increasing consensus that conflicts in the professional environment are related to a worse prognosis after LDH surgery^{9,10}.

This study analyzes the results of patients operated on for LDH, focusing on the preoperative occupational status (POS). The aim of this study was to establish any possible correlation between POS and long-term follow-up. The persistence of lumbar and leg pain, the need for further treatments and satisfaction with the surgical results were analyzed as outcomes.

METHOD

Study population and designs – The study population consisted of patients with a diagnosis of LDH operated on in our Institution from August 1992 until August 2002 were evaluated after ethical analysis and approval. Surgery was performed with similar microneurosurgical operative technique. For statistical analysis, only those patients with long-term follow-up (more than 3 years after surgery) and complete data were analyzed.

Exclusion criteria – Patients operated on in the lumbar region by other spine surgeons were excluded, as well as patients requiring fusion at the first operation and those with additional spinal disorders, such as spinal stenosis, spondylolisthesis, instability or fractures.

Data collection – The preoperative data were retrospectively analyzed. A letter explaining the goals of the study and a questionnaire was sent to each patient. The questions could be answered over the telephone or sent by fax. The more specific questions were: the patient's age, occupation before and after surgery, details of his/her employment such as if it was in a public or private institution, whether the patient was an employee or not, the physical effort exerted at work, any disabilities in occupational and social life, pain analog scale for lumbar and leg pain and the need for further treatment such as other surgeries.

The main indication for surgery in these patients was the persistence of lumbar and sciatic pain and clinical and radiological signs of radicular involvement with inadequate

relief after a period of at least 45 days of clinical treatment. A confirmation of LDH by computerized tomography (before 1993) and magnetic resonance (after 1993) was mandatory in every case, and the image had to show either a herniation or an extrusion of the disc through the spinal canal with signs of neural compression.

Outcome evaluation – The patients were classified according to their preoperative occupation as: 1) employee in a public institution; 2) employee at a private service; 3) employee in both public and private institutions; 4) autonomous; 5) housewife; 6) unemployed; 7) retired; 8) student.

The patients also classified their physical effort at work before surgery as: 1) sedentary or minimal; 2) moderate or 3) heavy.

The patients were asked to evaluate their pain in both in the lumbar and the leg region using a numerical analog scale (NAS), with values from 0 to 10, with 0 representing no pain and 10 the worst pain imaginable¹¹.

In the same way, the patients were asked to express their degree of satisfaction with the surgical treatment, choosing one of five possibilities: a) strongly satisfied; b) moderately satisfied; c) little satisfied; d) unsatisfied; or e) strongly unsatisfied. For statistical analysis the first two options were grouped as satisfied and the last three categories were considered as unsatisfied.

Return to work – Patients were asked about their return to work after the operation, choosing from five options: a) normal with no disability; b) return to work with little disability; c) return to work with moderate disability; d) return to work with strong disability and e) no return to work. For statistical analysis, the first two were classified as satisfactory return to work, while the remaining three were classified as unsatisfactory return to work.

Operative technique – A 4-6 cm lumbar midline incision was carried out over the corresponding spinal level. The paravertebral muscles were retracted laterally on the side where symptoms occurred, followed by a hemilaminectomy large enough to expose the dura mater, spinal root and the entire disc herniation. A surgical microscope was used afterwards. The ligamentum flavum was opened with a scalpel, the dural sac and root were retracted medially and the discectomy was done by opening the posterior longitudinal ligament. After disc removal, there was the concern of hemostasis, but no hemostatic or anti-fibrotic material was left.

Statistical analysis – Data are reported as mean±standard deviation or as frequency (percent). After having evaluated the homogeneity of variance (Cochrane test) the normal distribution of each group of data (Shapiro Wilks test), an ANCOVA was performed to determine the differences between groups defined by nominal variables. The time between surgery and evaluation was considered as a co-variable, and the least significance difference (LSD) test was used to compare two groups. Comparisons between two groups for nominal variables were made with Fisher's exact test. Statistical significance was accepted for p<0.05.

RESULTS

Number of patients – A total of 494 patients were operated on for LDH from 1992 to 2002 in our Institution. For 136 of these patients a complete dataset was not available due to changes in address and phone numbers. During the long-term follow-up, six patients died due to causes other than the surgery and two were disabled by dementia. A total of 350 patients had complete dataset and were considered as the sample group for this study.

Demographics – 350 patients were included in this study. The group consisted of 183 women and 167 men, with a mean age of 43.1 years (range 14-77 years old). The lumbar level operated on was L2-L3 in 4 (1.1%); L3-L4 in 12 (3.4%); L4-L5 in 132 (37.7%); L5-S1 in 166 (47.4%). More than one level was operated on for 36 patients (10.3%). The side of the surgery was the left for 178 patients (50.8%); the right for 151 (43.1%) and bilateral for 21 (6%). Follow-up time ranged from 3 to 15 years (mean 5.2 years).

