

SURGICAL TREATMENT OF DEGENERATIVE LUMBAR STENOSIS: COMORBIDITIES AND COMPLICATIONS

TRATAMENTO CIRÚRGICO DA ESTENOSE DEGENERATIVA LOMBAR: COMORBIDADES E COMPLICAÇÕES

TRATAMIENTO QUIRÚRGICO DE LA ESTENOSIS LUMBAR DEGENERATIVA: COMORBILIDADES Y COMPLICACIONES

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ABSTRACT

Objectives: To study the characteristics of patients who underwent surgical treatment of degenerative spinal stenosis in the last 10 years (2000–2010) at the Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto (USP-HCFMR) and correlate the postoperative complications and preoperative comorbidities found in the study population. *Methods:* Retrospective review of medical records and radiographs of patients with degenerative lumbar stenosis treated surgically. *Descriptive analysis of data was done with SAS 9.0. Results:* 92 patients were included, 47 (51.08%) males and 45 (48.91%) females, with ages ranging from 32 to 86 years (mean age of 64.27 years). The most prevalent comorbidities were hypertension (47.82%) and diabetes mellitus (25%). Twenty-three patients (25%) had two or more comorbidities. Postoperative infection was the most common complication found in 12 cases (13%). Patients with only one preoperative comorbidity showed similar complication rates compared to the population without comorbidities. However, patients with two or more comorbid conditions had a higher incidence of postoperative complications ($p < 0.001$). *Conclusions:* Comorbidities negatively influenced the outcome of surgical treatment of degenerative lumbar stenosis with higher rates of postoperative complications.

Keywords: Spinal stenosis/surgery; Intermittent claudication; Hypertension; Diabetes mellitus.

RESUMO

Objetivos: Estudar as características dos pacientes que foram submetidos ao tratamento cirúrgico da estenose lombar degenerativa nos últimos 10 anos (2000-2010) no Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto (HCFMR-USP), e correlacionar as complicações pós-operatórias e as comorbidades pré-operatórias encontradas na população estudada. *Métodos:* Avaliação retrospectiva dos prontuários e exames radiográficos dos pacientes portadores de estenose lombar degenerativa submetidos a tratamento cirúrgico. *Análise dos dados descritivos com o programa SAS 9.0. Resultados:* Foram incluídos 92 pacientes, sendo 47 (51,08%) do sexo masculino e 45 (48,91%) do sexo feminino, com idade que variou de 32 a 86 anos (média de 64,27). As comorbidades mais prevalentes foram a hipertensão arterial sistêmica (47,82%) e o diabetes *mellitus* (25%). Vinte e três pacientes (25%) apresentaram duas ou mais comorbidades associadas. A infecção pós-operatória foi a complicação mais comum, encontrada em 12 casos (13%). Os pacientes que tinham apenas uma comorbidade pré-operatória apresentaram iguais índices de complicação frente à população sem comorbidades. No entanto, pacientes com duas ou mais comorbidades apresentaram maior incidência de complicações pós-operatórias ($p < 0,001$). *Conclusão:* A presença de comorbidades influenciou negativamente o resultado do tratamento cirúrgico da estenose lombar degenerativa, com maiores índices de complicações pós-operatórias.

Descritores: Estenose espinhal/cirurgia; Claudicação intermitente; Hipertensão; Diabetes *mellitus*.

