THE MICROSCOPIC AND ENDOSCOPIC TECHNIQUES IN LUMBAR DISCECTOMY: A SYSTEMATIC REVIEW

A TÉCNICA MICROSCÓPICA E ENDOSCÓPICA NA DISCECTOMIA LOMBAR: UMA REVISÃO SISTEMÁTICA

LA TÉCNICA MICROSCÓPICA Y ENDOSCÓPICA EN LA DISCECTOMÍA LUMBAR: UNA REVISIÓN SISTEMÁTICA

ABSTRACT

Objectives: To compare microdiscectomy (MD) and endoscopic interlaminar discectomy (EID) as methods for the surgical treatment of lumbar disc herniation, describing their efficiency in reducing hospitalization time, pain, and neurological deficit, and comparing the findings and the quality of studies that used the microscopic and endoscopic techniques. Methods: A systematic literature review that used the PRISMA protocol as a methodology. The search was conducted in the PUBMED/MEDLINE and The Cochrane Library databases, using publications from the last 5 years in Portuguese and English. After applying the inclusion and exclusion criteria and validating the qualified studies via STROBE and CONSORT, there were a total of 16 studies for data compilation. Results: A sample of 1004 patients who underwent lumbar discectomy was obtained, 62% of whom were male, and 493 of whom underwent EID (49%) and 511 MD (51%). The mean patient age was 38.7 years and the predominant vertebral level operated was L5-S1 (64.8%). The EID had shorter surgical time (66.38 min) and hospitalization time (3.3 days), in addition to greater variation in the VAS LLLL score (5.38), while the MD presented greater variation in the VAS LUMBAR score (3.14). Conclusion: EID demonstrated efficacy like that of MD, given the similarity in the results obtained, in addition to non-inferiority in the reduction of pain and neurological deficit, and superiority in surgical and hospitalization times. Level of Evidence I; Systematic review.

Keywords: Diskectomy; Microsurgery; Endoscopy.

RESUMO

Objetivo: Comparar a microdiscectomía (MD) e a discectomía endoscópica interlaminar (DEI) como métodos de tratamento cirúrgico da hérnia de disco lombar, descrevendo a sua eficiência quanto à redução do tempo de hospitalização, da dor e do déficit neurológico e comparando os achados e a qualidade de estudos que utilizaram as técnicas microscópica e endoscópica. Métodos: Revisão sistemática da literatura que utilizou o protocolo PRISMA como metodologia. A busca foi realizada nas bases de dados: PUBMED/MEDLINE e The Cochrane Library, utilizando publicações dos últimos 5 anos, em português e inglês. Aplicados os critérios de inclusão e exclusão, bem como a validade dos estudos qualificados via STROBE e CONSORT, totalizaram 16 estudos para compilação de dados. Resultados: Foram obtidas amostras de 1.004 pacientes submetidos à discectomía lombar, sendo 493 com DEI (49%) e 511 com MD (51%), do sexo masculino (62%), média de idade de 38,7 anos e o nível vertebral L5-S1 (64,8%) como mais prevalente. A DEI mostrou menor tempo cirúrgico (66,38 min.) e de hospitalização (3,3 dias), além de maior variação no escore EVA MMII (5,38), enquanto a MD apresentou maior variação na EVA Lombar (3,14). Conclusões: A DEI demonstrou eficácia similar à MD diante dos resultados obtidos, além da não inferioridade na redução da dor e do déficit neurológico e da superioridade no tempo de cirurgia e de hospitalização. Nível de Evidência I; Revisão sistemática.

Descritores: Discotomia; Microcirurgia; Endoscopia.

RESUMEN

Objetivos: Comparar la microdiscectomía (MD) y la discectomía endoscópica interlaminar (DEI) como métodos de tratamiento quirúrgico de la hérnia de disco lumbar, describiendo su eficiencia para reducir el tiempo de hospitalización, el dolor y el déficit neurológico y comparando los resultados y la calidad de los estudios que utilizaron las técnicas microscópicas y endoscópicas. Métodos: Revisión sistemática de la literatura que utilizó el protocolo PRISMA como metodología. La búsqueda se realizó en las bases de datos: PUBMED / MEDLINE y The Cochrane Library, utilizando publicaciones de los últimos 5 años, en portugués e inglés. Tras aplicar los criterios de inclusión y exclusión, así como la validez de estudios calificados a través de STROBE y CONSORT, se recopilaron un total de 16 estudios para la compilación de datos. Resultados: Se obtuvieron muestras de 1004 pacientes sometidos a discectomía lumbar, 493 con DEI (49%) y 511 con MD (51%), hombres (62%), edad promedio de 38,7 años y el nivel vertebral L5-S1 (64,8%) como más prevalente. La DEI mostró un menor tiempo quirúrgico (66,38 min) y de hospitalización (3,3 días), además...
INTRODUCTION

