

# PROGNOSTIC FACTORS OF LUMBAR DISCECTOMY RECOVERY. A PROSPECTIVE ANALYSIS

FATORES PROGNÓSTICOS DA RECUPERAÇÃO DE DISCECTOMIA LOMBAR.  
UMA ANÁLISE PROSPECTIVA

FACTORES PRONÓSTICOS DE LA RECUPERACIÓN DE DISCECTOMÍA LUMBAR.  
UN ANÁLISIS PROSPECTIVO

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## ABSTRACT

**Objective:** To perform a prospective analysis of the quality of life prognostic factors in patients undergoing lumbar discectomy after two years of the procedure, relating the tools Short Form Health Survey, Roland Morris, Oswestry Disability Index, and VAS. **Methods:** Seventy-two patients were evaluated through the questionnaires in the preoperative, and one month, six months, one year and two years in the postoperative period, being performed lumbar discectomy after failure of conservative treatment. **Results:** We observed an improvement in comparative analysis during follow-up regarding baseline values. **Conclusion:** The domains social aspect, pain, general state, emotional aspect, mental health and vitality presented an improvement from the first month after the surgery; however, the domain functional capacity only showed significant improvement after 6 months and the physical aspects only after one year. Roland-Morris and VAS scales improved after one month after surgery, but Oswestry scale showed that for the measured aspects there was only improvement after six months of surgery.

**Keywords:** Intervertebral disc displacement; Prognosis; Quality of life; Surveys and questionnaires; Lumbosacral region.

## RESUMO

**Objetivo:** Realizar uma análise prospectiva dos fatores prognósticos da qualidade de vida em pacientes operados de hérnia de disco lombar após dois anos do procedimento, relacionando os instrumentos Short Form Health Survey, Roland Morris, Oswestry Disability Index e EVA. **Métodos:** Setenta e dois pacientes foram avaliados por meio dos questionários no pré-operatório e um mês, seis meses, um ano e dois anos no pós-operatório, tendo sido realizada cirurgia de discectomia lombar após falha do tratamento conservador. **Resultados:** Foi observada melhora nas análises comparativas no decorrer do seguimento em relação aos valores iniciais. **Conclusão:** Os domínios aspecto social, dor, estado geral, aspecto emocional, saúde mental e vitalidade apresentaram melhora a partir do primeiro mês após a cirurgia; porém, o domínio capacidade funcional somente apresentou melhora significativa a partir de seis meses e os aspectos físicos, somente após um ano. Os instrumentos Roland-Morris e EVA apresentaram melhora a partir de um mês após a cirurgia, porém o instrumento Oswestry demonstrou que para os aspectos mensurados somente houve melhora após seis meses da cirurgia.

**Descritores:** Deslocamento do disco intervertebral; Prognóstico; Qualidade de vida; Inquéritos e questionários; Região lombossacral.

## RESUMEN

**Objetivo:** Realizar un análisis prospectivo de los factores pronósticos de la calidad de vida en pacientes operados de hernia de disco lumbar después de dos años del procedimiento, relacionando los instrumentos Short Form Health Survey, Roland Morris, Oswestry Disability Index y EVA. **Métodos:** Setenta y dos pacientes fueron evaluados mediante los cuestionarios en el preoperatorio y un mes, seis meses, un año y dos años en el postoperatorio y se realizó una cirugía de discectomía lumbar después del fracaso del tratamiento conservador. **Resultados:** Se observó una mejora en los análisis comparativos durante el seguimiento en relación a los valores iniciales. **Conclusión:** Los dominios aspecto social, dolor, estado general, aspecto emocional, salud mental y vitalidad presentaron mejora a partir del primer mes después de la cirugía; sin embargo, el dominio capacidad funcional sólo presentó una mejora significativa a partir de 6 meses y los aspectos físicos sólo después de un año. Los instrumentos Roland-Morris y EVA mostraron mejoría a partir de un mes después de la cirugía, pero el instrumento Oswestry demostró que para los aspectos medidos sólo hubo mejora después de seis meses de la cirugía.

**Descriptores:** Desplazamiento del disco intervertebral; Pronóstico; Calidad de vida; Encuestas y cuestionarios; Región lumbosacra.