RESUMEN

Objetivos: Estudiar las características de pacientes que se sometieron a tratamiento quirúrgico de la estenosis lumbar degenerativa en los últimos 10 años (2000-2010) en el Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto (HCFMR-USP) y correlacionar las complicaciones postoperatorias y las comorbilidades preoperatorias encontradas en la población estudiada. *Métodos:* Revisión retrospectiva de las historias clínicas y las radiografías de pacientes con estenosis lumbar degenerativa tratada quirúrgicamente. *Análisis de los datos descriptivos con el programa SAS 9.0. Resultados:* Se incluyeron 92 pacientes, 47 (51,08%) hombres y 45 (48,91%) mujeres, con edades entre 32 y 86 años (media 64,27 años). Las comorbilidades más frecuentes fueron la hipertensión arterial (47,82%) y la diabetes *mellitus* (25%). Veintitrés pacientes (25%) tenían dos o más comorbilidades. La complicación más común, encontrada en 12 casos (13%), fue la infección postoperatoria. Los pacientes que tuvieron sólo una comorbilidad preoperatoria mostraron tasas similares de complicaciones en comparación con la población sin comorbilidades. Sin embargo, los pacientes con dos o más comorbilidades tuvieron una mayor incidencia de complicaciones postoperatorias ($p < 0,001$). *Conclusión:* La presencia de comorbilidades afectó negativamente los resultados del tratamiento quirúrgico de la estenosis lumbar degenerativa, con mayores tasas de complicaciones postoperatorias.

Descriptores: Estenosis de la columna/cirugía; Claudicación intermitente; Hipertensión; Diabetes *mellitus*.

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INTRODUCTION

Vertebral lumbar stenosis is the narrowing of the vertebral canal, lateral recess, or neural foramen. It generally occurs due to progressive degenerative hypertrophy of any osteocartilaginous and ligament structure, and can result in neurological or vascular compression at one or more lumbar levels.¹ This painful condition is potentially incapacitating, and is more prevalent in the elderly population.²

The patient generally presents pain in the legs, whether due to neurogenic claudication or irradiated pain. Neurogenic claudication is characterized by pain in the legs without defined dermatome, dysesthesia, numbness, discomfort, pins and needles, and postural changes with anterior tilt of the trunk, associated with gait and orthostasis.^{3,4} These symptoms are exacerbated when walking or standing, with regression only after rest or flexing of the lumbar spine.⁴⁻⁷ The other form of expression of the disease, irradiated pain, comes from compression of the neural root in the lateral recess or in the foramen itself, with sciatic pain for objective dermatome, worsening throughout the spine, and with possible neurological changes (paresthesia or loss of strength), the root of L5 being the vertebra most affected.⁶

The vast majority of patients with degenerative lumbar stenosis (DLS) begin their treatment in conservative form, with surgical treatment being indicated based on clinical findings, such as refractory pain and claudication over short distances, associated with objective changes in the imaging exams.⁸ Generally, surgery is indicated when there is progressive neurological deficit, when conservative treatment fails, or when the disease impacts on the patient's quality of life.^{5,7}

Factors such as advanced age and obesity are related to higher susceptibility to diseases of the spine.⁹ Aalto *et al.*¹⁰ demonstrate a poorer prognosis in patients with heart disease and those with psychiatric disorders submitted to surgical treatment. Patients with systemic arterial hypertension (SAH), insulin intolerance or diabetes *mellitus* (DM), heart disease, and metabolic syndrome (associated with SAH, DM, dyslipidemia and obesity) have higher levels of wound dehiscence, adjacent infection, and vascular complications.¹¹⁻¹³ It is believed that the patient's comorbidities are as significant as the clinical symptoms, and these should be taken into consideration in the choice of treatment for the patient.^{7,11} Thus, the objective of this study was to perform a retrospective analysis of the surgical results of patients with degenerative lumbar stenosis, evaluating the association between preoperative comorbidities and postoperative complications.

MATERIAL AND METHODS

This study was approved by the Research Ethics Committee of the institution. The study location was the Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto (HCFMRP-USP) in the city of Ribeirão Preto, a tertiary hospital that is part of the Public Health System of the State of São Paulo, Brazil. It consists of a quantitative and retrospective analysis of the patient records of 138 patients admitted for surgical treatment for DLS between January 2000 and December 2010, obtained through analysis of the surgical records of the Department of Spine Surgery of the hospital. Patients were excluded whose records did not contain sufficient information (whether due to a lack of information relating to comorbidities, or loss to follow-up), as well as patients with spondylolisthesis (independent of its etiology) with displacement of more than 25%, leaving a total of 92 patients included in the study.

