

# CHRONIC LOW BACK PAIN: MULTIFACTORIAL ASPECTS AFTER LUMBAR OSTEOARTHRITIS – A SYSTEMATIC REVIEW

*DOR LOMBAR CRÔNICA: MULTIFATORIEDADE APÓS ARTROSE LOMBAR – UMA REVISÃO SISTEMÁTICA*

*DOLOR LUMBAR CRÓNICO: MULTICAUSALIDAD DESPUÉS DE ARTROSIS LUMBAR – UNA REVISIÓN SISTEMÁTICA*

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## ABSTRACT

Chronic low back pain is a debilitating condition that significantly affects patients' quality of life. One of the strategies for solving the problem has been lumbar spine arthrodesis, a widely used surgical intervention to treat various spinal pathologies. However, a considerable number of patients report continued pain even after the procedure. Given this scenario, this study aims to evaluate the chronic low back pain after lumbar spine arthrodesis. In addition, it aims to identify the main errors committed both in the preoperative and postoperative periods and the procedures that should be adopted to minimize the occurrence of persistent low back pain. The methodology used includes a literature review. By identifying the factors that contribute to failure to resolve pain and the best clinical practices, it is expected to provide guidelines to improve surgical results and decrease the incidence of chronic post-arthrodesis pain. Adopting these approaches can significantly transform the management of chronic low back pain in patients undergoing spinal arthrodesis, promoting a more effective recovery and improving their quality of life. **Level of Evidence III; Systematic review<sup>b</sup> of Level III studies.**

**Keywords:** Spinal Fusion; Low Back Pain; Practice Patterns, Physicians'.

## RESUMO

A dor lombar crônica é uma condição debilitante que afeta significativamente a qualidade de vida dos pacientes. Uma das estratégias para a resolução do problema tem sido a artrodese de coluna lombar, uma das intervenções cirúrgicas amplamente utilizadas para tratar diversas patologias da coluna vertebral. No entanto, um número considerável de pacientes relata a continuidade da dor, mesmo após o procedimento. Diante desse cenário, este trabalho tem como objetivo avaliar o quadro de dor lombar crônica após artrodese de coluna lombar. Além disso, pretende-se identificar os principais erros cometidos tanto no período pré-operatório quanto no pós-operatório e as condutas que devem ser adotadas para minimizar a ocorrência de dor lombar persistente. A metodologia utilizada inclui revisão da literatura. Ao identificar os fatores que contribuem para a falha na resolução da dor e as melhores práticas clínicas, espera-se fornecer diretrizes para melhorar os resultados cirúrgicos e diminuir a incidência de dor crônica pós-artrodese. A adoção dessas condutas pode transformar significativamente o manejo da dor lombar crônica em pacientes submetidos à artrodese da coluna, promovendo uma recuperação mais eficaz e melhorando sua qualidade de vida. **Nível de Evidência III; Revisão sistemática<sup>b</sup> de Estudos de Nível III.**

**Descritores:** Fusão Vertebral; Dor Lombar; Padrões de Prática Médica.

## RESUMEN

El dolor lumbar crónico es una condición debilitante que afecta significativamente la calidad de vida de los pacientes. Una de las estrategias para solucionar el problema ha sido la artrodosis de la columna lumbar, una de las intervenciones quirúrgicas más utilizadas para tratar diversas patologías de la columna. Sin embargo, un número considerable de pacientes reportan dolor continuo, incluso después del procedimiento. Ante este escenario, este estudio tiene como objetivo evaluar el dolor lumbar crónico después de una artrodosis de columna lumbar. Además, se pretende identificar los principales errores cometidos tanto en el preoperatorio como en el postoperatorio y las medidas que se deben adoptar para minimizar la aparición de lumbalgia persistente. La metodología utilizada incluye una revisión de la literatura. Al identificar los factores que contribuyen a la falta de resolución del dolor y las mejores prácticas clínicas, esperamos proporcionar pautas para mejorar los resultados quirúrgicos y disminuir la incidencia del dolor crónico posartrodosis. La adopción de estos enfoques puede transformar significativamente el tratamiento del dolor lumbar crónico en pacientes sometidos a artrodosis espinal, promoviendo una recuperación más efectiva y mejorando su calidad de vida. **Nivel de evidencia III; Revisión sistemática<sup>b</sup> de Estudios de Nivel III.**

**Descriptor:** Fusión Vertebral; Dolor de la Región Lumbar; Pautas de la Práctica en Medicina.

Study conducted by the Regional Hospital of São José Dr. Homero de Miranda Gomes.