Disc herniation, defined as the process of posterior herniation of the disc content beyond its anatomical space, due to the appearance of radial fissures in the fibrous ring of the intervertebral disc and leading to the extravasation of the nucleus pulposus, is one of the main causes of lumbosciatic pain. Such fissures result from a process of disc degeneration, caused by a prolonged period of mechanical stress that the spine of the individual suffers during their life.1,2,3

The phenomenon of spontaneous reabsorption of the herniated content by the body has been reported in the literature, based on computed tomography and magnetic resonance findings, with an overall incidence of approximately 66.66%.4,5 However, in some cases this herniated fragment tends to compress adjacent nerve structures, such as the nerves that emerge and converge through the intervertebral foramen, or even the cauda equina itself, causing greater morbidity.1 This compressive radiculopathy caused by the disc content varies according to the degree of compression of the nerve structures, and can generate a process of radicular pain, or even sensory/motor dysfunction of the lower limbs, such as paresis and paresthesia.2,6

An indication of elective surgery is based on the convergence between the patient's history and their physical examination, imaging tests that confirm intervertebral disc herniation, and the presence of pain refractory to at least six weeks of conservative treatment. The surgical approach is superior to conservative treatment in relieving symptoms and in functional improvement when clinical conditions persist, with an absolute indication for the cauda equina syndrome or severe paresis, which require immediate surgical treatment.2,7,8

Related indications include sciatica that does not respond to a minimum of six weeks of conservative treatment, motor deficit higher than grade 3 associated with sciatica for more than six weeks or radicular pain associated with foraminal stenosis.9 In addition, other factors like the patient's lifestyle, pain tolerance, understanding of the procedure, and knowledge of the postoperative process must be considered when the surgeon and the patient opt for surgery.2,6,9

Surgical treatment for a herniated disc consists of total removal of the herniated content outside of its anatomical limit, decompressing the adjacent nerve roots. Given this objective, surgical techniques have been developed over decades, with the goal of reducing the area of surgical manipulation, providing better recovery and better aesthetic results.5,9

Currently, the most used procedure for surgical treatment of lumbar disc herniation is microdiscectomy, which is an open procedure performed using a surgical microscope, reducing the size of the skin and muscle tissue incision. Recently and analogously, the endoscopic technique emerged with the aim of minimizing even further the tissue trauma caused by the surgical procedure, reducing the area of surgical manipulation, and providing considerable postoperative benefits for the patient.2,6,10,11

Although the literature describes significant results from the endoscopic technique, more studies comparing it with already established techniques, such as microdiscectomy must be conducted. Therefore, the objective of this systematic review is to compare the open microscopic technique and the endoscopic technique as tools for the surgical treatment of lumbar disc herniation, describing the efficiency of the techniques based on the length of hospitalization, the pain, and the neurological deficit present, as well as the findings and the quality of the studies that use the microscopic and endoscopic techniques.