## INTRODUCTION

Lumbar disc herniation is a common manifestation of degenerative lumbar discopathy,<sup>1,2</sup> which can be defined as the process of rupture of the annulus fibrosus with subsequent focal displacement of the central disc mass to the intervertebral space.<sup>3</sup>

It is currently accepted that 80% of the world population will have a complaint relating to the lumbar spine at some point in their

life. Epidemiological studies estimate that of these, 30 to 40% will present asymptomatic lumbar disc herniation and 2 to 3% will present symptoms.<sup>4</sup> The latter can lead to disabling forms of the disease and have an impact on the economically active population of a country. In Brazil, lumbalgia and lumbosciatalgia are the main causes of sick leave and the third most common cause of disability retirement.<sup>5</sup>

Study conducted in the Spine Surgery Group of the Faculdade de Medicina do ABC. Hospital Estadual Mário Covas. Santo André - SP, Brazil  
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Among the causes of mechanical lumbosciatalgia, disc herniation is certainly one of the most frequent (90%). The onset of disc herniation is multifactorial and postural changes, environmental factors, genetic factors, and the patient's daily and occupational activities may be contributing factors. This disorder occurs most often in patients between 30 and 50 years of age<sup>6</sup> and is more prevalent in men (4.8%) than women (2.5%) above the age of 35.<sup>7</sup> It may affect a smaller percentage of adolescents, the elderly, and children.

The patient frequently presents the classic symptoms of pain below the knee (sciatica) resulting from compression of one or more nerve roots. Etiologically, the pain may be due to herniation, disc degeneration, or spinal stenosis, alone or in combination, associated with mechanical compression and inflammatory changes around the disc or nerve root.<sup>8,9</sup>

As regards the characteristics, radicular pain can be a burning or stinging sensation or dysesthesia. Radicular compression can lead to motor deficits, sensory deficits, and weakness, often referred to by the patient as "foot drop", "knee buckling", and gait imbalance.<sup>10,11</sup> Although the decrease in strength of the muscles in the corresponding metamer is an important component of the compressive root syndrome, its absence does not rule out compression. Thus, we have patients with large disc herniations compressing the cauda equina exhibiting no motor deficit even in the presence of intense pain radiating to the affected limb.<sup>4</sup>

In terms of location, disc herniation can be classified as: 1) medial, which usually manifests as acute, and possibly radiating, low back pain; 2) central-lateral, which can affect the transient or emergent root; 3) foraminal, which compromises the emergent root; and 4) extraforaminal, which compromises the upper root because of the oblique path that the lumbar roots take, making clinical correlation with the radiological study extremely important.<sup>12</sup>

From a therapeutic point of view, we should always consider the option of conservative treatment. The goal is to relieve pain, increase functional capacity, and delay progression of the disease.<sup>13</sup> It is based on partial to complete restriction of the lumbar region through the use of vests and orthosis, as well as a combination of auxiliary methods: acupuncture, cryotherapy, RPG, ultrasound, and prescription analgesics and anti-inflammatory medications.<sup>14</sup>

Surgical treatment is indicated when conservative treatment fails, defined as no significant remission of pain over the course of four to 12 weeks, or progressive motor weakness, bladder and intestinal disorders, and incapacitating radicular pain. The decision for surgery should be shared by both physician and patient, since the patient with good expectations about the surgery recovers more rapidly.<sup>15</sup>

Given this context, patient satisfaction is an important tool for evaluating results. We should take subjective measurements, symptoms, and the bio-psycho-social scenario into account. Thus, quality of life questionnaires are important analytical tools currently used to detail the multidimensional sensation of improvement of the pain.

## METHODS

After receiving approval from the institutional review board, recorded as No. 377.252, 84 patients with lumbar disc herniation were selected according to the study inclusion and exclusion criteria. During follow-up, 12 patients were lost, leaving 72 patients monitored over a follow-up period of two years.

Patients with lumbar disc herniation, aged between the second and seventh decades of life, treated clinically for a minimum period of six months were included in this study. We excluded patients with prior surgery, grade III obesity, history of neoplasia, and rheumatological disease.