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## INTRODUCTION

Chronic lumbar pain is one of the most prevalent and debilitating conditions, affecting millions of people worldwide. When conservative treatments do not provide adequate relief, spinal arthrodesis can be considered a viable surgical intervention.<sup>1,2</sup> Arthrodesis aims to stabilize the spine by merging two or more vertebrae, thereby reducing pain associated with abnormal movement between them.

However, even after surgery, many patients continue to experience chronic lumbar pain, raising questions about the effectiveness and complications of this procedure. Recent studies suggest that up to 40% of patients can continue to feel pain after the arthrodesis. The persistence of the pain can be attributed to a number of causes, including failure in bone fusion, pseudoarthrosis and degeneration of adjacent segments.<sup>3</sup> Furthermore, psychosocial factors such as depression and anxiety are also known to negatively influence postoperative outcomes.<sup>4</sup>

The surgical technique used during arthrodesis also plays a crucial role in clinical outcomes. Comparisons between different surgical approaches indicate that minimally invasive techniques can lead to better results in terms of functional recovery and reduction of postoperative pain. However, these benefits should be balanced with the potential increase in surgical time and learning curve for surgeons.<sup>5</sup>

Detailed preoperative evaluation of patients is essential to predict the results of the arthrodesis. Factors such as advanced age, presence of comorbidities and history of anterior spinal surgery may predispose to treatment failure.<sup>6</sup> Furthermore, the use of advanced imaging techniques such as computed tomography (CT) and MRI can help in the precise identification of the anatomical structures involved in lumbar pathology. Finally, multidisciplinary approaches that combine surgical intervention with intensive physical rehabilitation have shown greater effectiveness in managing chronic lumbar pain post-arthrosis. Personalized programs that include physiotherapy, occupational therapy and psychological support have been shown to significantly improve the quality of life of patients.<sup>7</sup>

Recently, the role of emerging technologies in the management of post-arthrosis chronic lumbar pain has been investigated. Therapies such as transcutaneous electrical nervous stimulation (TENS) and minimally invasive techniques are being explored with promising results. Studies suggest that these approaches can offer significant pain relief with a lower risk of complications compared to traditional methods.<sup>8</sup>

Considering this scenario, the present study aims to contribute with data relevant to the field of spine surgery and chronic pain medicine, by identifying modifiable factors that can be implemented in clinical practice, with the aim of improving the results post-arthrosis in terms of pain control.

## MATERIALS AND METHODS

This study is a systematic review, conducted between April and May 2024, which aims to integrate information about chronic lumbar pain after the procedure of arthrodesis. For this purpose, original articles, case reports and review articles published and referenced in MEDLINE/PubMed, SciELO and Cochrane were consulted between January 2010 and June 2024, in English and Portuguese.

The descriptors "lumbar spine arthrodesis" and "chronic low back pain" were used and their variations were included in the Medical Subject Headings (MeSH). Original studies in English, conducted with humans, published in the last 15 years were included and excluded those whose titles and summary did not fit the focus of chronic lumbar pain after arthrodesis procedures.

After the initial research was carried out, 298 articles were identified. When applying the inclusion criteria, there were 167 articles left, and after reading the titles and summaries that showed duplicity of the studies found or divergence in the focus of research, there were 24 articles left to compose the scope of this integrative review. Finally, each of the papers was subjected to careful reading for analysis and discussion.

## DISCUSSION

Chronic lumbar pain is a challenge as there is no uniform way to define it or understand how it occurs. The causes include adjacent segmental disc degeneration, pseudoarthrosis, sacroiliac joint pain, and isthmic spondylolisthesis.<sup>9</sup> Since only a subset of patients have chronic pain, it is believed that some patients may be more susceptible to this phenomenon.

Studies conducted indicate a clinical failure rate of around 20% to 40% of lumbar arthrodesis surgeries.<sup>10</sup> In this bias, the results suggest that factors such as advanced age, the presence of comorbidities and preoperative psychological state may negatively influence post-surgical outcomes.<sup>11</sup>

Another important point evidenced is pseudoarthrosis, which turned out to be one of the main causes of failure of surgical treatment. Recent studies show that the rate of pseudoarthrosis can reach up to 15%, contributing to the persistence of chronic lumbar pain.<sup>12</sup> The correlation between the lack of proper bone fusion and the maintenance of painful symptoms highlights the need for advanced techniques and biocompatible materials that can improve vertebral fusion rates.

Integrated programs involving physiotherapy, psychotherapy and pharmacological management have been shown to be effective in reducing pain levels and improving patient function. Combined interventions are more effective than isolated approaches, emphasizing the need for continued and holistic care for these patients.<sup>13</sup>

The implications of these findings are significant for both the surgical planning and the postoperative management of patients with chronic lumbar pain undergoing arthrodesis. The high prevalence of persistent pain suggests the urgent need for effective preventive strategies and improved therapeutic interventions.<sup>14</sup> Early identification of predictive factors can better guide clinical decisions, minimizing risks and optimizing outcomes.