The parameters evaluated were the sex and age of the patients, non-surgical treatments received, the number of segments operated on, the persistence of complaints and need for new surgical intervention, associated comorbidities, and early and late complications.

As an option for surgical treatment, decompression of the neural arch was used – with laminectomy and complete flavectomy – at the affected levels, associated with foraminal decompression in the presence of lateral stenosis and posterolateral arthrodesis with

autologous bone graft. In all the patients operated on, pedicle screws and rods were used as the fixation system, to prevent instability caused by the main surgical procedure. Intersomatic arthrodesis (transforaminal lumbar interbody fusion, TLIF), combined with the main procedure, was performed in 10 patients. The criteria used in the indication for intersomatic arthrodesis was the presence of reduced disc height (with mobility of the segment) and foraminal stenosis due to an accentuated decrease in disc space. Thus, the aim was to ensure indirect decompression of the foramen after insertion of the intersomatic device.

For descriptive analysis of the data, we used the statistic Student's t-test for the unpaired samples, and Fisher's exact test for the categorical variables, with the aid of the program SAS 9.0, adopting a confidence limit of 5%.

RESULTS

In the distribution by sex, 47 (51.08%) were male and 45 (48.91%) were female. The average age was 64.27 years (minimum of 32 years and maximum of 86 years) with standard deviation of 12.76 years, and a slightly higher average age for the female population, though without statistical difference. The average age of the patients with comorbidities was approximately 6 years older than that of the patients without comorbidities (66.25 years versus 60.42 years) with a significance value of $p=0.05$. However, when we analyzed patients with the presence of two or more comorbidities, the average age of this group was 70.5 years, with a significance value of $p=0.006$.

As treatment prior to the surgery, 38 patients received analgesic medication alone (41.25%), 36 had physiotherapy and analgesic medication (39%), five had epidural blocks performed by the clinical pain team, and 14 received a combination of analgesic medication, epidural block and physiotherapy (15%).

All the patients were submitted to pedicle screw fixation, posterolateral arthrodesis, and decompression of the segment with stenosis. We found 45 patients with arthrodesis and fixation of one or two segments (48%), 42 patients with arthrodesis and fixation of three or four segments (45%), and six patients with arthrodesis of more than five segments (7%).

The most prevalent associated disease in this study was systemic arterial hypertension in 44 patients (47.82%) followed by diabetes *mellitus* in 23 patients (25%) and heart disease in seven patients (7.6%). The presence of other comorbidities was observed in 13 patients (14.1%) which, in isolation, were statistically less significant, such as: glaucoma; gout; sequelae of poliomyelitis; prostate cancer; breast cancer, and hypothyroidism. There was no difference in distribution between the male and female populations, and the association of two or more comorbidities was found in 25% of the patients, the most common ones being SAH with DM, present in 17 patients (18.47%). (Table 1)

Early postoperative complications (diagnosed during admission to surgery) found were: acute infections, cardiopulmonary complications, pneumonias, and hematomas. Late postoperative complications (diagnosed after hospital discharge, during the outpatient visits) were: latent infection, residual pain, loosening of the implants, and neurological deficit. Thirty patients (32.6%) developed complications: 16 early and 14 late. The most frequent early complication was postoperative infection, found in seven patients (7.6% of the surgeries),

Table 1. Distribution of comorbidities.