Initially, all patients were treated clinically with oral analgesics, anti-inflammatory medications, and physical therapy for a minimum of six months with follow-up at the outpatient spine clinic of the Hospital Estadual Mario Covas. The indication for surgery was made after the failure of conservative treatment and the levels were established according to the clinical findings consistent with imaging, radiographic, and magnetic resonance exams. The surgical technique performed

was a laminotomy with the use of a microscope with removal of the yellow ligament, release of the affected root, and removal of the herniated fragment.

The patients underwent the surgical procedure during the period between February 2008 and February 2011. Demographic data such as age, sex, and date of surgery were obtained from patient medical records. Following the surgical indication, the patient was directed to another room where they answered the Visual Analog Scale for pain (VAS), the Short Form Health Survey (SF-36), the Oswestry Disability Index (ODI), and the Roland-Morris questionnaires, administered by a physical therapist. After the surgical procedure and discharge from the hospital, the patients were referred to the outpatient clinic. Postoperative patient evaluations were conducted after one month, six months, one year, and two years. The results were recorded and filed with the medical records stored in the medical and statistical archive service (SAME).

SF-36 is a generic quality of life evaluation tool, easy to administer and understand. It is a multidimensional questionnaire consisting of 36 items, subdivided into 8 domains: functional capacity, limitation by physical aspects, pain, general state of health, vitality, social aspects, limitation by emotional aspects, and mental health. Each question is assigned a score, which is transformed into a scale of 0 to 100 per domain. A score of 0 corresponds to the worst state of health and 100 to the best.<sup>16</sup>

ODI (translated to and adapted for Portuguese) is a questionnaire based on the social and physical restrictions that back pain causes. There are 10 questions that cover different daily activities. The result ranges from 0% to 100%, with 0% indicating no restrictions and 100% the maximum limitation.<sup>17</sup>

VAS is a questionnaire in which the patient evaluates and classifies their pain by assigning a score from zero to ten. It is a subjective tool for the assessment of chronic pain symptoms.<sup>18</sup>

Roland-Morris was created in 1983 to evaluate the impacts of low back pain in terms of interference with daily patient activities. It consists of 24 questions, where each question is assigned one point, and the higher the total score, the greater the disability of the individual.<sup>19</sup>

## STATISTICAL ANALYSIS

The continuous data for each variable were initially compared with a normal curve using the K-S distance test and classified as non-parametric, being represented as median and lower quartile (25th percentile) and upper quartile (75th percentile), and the times were compared among themselves using the Friedman test and the Muller-Dunn post-test.

For the study, we considered an alpha risk of less than or equal to 5% of committing a type I or first-species error and a beta risk of less than or equal to 5% of committing error type 2 or second-species error.

## RESULTS

Seventy-two lumbar discectomy surgeries were performed and accompanied for two years at the outpatient spine surgery clinic of the Hospital Estadual Mario Covas. (Table 1)

The most frequent decade of life was 30 to 39 years and the average age of the sample was 41.7 years. The distribution by sex was 46 men (63.8%) and 26 women (36.1%). The most frequently performed surgery was discectomy at one level, with most patients saying they would undergo surgery again and half of the patients returning to their activities. One third of the patients were tobacco users.

The social aspect domain of SF-36 (Table 2) had a median preoperative value of 50, and there was a significant improvement ( $p < 0.001$ ) in this domain starting with the first postoperative month (median=63), with progressive improvement reaching a median of 87.5 after two years. (Figure 1)

The SF-36 functional capacity domain had a preoperative median score of 15, but only showed postoperative improvement of this aspect after six months when the median reached 45, after which improvement remained stable. (Figure 2)

**Table 1.** Sample characteristics.

		Count	Column N %
Decade of life	10 to 19 years	2	3%
	20 to 29 years	13	18%
	30 to 39 years	20	28%
	40 to 49 years	12	17%
	50 to 59 years	18	25%
	60 to 69 years	6	8%
Number of levels	1	64	89%
	2	8	11%
Would undergo surgery again	Yes	60	83%
	No	12	17%
Return to activities	Yes	36	50%
	No	36	50%
Tobacco user	Yes	22	31%
	No	50	69%