METHODS

Study design and search strategy

This is a systematic literature review that used a systematized methodology based on the PRISMA protocol.12 The search was performed in the MEDLINE/PubMed (U.S. National Library of Medicine/Public Medicine Library) and The Cochrane Library electronic data sources using a combination of descriptors, including the Medical Subject Headings (MeSH) terms. The descriptors used together were: ((("microdiscectomies"[All Fields] OR "microdiscectomy"[All Fields]) OR ("full-endoscopic"[All Fields] AND "interlaminar"[All Fields]))) OR ("discectomies"[All Fields] OR "discectomy"[All Fields])) AND ((((((("lumbarised"[All Fields] OR "lumbarization"[All Fields]) OR "lumbarized"[All Fields] OR "lumbars"[All Fields] OR "lumbarsocral region"[MeSH Terms]) OR ("lumbosacular"[All Fields] AND "region"[All Fields])) OR "lumbosacular region"[All Fields]) OR "lumbar"[All Fields]) AND ((("intervertebral disc displacement"[MeSH Terms]) OR ("intervertebral"[All Fields] AND "discedisc"[All Fields] AND "discectomy"[All Fields])) OR ("lumbarised"[All Fields] AND ("lumbarized"[All Fields] OR "lumbarsocral region"[MeSH Terms])) OR ("lumbosacular region"[All Fields]) OR "lumbar"[All Fields]) AND ((("intervertebral disc displacement"[MeSH Terms]) OR ("intervertebral"[All Fields] AND "discedisc"[All Fields] AND "disc herniated"[All Fields])) OR ("lumbarised"[All 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("decompresses"[All Fields] OR "decompressing"[All Fields] OR "decompressions"[All Fields] OR "decompressive"[All Fields]) AND ((("clinical trial"[Publication Type] OR “observational study”[Publication Type]) OR “randomized controlled trial”[Publication Type]) AND 2015/6/3-3000/11[Date - Publication] AND “humans”[MeSH Terms]).

Inclusion and exclusion criteria of the sample

The population studied in this review comprised patients of both sexes, above 18 years of age, who underwent surgical treatment for lumbar disc herniation, via open microdiscectomy or endoscopic discectomy. The pre- and postoperative visual analog scale (VAS) values obtained for the lumbar region and lower limbs, the demographic data, and the duration of each surgical procedure were compared.

Retrospective and prospective observational studies, cohort studies, and randomized trials found in the previously mentioned databases were selected. Only articles written in English or Portuguese and studies involving human beings were included. Works that diverged from the proposed topic, studies published more than five years before, and systematic reviews were excluded.

Data identification and selection

Studies published between October 2019 and June 2020 were selected. The authors responsible for the study performed a reading of the title and abstract of each preselected paper, separately identifying articles that correctly met the inclusion and exclusion criteria. After this stage, a full reading of the articles respecting the criteria set out in the abstract was conducted, and in cases of doubt, both researchers met to make a consensual decision.
Data extraction

After selection of the articles for data analysis, the following characteristics were extracted from the studies: author, year of publication, scientific journal where published, type of study, sample size, methods and criteria analyzed, surgical time, and pre- and postoperative surgical results of the technique performed in the study (lower limb and lumbar VAS and hospitalization time). The data analyzed were classified by visual analog score (VAS) to compare the degrees of pre- and postoperative neurological deficit and hospitalization time, as well as the intra-hospital recovery time necessary after each surgical procedure.

Assessment of the methodological quality of the selected articles

To evaluate the methodological quality of the selected articles, both authors separately filled out a checklist based on the Consolidated Standards of Reporting Trials (CONSORT) for the analysis of clinical trials, and the studies that met at least 14 of the 25 CONSORT criteria were included. The other checklist was based on Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) for the analysis of observational studies, and the studies that met a minimum of 18 of the 22 STROBE criteria were included.

Statistical analysis

After the collection period, the data selected were recorded in a Microsoft Excel spreadsheet created for the current study. Then, the recorded data were submitted for statistical analysis using the same program.

RESULTS

The search process to identify the articles to be analyzed yielded 184 articles from the previously mentioned platforms and 11 articles found through other sources, which appeared to be compatible with the topic. There were no duplicates among these 195 works, but 160 studies were excluded because they did not relate to the topic of this review, leaving 35 original articles for full text analysis. Thirteen of these studies were excluded because the text was not consistent with the review, because they did not address the criteria to be analyzed, or because only a draft of the paper was presented with no explanation of the results. The remaining 22 articles underwent both qualitative and quantitative analysis, and 6 articles which did not meet the predetermined minimum scores of 14 and 18 points for the CONSORT and STROBE instruments, respectively, were excluded, concluding the selection process with a final sample of 16 articles, as shown in Figure 1.

From the 16 selected articles, shown in Table 1, we obtained a total sample of 1004 patients who underwent surgical treatment for lumbar disc herniation. Of these, 493 were operated using the endoscopic interlaminar technique and 511 using the open microscopic technique. There was a predominance of males (62%), a mean age of 38.7 years, and the most prevalent location (64.8% of cases) was vertebral level L5-S1, as shown in Table 2.