Regarding the use of drug treatment, Amitriptyline, when in low doses (10 mg) and for a short period (3 months), showed improvement in the incapacity of patients.<sup>15</sup> In contrast, the use of Imipramine, another tricyclic antidepressant, showed no effect compared to placebo, showing the ineffectiveness of the medication for the treatment of the algae.<sup>16</sup>

Another drug, Duloxetine, with action in the modulation of serotonin and norepinephrine, has its action proven to improve chronic low back pain. Studies have demonstrated a reduction in the intensity of the illness and an improvement in the quality of life of patients after introduction of the medication.<sup>17</sup>

In addition, the different uses of Tramadol in the treatment and improvement of the intensity of chronic lumbar pain were evaluated. The Tramadol versus placebo ratio showed that the medication helped reduce the intensity of lumbar pain in 8 weeks, and after 16 weeks the difference was not significant.<sup>18</sup>

Regarding treatment with non-steroidal anti-inflammatory agents (NSAIDs), some improvement in the intensity of pain and disability is seen compared to placebo. However, this association was not sufficient to prove the efficacy of the drug use in the condition, since there was low quality of evidence and report of adverse events with the use of the medication.<sup>19</sup> The efficacy of the surgical procedure, arthrodesis or decompression, in the reduction of chronic lumbar pain is noted in several studies.<sup>20-22</sup> However, it is essential to recognize that the reduction of pain was not uniform among all patients, pointing to individual variables that may impact the results. It is important to consider the inherent limitations of the procedure, such as the prolonged recovery time and possible postoperative complications. On the other hand, a critical point identified was the persistence of pain in some cases. Studies suggest that factors such as the surgical technique used, surgeon experience and specific patient characteristics such as age and comorbidities may influence these results.<sup>23</sup>

The presence of residual pain can be associated with the development of complex painful syndromes or the failure to complete bone fusion. In addition, a comparative analysis between different arthrodesis techniques revealed variations in clinical outcomes. For example, minimally invasive techniques have proved promising in terms of shorter recovery time and reduced complications.<sup>5</sup> These

data suggest the continuing need for research to optimize surgical approaches and personalize treatments based on individual patient characteristics. The implications of these findings are diverse. First, they reinforce the need for strict postoperative monitoring to identify complications or failures in bone fusion early. Second, they emphasize the importance of continuous development and improvement of surgical techniques to maximize therapeutic benefits while minimizing associated risks. Finally, they emphasize the crucial role of individualization of treatment based on patient-specific parameters.<sup>24</sup>

Early identification of prognostic factors can help in the appropriate selection of candidates for arthrodesis, potentially increasing the rates of surgical success. In addition, the need for multidisciplinary approaches in postoperative treatment is emphasized to maximize the clinical benefits of surgery.

## CONCLUSION

The results indicate that although arthrodesis is a common intervention for relieving the pain and instability of the spine, a

significant proportion of patients continue to experience chronic lumbar pain after the procedure. The findings are consistent, suggesting that the etiology of pain is not fully addressed by surgery. The data collected showed that factors such as advanced age, smoking, associated comorbidities and psychological characteristics are important determinants for postoperative prognosis. These factors should be carefully considered during the preoperative evaluation to minimize the risks of unsatisfactory outcomes. In addition, the need for multidisciplinary follow-up becomes evident, integrating professionals from areas such as physiotherapy, psychology and occupational therapy to provide comprehensive support to patients.

These results, first, emphasize the importance of a personalized approach in the indication and postoperative management of patients undergoing spinal arthrodesis. Secondly, they point to the urgent need for complementary non-surgical strategies that can improve outcomes in the long run. Finally, this work reinforces the importance of continuous development of evidence-based clinical protocols to optimize the treatment of chronic lumbar pain.

## CONFLICT OF INTEREST

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

## CONTRIBUTIONS OF THE AUTHORS

The authors FW and LMC played key roles in this work, contributing substantially to the design and design of the study as well as the acquisition, analysis and interpretation of the data. Both actively participated in the discussions on the results, contributing to the deepening and validation of the analyses. In addition, FW was involved in writing the manuscript, carrying out critical revisions to ensure the accuracy and integrity of the scientific content. Finally, both reviewed and finally approved the version of the document, taking full responsibility for the content presented.

## DATA AVAILABILITY DECLARATION

The contents underlying the research are available in the manuscript.

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