**Table 2.** Comparison of pre- and postoperative SF36 domains.

	Median	25%	75%	Comparison with preoperative
sf36 pre social aspect	50	38	69	<0.0001
sf36 1M social aspect	63	63	88	<0.0001
sf36 6M social aspect	88	63	88	<0.0001
sf36 1Y social aspect	88	75	100	<0.0001
sf36 2Y social aspect	87.5	87.5	100	
sf36 pre functional capacity	15	10	25	
sf36 1M functional capacity	20	10	33	0.121
sf36 6M functional capacity	45	25	58	<0.0001
sf36 1Y functional capacity	50	40	65	<0.0001
sf36 2Y functional capacity	45	38	60	<0.0001
sf36 pre pain	30	20	40	
sf36 1M pain	50	50	70	<0.0001
sf36 6M pain	60	50	70	<0.0001
sf36 1Y pain	70	60	80	<0.0001
sf36 2Y pain	70	60	80	<0.0001
sf36 pre general state of health	60	45	80	
sf36 1M general state of health	63	50	80	0.006
sf36 6M general state of health	65	55	80	0.001
sf36 1Y general state of health	68	55	80	0.002
sf36 2Y general state of health	65	50	80	0.028
sf36 pre limitation by emotional aspect	66.66	33.33	100	
sf36 1M limitation by emotional aspect	100	67	100	0.011
sf36 6M limitation by emotional aspect	100	100	100	0.050
sf36 1Y limitation by emotional aspect	100	100	100	0.011
sf36 2Y limitation by emotional aspect	100	100	100	0.014
sf36 pre limitation by physical aspect	25	25	25	
sf36 1M limitation by physical aspect	25	25	75	0.414
sf36 6M limitation by physical aspect	50	25	50	0.084
sf36 1Y limitation by physical aspect	50	25	75	0.047
sf36 2Y limitation by physical aspect	50	38	75	0.011
sf36 pre mental health	54	42	62	
sf36 1M mental health	68	62	76	<0.0001
sf36 6M mental health	76	60	80	<0.0001
sf36 1Y mental health	76	60	80	<0.0001
sf36 2Y mental health	72	64	80	<0.0001
sf36 pre vitality	50	35	60	
sf36 1M vitality	65	60	70	<0.0001
sf36 6M vitality	68	60	70	<0.0001
sf36 1Y vitality	70	60	80	<0.0001
sf36 2Y vitality	75	68	80	<0.0001

In the preoperative period, the pain domain scored a median of 30 and starting with the first postoperative month we observed a significant improvement ( $p < 0.001$ ), reaching a median of 50. We observed progressive patient improvement towards a median of 70 after two years. (Figure 3)

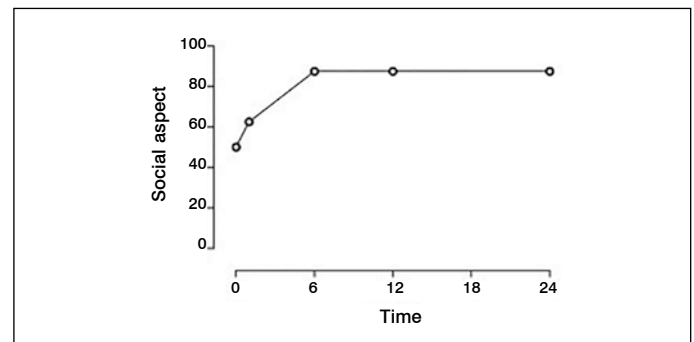
The behavior of general state of health had the same characteristics, with a median of 60 in the preoperative period and of 63 ( $p = 0.006$ ) in the first month following surgery, remaining stable through the two years of observation. (Figure 4)

The emotional aspect measured by SF-36 presented a moderate preoperative score (median=66), increasing as of the first month following surgery (median=100) and staying at this level through the end of follow-up. (Figure 5)

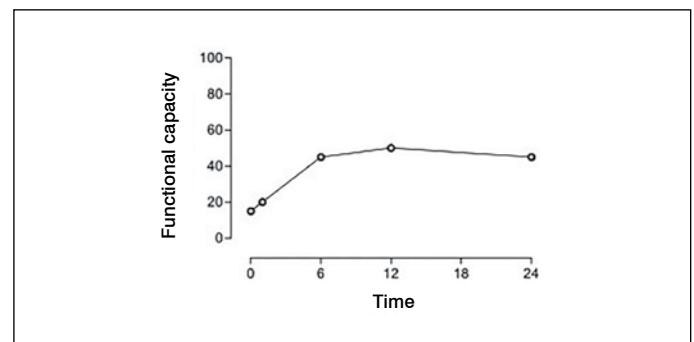
Limitation by physical aspect scored a median of 25 prior to surgery and improvement in this domain was only seen after one year, when the median reached 50 ( $p = 0.047$ ), where it remained unchanged until the end of observation. (Figure 6)