The mean follow-up times of the articles that analyzed the open microscopic and endoscopic discectomy techniques were 34 and 24.5 months, respectively. Regarding the surgical time, there was a reduction in the average time in the endoscopic technique (66.38 min), compared to the microscopic technique (78.3 min), as shown in Table 3. The analysis of surgical procedure efficiency according to the lumbar VAS and lower limb VAS (LLLL VAS) showed that the endoscopic technique provided patient improvement of 51.97% (lumbar VAS) and 76.74% (LLLL VAS), while the open microscopic technique percentages were 54.7% (lumbar VAS) and 69.1% (LLLL VAS), with a mean follow-up time of 21.6 months for endoscopic discectomy and 34 months for microdiscectomy, as shown in Tables 4 and 5.

A difference between the initial mean lumbar VAS scores for the endoscopic and microscopic techniques can be observed in Figure 2, suggesting a distinction between the patients submitted to each of the techniques. However, we can identify a greater variation for microdiscectomy, even though this technique did not score the lowest final follow-up values. In Figure 3, the mean initial lower limb VAS (LLLL VAS) values of both techniques are similar, suggesting greater commonality between the clinical statuses of the two patient groups. The endoscopic technique had a greater variation between the initial and final LLLL VAS values, in addition to scoring a lower mean value, indicating a better clinical outcome than microdiscectomy.
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Publication journal</th>
<th>Keywords</th>
<th>Study design</th>
<th>Sample</th>
<th>Characteristics evaluated</th>
<th>Approaches analyzed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahn et al.</td>
<td>2019</td>
<td>Pain Physician</td>
<td>Endoscopic; discectomy; hospital stay; lumbar disc; microscopic; operative time; return to work; transforaminal</td>
<td>Cohort</td>
<td>298</td>
<td>Age, sex, BMI, level of herniation, preoperative lumbar VAS, preoperative leg VAS, preoperative ODI, postoperative lumbar VAS, postoperative leg VAS, postoperative ODI, modified MacNab criterion, postoperative complications, reoperation, surgical time, hospitalization time, time to return to work, time to herniation recurrence.</td>
<td>Microdiscectomy/ endoscopic transforaminal discectomy</td>
</tr>
<tr>
<td>Kong et al.</td>
<td>2019</td>
<td>Orthopade</td>
<td>Intervertebral disc diseases; Lumbar vertebrae; Postoperative blood loss; Root canal; Visual analog scale</td>
<td>Randomized clinical trial</td>
<td>40</td>
<td>Age, sex, duration of symptoms, motor or sensory deficit, location of herniation, surgical time, blood loss, preoperative leg VAS, preoperative lumbar VAS, postoperative lumbar VAS, postoperative ODI, hospitalization costs, hospitalization time, postoperative complications</td>
<td>Endoscopic interlaminar discectomy/ microsurgical laminectomy</td>
</tr>
<tr>
<td>Segura-Trepichio et al.</td>
<td>2018</td>
<td>Journal of Clinical Neuroscience</td>
<td>Lumbar disc herniation; Discectomy; Microdiscectomy; Patient related outcomes; Length of stay; In-hospital costs; Surgical safety; Readmission; Re-operation</td>
<td>Observational retrospective</td>
<td>30</td>
<td>Age, sex, BMI, tobacco use, vertebral levels treated, Charlson comorbidity index, preoperative ODI, preoperative axial VAS, preoperative lumbar VAS, postoperative ODI, postoperative axial VAS, postoperative lumbar VAS</td>
<td>Microdiscectomy</td>
</tr>
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<td>Tu et al.</td>
<td>2018</td>
<td>Pain Physician</td>
<td>Adolescent lumbar disc herniation; full-endoscopic interlaminar discectomy; sciatic scoliosis; recurrence</td>
<td>Observational retrospective</td>
<td>74</td>
<td>Age, sex, duration of symptoms, trauma, BMI, level of herniation, type of herniation, surgical time, hospitalization time, complications, recurrence, preoperative leg VAS, preoperative lumbar VAS, preoperative ODI, postoperative leg VAS, postoperative lumbar VAS, postoperative ODI, MacNab criterion, radiological results of the group with scoliosis</td>
<td>Endoscopic interlaminar discectomy</td>
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<tr>
<td>Hua et al.</td>
<td>2018</td>
<td>Medicine</td>
<td>Discectomy; Foraminoplasty; Full-endoscopic visualization technique; General anesthesia; Interlaminar approach; Laminectomy; Transforaminal approach</td>
<td>Observational retrospective</td>
<td>60</td>
<td>Age, sex, type of hernia, symptoms, neurological changes, preoperative leg VAS, preoperative lumbar VAS, preoperative ODI, postoperative leg VAS, postoperative lumbar VAS, postoperative ODI, MacNab criterion, surgical time, surgical complications, reoperation.</td>
<td>Endoscopic interlaminar discectomy</td>
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<tr>
<td>Shi et al.</td>
<td>2018</td>
<td>BioMed Research International</td>
<td>-</td>
<td>Randomized clinical trial</td>
<td>22</td>
<td>Age, sex, duration of symptoms, type of hernia, presence of disc calcification, preoperative VAS, preoperative ODI, postoperative VAS, postoperative ODI, MacNab criterion, surgical time, volume of disc tissue removed, postoperative complications</td>