Occupational status before surgery – There were 91 employees in public service (26%); 96 employees in private service (27.4%); 4 employees part time in public and part time in private service (1.1%); 89 autonomous (25.4%); 40 housewives (11.4%); 4 unemployed (1.1%); 19 retired (5.4%) and 7 students (2%).

According to the patients' questionnaire answers, the physical exertion at work for those working is shown in Table 1.

Occupation versus lumbar and leg pain – Mean NAS for each occupation group is shown in Table 2. Unemployed people had the worst lumbar pain NAS while the retired group had the worst leg pain NAS. On the other hand, students had the better lumbar and leg NAS. The difference between those groups was not statistically significant, either for lumbar pain ($p=0.2930$) or for leg pain ($p=0.3008$).

Occupation versus degree of satisfaction – The relationship between occupation before surgery and degree of satisfaction at late follow-up is shown in Table 3. Housewives had the best degree of satisfaction (100%), while retired people had the worst (63.2% satisfied). There was a statistically significant difference between the retired group and those employed in private service ($p=0.0263$); employed in public service ($p=0.0035$); autonomous ($p=0.0007$) and housewives ($p=0.0001$).

Occupation versus return to work – The relationship between the occupation before surgery and return to work was analyzed only for the working group (i.e. public, private, both or autonomous). All

Table 1. Physical exertion at work based on patients' own evaluation.

	Minimal	Moderate	Heavy
Public employee	64 (70.3%)	24 (26.4%)	3 (3.3%)
Private employee	64 (66.6%)	28 (29.2%)	4 (4.2%)
Public + private	1 (25%)	3 (75%)	0
Autonomous	60 (67.4%)	24 (27%)	5 (5.6%)
Housewife	18 (45%)	21 (52.5%)	1 (2.5%)

Table 2. Lumbar and leg pain at late follow-up according to preoperative occupation.

	Number	NAS lumbar pain (mean)	NAS leg pain (mean)
Public	91	2.98	2.65
Private	96	3.23	2.09
Priv/ public	4	2.25	2.50
Autonomous	89	2.72	2.15
Housewife	40	3.22	2.33
Unemployed	4	4.75	2.50
Retired	19	3.05	3.32
Student	7	0.57	0.14
Total	350	2.98	2.31

NAS, numerical analog scale.

Table 3. Degree of satisfaction with the surgical treatment on different occupations.

	Number	Satisfied	Unsatisfied
Public	91	82 (90.1%)	9 (9.9%)
Private	96	82 (85.4%)	14 (14.6%)
Priv/ public	4	3 (75%)	1 (25%)
Autonomous	89	83 (93.3%)	6 (6.7%)
Housewife	40	40 (100%)	0
Unemployed	4	3 (75%)	1 (25%)
Retired	19	12 (63.2%)	7 (36.8 %)
Student	7	6 (85.7%)	1 (14.3%)
Total	350	311 (88.9%)	39 (11.1%)

Table 4. Workers' long-term return to work after surgery.

	Number	Satisfactory	Unsatisfactory
Public	91	63 (69.2%)	28 (30.8%)
Private	96	68 (70.8%)	28 (29.2%)
Priv/ public	4	4 (100%)	0
Autonomous	89	70 (79.6%)	19 (20.4%)
Total	280	205 (73.2%)	75 (26.8%)

workers in both private and public service had a satisfactory return to work, although the number of patients in this group was small. The autonomous group had the higher rate of return to work. There was no difference between workers in public or private service (Table 4).

Exertion at work versus pain and satisfaction – This topic was studied to confirm whether a worse prognosis was related to a higher effort at work. A higher effort at work before surgery related to higher pain, but this difference was not statistically significant either for lumbar ($p=0.1643$) or leg pain ($p=0.1030$).

In the same way, the possible relationship between effort at work and degree of satisfaction was analyzed. A lower degree of satisfaction was related with higher effort at work before surgery, but once again this relationship was not statistically significant.

Gender versus pain and satisfaction – Women had a mean NAS for lumbar pain higher than men (3.38 x 2.54), a difference which was not statistically significant ($p=0.062$). Nevertheless, leg pain in women was higher (2.79x1.79) with statistical significance ($p=0.003$). There was no statistical difference between satisfaction and gender ($p=0.12$).

Age versus pain and satisfaction – As a difference was found in retired patients, the authors analyzed

the effect of age versus pain and degree of satisfaction. For lumbar pain, there was a small difference between age groups, but it was not statistically significant ($p=0.077$). For leg pain, on the other hand, an older age related to a higher NAS score with a significance of $p=0.002$.

An older age was also related to a statistically significant worse degree of satisfaction ($p=0.0146$).

DISCUSSION

Low back pain is a major problem in health services all around the world¹², and it is usually related to disc degeneration¹³. Some risk factors have been studied such as mechanical stress to the spine¹⁴, night shift work, lack of sporting activities and cigarette-smoking^{1,15}. Lumbar disc herniation is a common cause of lumbar and sciatic pain. Surgical treatment may be indicated for a selected group of patients, when the conservative treatment is ineffective and there is clinical and radiological evidence of dural sac and spinal root compression¹⁶. In a review of randomized controlled trials, discectomy has shown considerable evidence of the relative effectiveness when compared with other methods such as chemonucleolysis and automated percutaneous discectomy¹⁷. This procedure is currently the third most frequent surgery in many countries, including the United States^{14,18}.