The mental health domain of the SF-36 obtained a median of 54 prior to surgery, rising to 68 after 30 days ( $p < 0.001$  vs. pre), increasing gradually over the next 48 months. (Figure 7)

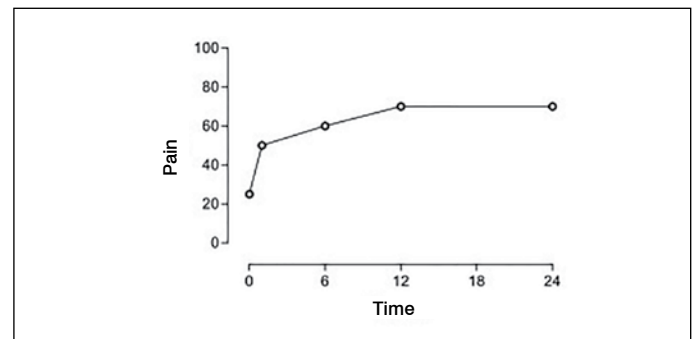
We observed that the preoperative vitality of the patients had a median of 50, already exhibiting a postoperative increase (median=65)



**Figure 1.** Social aspect.



**Figure 2.** Functional capacity.



**Figure 3.** Pain.

in the first month, rising subsequently until the end of follow-up (median=75,  $p<0.001$ ). (Figure 8)

Our analysis of the Oswestry tool (Table 3) showed compromise from low back pain in the preoperative period (median=59;  $p<0.001$  vs. pre), dropping only six months after surgery and improving progressively through the end of observation. (Figure 9)

The Roland-Morris had a preoperative median value of 18, already exhibiting a large decrease starting in the first month following surgery (median=12,  $p<0.001$ ), dropping progressively over the first year (median=7), and then remaining stable through the end of follow-up. (Figure 10)

The analysis of pain via the VAS presented a median of 9 in the preoperative period, with a decrease in values already occurring in the first month (median=6) and continuing to decrease up to two years following surgery (median=3). (Figure 11)

DISCUSSION

Disc herniation is considered an extremely common disease that causes serious disability to those who suffer from it. In view of this, it constitutes a global public health problem and validates the importance of this analysis.<sup>20</sup>

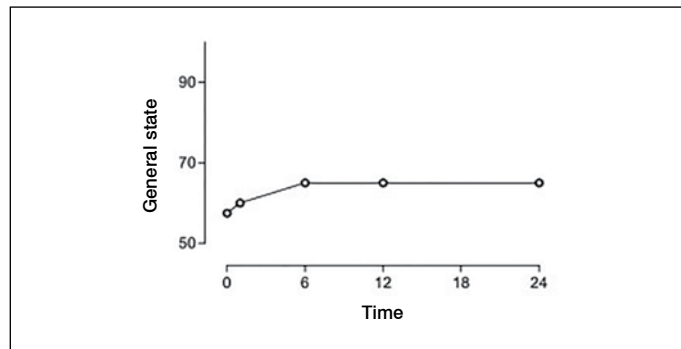


Figure 4. General state.

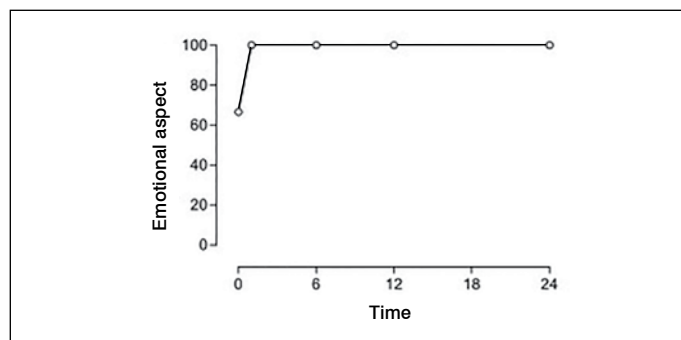


Figure 5. Emotional aspect.