<td>Endoscopic interlaminar discectomy</td>
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<tr>
<td>Hua et al.</td>
<td>2018</td>
<td>Medicine</td>
<td>Discectomy; full-endoscopic interlaminar approach; laminectomy</td>
<td>Observational retrospective</td>
<td>84</td>
<td>Age, sex, location of herniation, type of herniation, pain, neurological changes, preoperative leg VAS, postoperative leg VAS, surgical complications, surgical time, hospitalization time, recovery time, reoperation, MacNab criterion</td>
<td>Endoscopic interlaminar discectomy</td>
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<tr>
<td>Brouwer et al.</td>
<td>2017</td>
<td>Interventional Neuroradiology</td>
<td>Minimally invasive; spine intervention; disk herniation; laser; percutaneous laser disc decompression</td>
<td>Randomized clinical trial</td>
<td>115</td>
<td>Age, sex, BMI, tobacco use, time of sciatica, neurological changes in LLLL, pain, level of herniation, Roland disability questionnaire, lumbar VAS, leg VAS, preferred method, surgical time.</td>
<td>Microdiscectomy/ Percutaneous laser discectomy</td>
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<tr>
<td>Name et al.</td>
<td>Year</td>
<td>Journal</td>
<td>Clinical outcome</td>
<td>Surgical technique</td>
<td>Study Design</td>
<td>n</td>
<td>Total endoscopic technique(s)</td>
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<tr>
<td>------------</td>
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<tr>
<td>Song et al.</td>
<td>2017</td>
<td>Journal of Orthopaedic surgery and research</td>
<td>Clinical outcome; Full endoscopy; Herniated nucleus pulposus; Interlaminar approach; Intermittent endoscopy; Intracanalicular disc herniation; MacNab criteria; Percutaneous endoscopic lumbar discectomy</td>
<td>Observational retrospective</td>
<td>126</td>
<td>Age, sex, type of herniation, leg pain, low back pain, neurological symptoms, duration of pain, surgical time, recovery time, hospitalization time, hospital costs, preoperative VAS, preoperative ODI, MacNab evaluation, additional conditions, postoperative complications</td>
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<tr>
<td>Overdevest et al.</td>
<td>2017</td>
<td>Journal of Neurology, Neurosurgery and Psychiatry</td>
<td>Herniation; lumbar disc; minimal invasive; surgery; tubular discectomy</td>
<td>Randomized clinical trial</td>
<td>325</td>
<td>Age, sex, BMI, time of sciatica, neurological changes, level of herniation, physical functionality, Roland-Morris questionnaire for sciatica (RDS), preoperative leg VAS, preoperative lumbar VAS, postoperative leg VAS, postoperative lumbar VAS, self-perception of improvement, surgery wait time, need for reoperation</td>
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<tr>
<td>Gibson et al.</td>
<td>2017</td>
<td>European Spine Journal</td>
<td>Lumbar discectomy; Microdiscectomy; Transforaminal endoscopic surgery; Randomized controlled trial</td>
<td>Randomized clinical trial</td>
<td>143</td>
<td>Age, sex, weight, tobacco use, duration of symptoms, work, level of herniation, type of hernia, preoperative lumbar VAS, preoperative leg VAS, preoperative ODI, postoperative lumbar VAS, postoperative leg VAS, postoperative ODI, SF-36 index, hospitalization time, reoperation</td>
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<tr>
<td>Nakamura et al.</td>
<td>2017</td>
<td>Pain Physician</td>
<td>Clinical outcome; Herniated nucleus pulposus; Interlaminar approach; Intracanalicular disc herniation; Learning curve; MacNab criteria; Percutaneous full-endoscopic lumbar discectomy</td>
<td>Observational retrospective</td>
<td>50</td>
<td>Endoscopic interlaminar discectomy</td>
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<tr>
<td>Cristante et al.</td>
<td>2016</td>
<td>Clinics</td>
<td>Discectomy, percutaneous discectomy, low back pain, spine</td>
<td>Randomized clinical trial</td>
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<td>Microdiscectomy/ hydrodiscectomy</td>
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<td>Choi et al.</td>
<td>2016</td>
<td>Pain Physician</td>
<td>Large lumbar disc herniation, percutaneous endoscopic lumbar discectomy, microdiscectomy, back pain, disc height</td>
<td>Observational retrospective</td>
<td>43</td>
<td>Microdiscectomy/ endoscopic discectomy</td>
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<td>Joswig et al.</td>
<td>2016</td>
<td>Journal of Neurological Surgery, Part A: Central European Neurosurgery</td>
<td>Full-endoscopic lumbar discectomy; learning curve; minimally invasive; percutaneous endoscopic lumbar discectomy; recurrence rate</td>
<td>Observational retrospective</td>
<td>68</td>
<td>Endoscopic interlaminar discectomy</td>
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<td>Dabo et al.</td>
<td>2016</td>
<td>Pain Physician</td>
<td>Lumbar disc herniation; percutaneous endoscopic lumbar discectomy; interlaminar approach; calcification</td>
<td>Observational retrospective</td>
<td>30</td>
<td>Endoscopic interlaminar discectomy</td>
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</table>
Table 2. Summary demographic data for the patients in each study (n = 16).