When good selection criteria are used, postoperative results are usually rewarding, but even in skilled

hands a significant number of patients (ranging from 10-30%) may experience persistent lumbar and leg pain^{19,20}. This problem, usually described as failed-back surgery syndrome, causes considerable economic and social losses worldwide²¹.

It is well known that different factors may be related to persistent pain. These factors include misdiagnosis, technical failure, new disc protrusion, bony compression, excessive fibrosis, facet syndrome, infection and instability^{7,22-24}. In a retrospective study Osterman et al.²⁵ found a risk of 25,1% of further spinal surgery in the first ten years of follow-up. The success of spine surgery decreases after repeated surgeries²⁴.

Gender is an uncertain prognostic factor. Fritsch¹⁹ found a significant influence of the patient's sex on the long-term follow-up, with 18% of male patients presenting a satisfactory long-term result in contrast to 32% of females. Other authors have argued against this result^{26,27}. A negative influence of age on the outcome has been discussed, with inconclusive data²⁷.

Psychological and occupational problems seem to play important roles^{2,28}. For this reason, they should be a concern for spinal surgeons. Many prospective series have shown that psychological distress, depressive mood and somatization relate with persistence of lumbar pain^{8,29,30}. Levy et al.³¹ used a three-question depression screener for lumbar disc herniation and spinal stenosis. A positive response was found in 38,4% of patients with LDH, and this was associated with poorer functional status and health-related quality of life, as well as higher symptom intensity. Anema et al.³² showed that medical management may be an obstacle for return to work in some cases.

Conversely, those patients with better job satisfaction have a significantly better outcome and earlier return to work^{21,33-35}. Psychosocial aspects of health and work have a significantly larger impact on the return to work than more physical aspects of disability²¹. Significant associations have been shown between low-back pain and perceived inadequacy of income, dissatisfaction with work and poorer social class³⁵. Poorer outcomes are seen in patients' filing of workers' compensation claims²⁶.

Schade et al.³⁶ stated that the return to work was not influenced by clinical or radiological findings, but only by psychological factors and self evaluation of work (occupational mental stress). Hildebrandt et al.³⁷ studied patients with low-back pain and demonstrated that a negative self-evaluation for predict-

ing a return to work was related to a longer period out of work and an application for pension was significantly related to a low probability of a patient's return to work. Although this result was statistically insignificant, the authors also stated that patients with a low level of education or low professional status were less likely to return to work, a statement confirmed by other studies³⁴. Pransky³⁸ found that simply measuring return to work does not seem to capture the full range of work-related consequences from occupational back injuries, and he reinforced the importance of the timing of the return to work, occupational ergonomic risks and appropriate job changes. Prescription of work restriction, however, doesn't appear to influence either the recurrence of unspecific low back pain or the early return to work³⁹.

In Brazil, some peculiar characteristics of workers may be distinct from different countries. The first is the high number of housewives, although this is progressively decreasing each year. The other difference is that employees in public service have tenure or the right of constancy at a job guaranteed by law. An employee at a public institution can only be fired if a serious problem can be proven. For this reason, it was important to know whether this could lead to different results when compared to private companies where there was no guarantee of keeping that job.

This study found that the unemployed group had higher lumbar pain, while retired people had higher leg pain. Although this difference was not statistically significant, it may reflect a tendency for these patients to have a worse prognosis, as has been stated by some authors⁴⁰.

The degree of satisfaction after surgery was similar within the working group, with no difference if they were employees or autonomous. The retired group was significantly less satisfied. Additional analysis based on age demonstrated that older people had a lower degree of satisfaction. Probably, an explanation is that elderly people usually have additional spine abnormalities, systemic diseases and higher depression^{8,29}.

In this study, 100% of housewives had a good/excellent degree of satisfaction, although their pain NAS was similar to other groups. So, in some cases, pain status and operative satisfaction were not always related.

Strenuous effort at the workplace before surgery was related to a higher level of pain and a lower degree of satisfaction after surgery, although this result

was not statistically significant. In this study, as the level of exertion was determined by the patient himself, this subjective analysis could introduce a bias. Some authors have shown a correlation between effort at work and persistent low back pain⁴¹.

Graver et al.⁴² found that strenuous work activities were related to a lower frequency of return to work. In a subsequent paper, he found that physical fitness has no significant prognostic value²⁷, reinforcing the concept that it is not the effort itself, but the patients' perception of it that may influence the outcome for return to work.

In conclusion, this retrospective study demonstrated no major relationship between occupational status and prognosis for patients undergoing lumbar disc surgery. Retired patients were statistically less satisfied, although their lumbar and leg pain showed only slightly higher pain measures. On the other hand, housewives had a better degree of satisfaction, while their mean NAS was similar. In this population, strenuous effort at work before surgery had a small and statistically insignificant influence on the outcome.

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