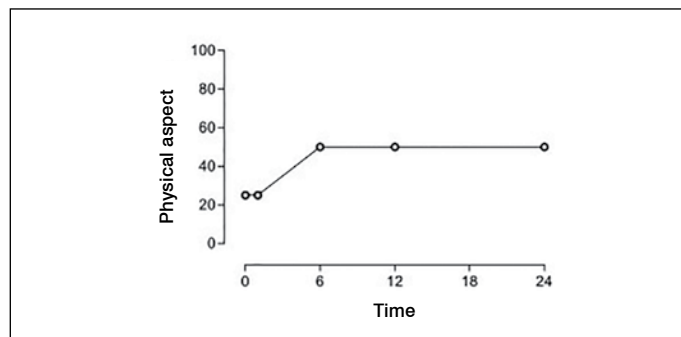


Figure 6. Physical aspect.

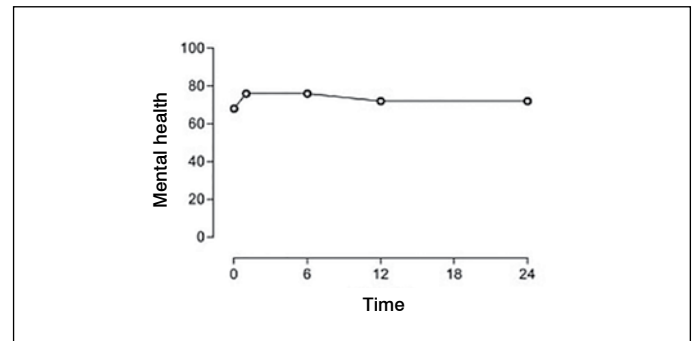


Figure 7. Mental health.

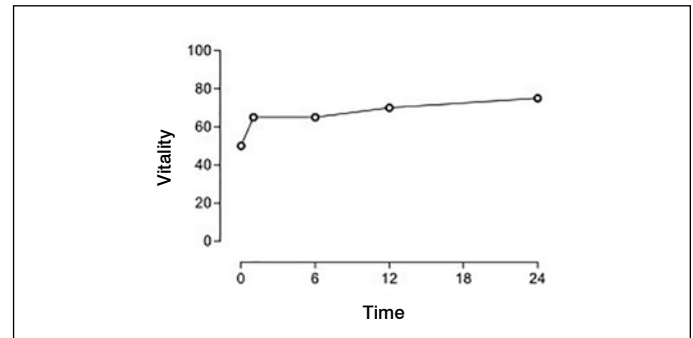


Figure 8. Vitality.

Table 3. Comparison of Oswestry, Roland-Morris, and VAS over time.

	Median	25th Percentile	75th Percentile	Comparison with preoperative
Oswestry pre	59	43	68	
Oswestry 1M	52	34	65	.206
Oswestry 6M	45	28	60	.034
Oswestry 1Y	40.0	22.5	55.0	.001
Oswestry 2Y	31	28	52	<0.001
Roland-Morris pre	19	15	20	
Roland-Morris 1M	12	8	16	<0.001
Roland-Morris 6M	9	6	14	<0.001
Roland-Morris 1Y	7	5	13	<0.001
Roland-Morris 2Y	7	5	10	<0.001
VAS pre	9	8	10	
VAS 1M	6	3	8	<0.001
VAS 6M	5	2	6	<0.001
VAS 1Y	4	2	6	<0.001
VAS 2Y	3	2	5	<0.001

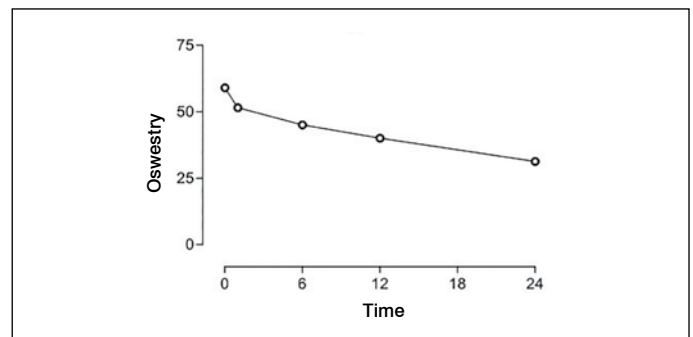


Figure 9. Oswestry.