	Population (n = 92)	Male (n = 47)	Female (n = 45)
No comorbidities	31 (33.7%)	18	13
Hypertension	44 (47.82%)	19	25
Diabetes <i>mellitus</i>	23 (25%)	13	10
Heart disease	7 (7.6%)	2	5
Other comorbidities	13 (13.98%)	9	4
Association of two or more comorbidities	23 (25%)	12	11

followed by cardiovascular complications (acute myocardial infarction, difficult-to-control hypertension, and angina) in five patients (5.4%). Meanwhile, residual pain (or recurrence of the symptoms) and late infection were recorded in five patients each (5.4%). (Table 2) Analyzing the population with postoperative complications (both early and late) we found the average population age was around 70 years, while the age of the population without complications was around 62 years, with a value of $p=0.02$.

When analyzed in isolation, the various comorbidities are not related to either higher levels of complications, or to different types of complications from the one studied. However, the association of two or more comorbidities was related to higher levels of postoperative complications, with significance of $p<0.001$. Female patients presented complications in 28% of the surgical procedures ($n=13$), while 19% ($n=9$) of the men presented complications, with a p value of 0.20. The cases with fusion of one or two segments developed complications in 17% ($n=8$) of the surgical procedures; cases with fusion of three to four segments, in 16% ($n=7$) while cases with fusion of more than five segments developed 50% ($n=3$) complications, with a p value of 0.16.

Table 2. Complications of surgical treatment of degenerative lumbar stenosis.

	Type of complication	Total no. of patients
Early complications	Pneumonia	2 (2.1%)
	Hematoma	2 (2.1%)
	Cardiovascular	5 (5.4%)
	Infection	7 (7.6%)
Late complications	Neurological deficit	2 (2.1%)
	Residual pain	5 (5.4%)
	Latent infection	5 (5.4%)
	Loosening of the implants	2 (2.1%)

DISCUSSION

The distribution by sex and age group found in our study population is in keeping with what is described in various epidemiological and review studies in the literature on the subject.^{5,7,14}

Patients with degenerative lumbar stenosis generally start with conservative treatment, with physiotherapy, analgesics, NSAIDs, epidural blocks and calcitonin.⁷ All the patients studied had previously received conservative treatment. Ammendolia *et al.*,¹⁵ in a

literature review, report evidence of unsatisfactory quality in recovery of walking ability, with the patient remaining dysfunctional even after complete conservative treatment.

In the series of patient records analyzed, we found a high incidence of comorbidities, probably because it is a tertiary reference center. The main ones were SAH, DM and heart disease. Lotan *et al.*,¹⁴ in a similar evaluation, found a lower incidence of comorbidities, the main ones being: SAH in 23.2%, diabetes in 13.6%, and ischemic heart disease in 11.9%. Furthermore, as described by Kats *et al.*,¹⁶ comorbidities have a negative influence on the result of surgical treatment in patients with lumbar stenosis. Similarly, as demonstrated by other studies, patients with comorbidities present higher levels of complications as a result of surgical treatment for degenerative lumbar stenosis.^{17,18}

Although Athiviraham *et al.*,¹⁹ in a population study, concluded that comorbidities, sex and age were not associated with a poor prognosis or increased level of complications, our evaluation corroborates the literature that supports higher levels of surgical complications with associated clinical diseases,^{14,16-18} and like Kurd *et al.*,²⁰ do not demonstrate an association of complications with any particular comorbidity, but with the simultaneous presence of two or more comorbidities. Thus, factors like age, lifestyle, expectation, and general state of health of the patients can contribute to the decision on surgical conduct.^{21,22}

This study has some weak points, such as the absence of evaluation of the patients' sagittal balance, and the presence of degenerative disease of the adjacent disc, which could influence the clinical result and consequently, the results of our study. Furthermore, obesity, mood disorders, smoking, and assessments of expectations and satisfaction could have been included in our evaluation, providing more data on the patient's response to the treatment used. We therefore believe that further studies, with the inclusion of these and other aspects, are important for responding to this study question.

CONCLUSION

The presence of two or more associated comorbidities had a negative influence on the result of the surgical treatment for degenerative lumbar stenosis, with higher levels of postoperative complications.

All authors declare no potential conflict of interest concerning this article.

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