<table>
<thead>
<tr>
<th>Technique</th>
<th>Sample (N)</th>
<th>Surgical time (MIN)</th>
<th>Hospitalization (Days)</th>
<th>Follow-up (Months)</th>
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</thead>
<tbody>
<tr>
<td>Endoscopic interlaminar</td>
<td>493 (49%)</td>
<td>66.38</td>
<td>3.3</td>
<td>24.5</td>
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<td>Microscopic technique</td>
<td>511 (51%)</td>
<td>78.3</td>
<td>3.6</td>
<td>34</td>
</tr>
</tbody>
</table>

Table 3. Temporal data values for each technique, showing sample size, surgical time, hospitalization, and study follow-up (n = 16).

<table>
<thead>
<tr>
<th>Technique</th>
<th>Sample (N)</th>
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<th>Postoperative</th>
<th>Fractional anesthesia</th>
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<tr>
<td>Endoscopic technique</td>
<td>511</td>
<td>100</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Microscopic technique</td>
<td>493</td>
<td>90</td>
<td>40%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Table 4. Clinical results by technique, according to lumbar VAS in each follow-up period (n = 13).

<table>
<thead>
<tr>
<th>Technique</th>
<th>Preoperative Lumbar VAS</th>
<th>Lumbar VAS 6 months</th>
<th>Lumbar VAS 12 months</th>
<th>Final lumbar VAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endoscopic technique</td>
<td>4.31</td>
<td>2.05</td>
<td>1.58</td>
<td>2.07</td>
</tr>
<tr>
<td>Microscopic technique</td>
<td>5.74</td>
<td>2.74</td>
<td>2.49</td>
<td>2.60</td>
</tr>
</tbody>
</table>

Table 5. Clinical results by technique, according to lower limb VAS in each follow-up period (n = 14).

<table>
<thead>
<tr>
<th>Technique</th>
<th>Preoperative LLLL VAS</th>
<th>LLLL VAS 6 Months</th>
<th>LLLL VAS 12 Months</th>
<th>Final LLLL VAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endoscopic technique</td>
<td>7.01</td>
<td>1.29</td>
<td>0.92</td>
<td>1.63</td>
</tr>
<tr>
<td>Microscopic technique</td>
<td>7.03</td>
<td>2.11</td>
<td>1.99</td>
<td>2.17</td>
</tr>
</tbody>
</table>

Discussion

This systematic review compared the clinical results obtained within the last 5 years in each study, following correction of lumbar disc herniation by the open microscopic or the endoscopic technique. In view of the results obtained in this study, we observed a similarity between the techniques when we analyze efficacy, represented by the reduction in the lumbar VAS and LLLL VAS.