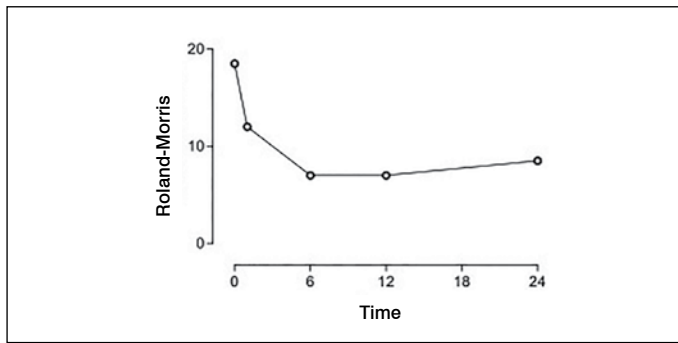


Figure 10. Roland-Morris.

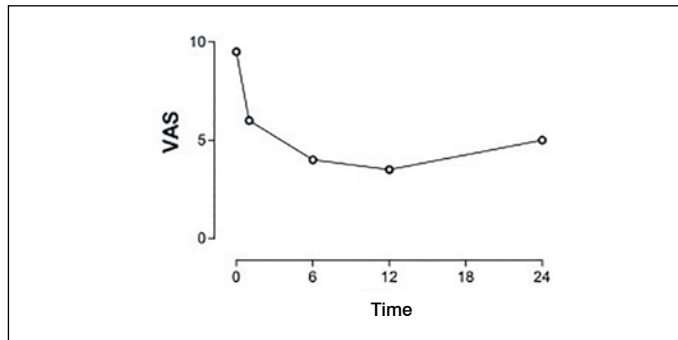


Figure 11. Visual Analog Scale.

The objective of this study was not to select patients with similar clinical profiles, radiological aspects, ages, or levels of medullary compromise, but to evaluate whether the surgical procedure, when properly indicated, generates positive impact on quality of life.

Over the course of our study, through an analysis of the SF-36, Roland-Morris, and VAS tools, we noted a significant improvement in quality of life in comparison to the values observed in preoperative assessments. Based on recently published studies, we obtained estimates consistent with the literature for significant clinical differences

in relation to scores (a difference of 10 points for the SF-36 domains and eight to twelve points for the ODI tool between the pre- and post-surgical scores).<sup>21</sup>

Conducting a longitudinal comparative analysis over time between the different SF-36 domains, we observed that in the first postoperative month there was already improvement in the social aspects, pain, state of general health, emotional, mental health, and vitality domains. The functional capacity and limitation by physical aspect domains improvement came later (6 months and 1 year, respectively) and corroborated the hypothesis that muscular atrophy caused by pain and radiculopathy resulting from the herniation cause a decrease in the strength of lumbar, abdominal, and dorsal muscles, which require a longer interval of time to recover muscle tone with the consequent improvement of functional capacity and physical aspect.<sup>22</sup>

It is interesting to note that the Oswestry tool, which takes the social and physical restrictions that lumbalgia causes into account, presented improvement indices starting in the sixth month in close correlation with the SF-36 functional capacity domain. Even though it is a specific tool, it suggests that lumbar pain has an influence as an overall limiter of functional capacity.

Pain assessment using the VAS and Roland-Morris scales showed a decrease in the absolute values in all postoperative periods (one month, six months, one year, two years) when compared to the preoperative values.

## CONCLUSIONS

The social aspect, pain, general state, emotional aspect, mental health, and vitality domains presented improvement starting in the first month following surgery; but the functional capacity domain only showed significant improvement after six months and the physical aspects only after one year.

The Roland-Morris and VAS tools showed improvement starting one month after surgery, while the Oswestry tool showed that there was improvement in the aspects measured only six months following surgery.

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All authors declare no potential conflict of interest related to this article.

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**CONTRIBUTION OF THE AUTHORS:** Each author made significant individual contributions to this manuscript. TKB and BVM were the main contributors to the preparation of the manuscript. TKB, BVM, ANM, and AMY were submitted to surgery, followed up on patients, and gathered clinical data. LMRR and FHU calculated the statistical analysis data. TKB, BVM, and LMRR conducted the bibliographical research, manuscript review, and contributed to the intellectual concept of the study.

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