The main objective of using new minimally invasive techniques is to minimize the trauma and long-term harm caused by surgery. Surgical correction of lumbar disc herniation using the endoscopic technique has produced satisfactory results in reducing the pain reported by the patient, as well as a reduction in neurological deficits and tissue damage inherent to the procedure.
In his review study, Ahn\(^{31}\) discusses indications and outcomes of the different types of endoscopic access. Interlaminar access proved to be the most indicated for disclaxtions without calcification and for inaccessible transforaminal access, in addition to the following conditions: (1) L5-S1 intervertebral space with the iliac crest level elevated above the L5 pedicle in a lateral radiograph, (2) high-grade migraine disc herniation, (3) sufficient interlaminar window between the cranial and caudal laminae, and between the midline and the dorso-medial edge of the inferior articular process measuring at least 6 mm, and (4) no limitation as to the dorsal or lateral extension of the disc herniation.

A recent meta-analysis conducted by Muthu, Ramakrishnan, and Chellamuthu\(^{26}\) analyzed 27 articles, of which 11 were randomized clinical trials, 7 were non-randomized prospective studies, and 9 were retrospective studies, involving a total of 4018 patients. When analyzing the randomized clinical trials, they observed equivalence in the comparison of the endoscopic discectomy and the conventional microdiscectomy in relation to the lumbar VAS (P = 0.860) and LLLL VAS (P = 0.495) values obtained. On the other hand, the superiority of the endoscopic technique over the microscopic technique (P = 0.05) in terms of the Oswestry Disability Index (ODI) functional results score (P = 0.008), the duration of the procedure (P = 0.023), and the length of the hospital stay (P < 0.001), even though significant heterogeneity was observed.

Park et al.\(^{33}\) conducted a randomized clinical trial with 64 patients, comparing decompressive lumbar laminectomy using the biportal endoscopic technique and conventional microdiscectomy in patients with spinal stenosis. In their analysis of the results obtained, they concluded that there was no significant difference between the groups, considering the 12-month postoperative ODI score (P = 0.635). Furthermore, there were no significant differences between lumbar and LLLL VAS scores, in EQ-SD and painDETECT at the 3rd, 6th, or 12th months of follow-up, or in the clinical outcomes of each patient in surgical duration, hospitalization time, serum CPK, or peroperative complications.

When we compared the above studies with the present systematic review, we observed a concordance between them in that the heterogeneity of the results found in each study analyzed indicates a difficulty in determining which technique is really superior. However, the similarity in the results proves that, even though the endoscopic procedure was developed more recently and, therefore, has been applied in treatment of lumbar disc herniation for a shorter time, it is a viable method for the treatment of lumbar disc herniation, when compared to microdiscectomy.

Among the articles included for the review, Choi et al.\(^{26}\) and Ahn et al.\(^{31}\) performed direct comparisons between microdiscectomy and endoscopic discectomy in the same study. However, only Choi et al.\(^{26}\) specifically addressed the endoscopic interlaminar technique in their comparative study. This observation reinforces the need for more studies that compare the techniques concurrently in a similar population sample, regardless of the study design, to produce more scientific evidence.

**CONCLUSION**

Based on the evidence presented by this study, we can conclude that the endoscopic interlaminar technique proved to be as efficient as conventional microdiscectomy, given the similarity of the results obtained. In addition, according to the lumbar and LLLL VAS values of the patients evaluated in each study, this technique demonstrates equivalence in pain and neurological deficit reduction and superiority in terms of surgical and hospitalization times. In view of this, we can affirm that endoscopic discectomy is a viable therapeutic option for the correction of lumbar disc herniation, and it is up to the surgeon to make the decision in accordance with their experience in performing the technique.

However, we also recommend conducting further studies that can complement and deepen knowledge about the clinical results and benefits of the endoscopic technique, given the evolution and innovation of the instruments used in the surgical procedure. From this perspective, the clinical outcomes obtained in these studies will ensure more safety in the choice of treatment, as well as greater benefits for the patient.

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

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**REFERENCES**


