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COMPARATIVE STUDY BETWEEN LUMBAR FACETARY BLOCKADE PERFORMED BY USG X FLUOROSCOPY IN PATIENTS WITH LUMBAR FACETARY SYNDROME

ESTUDO COMPARATIVO ENTRE BLOQUEIO FACETÁRIO LOMBAR REALIZADO POR USG X FLUOROSCOPIA EM PACIENTES COM SÍNDROME FACETÁRIA LOMBAR

ESTUDIO COMPARATIVO ENTRE BLOQUEO FACETARIO LUMBAR REALIZADO POR FLUOROSCOPÍA USG X EN PACIENTES CON SÍNDROME FACETARIO LUMBAR

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ABSTRACT

Introduction: Chronic low back pain is a major cause of disability, especially in patients with lumbar facet syndrome. Lumbar medial branch block can be guided by fluoroscopy or ultrasound, aiming to relieve pain and improve functional capacity. This study compared the efficacy of both techniques. Methods: A retrospective observational study evaluated data from 30 patients with lumbar facet syndrome and divided them into two groups: USG (n = 15) and FS (n = 15). Pain was assessed using the Visual Analog Scale and functional capacity by the Oswestry Disability Index before and 1 month after the procedure. Statistical analysis included the Wilcoxon and Mann-Whitney tests, with significance set at $p < 0.05$. Results: Both groups showed positive results. The USG group showed a reduction of 4.20 points in VAS ($p < 0.001$) and 25.07 points in ODI ($p < 0.001$), while the FS group showed a reduction of 5.67 points in VAS ($p < 0.001$) and 31.2 points in ODI ($p < 0.001$). The two techniques had no statistically significant difference ($p = 0.93$ for ODI and $p = 0.53$ for VAS). Conclusion: USG- and FS-guided block techniques are equally effective in reducing pain and improving functional capacity in patients with lumbar facet syndrome. ***Level of Evidence IV; Retrospective, Observational Study.***

Keywords: Low Back Pain; Chronic Pain; Fluoroscopy; Ultrasonography; Nerve Block.

RESUMO

Introdução: A dor lombar crônica é uma das principais causas de incapacidade, especialmente em pacientes com síndrome facetaria lombar. O bloqueio do ramo medial lombar pode ser guiado por fluoroscopia ou ultrassom, com o objetivo de aliviar a dor e melhorar a capacidade funcional. Este estudo comparou a eficácia de ambas as técnicas. Métodos: Estudo observacional retrospectivo, que avaliou dados de 30 pacientes com síndrome facetária lombar, divididos em dois grupos: USG (n = 15) e FS (n = 15). A dor foi avaliada por meio da Escala Visual Analógica e a capacidade funcional pelo Índice de Incapacidade de Oswestry antes e 1 mês após o procedimento. A análise estatística incluiu o teste de Wilcoxon e o teste de Mann-Whitney, com significância de p<0,05. Resultados: Ambos os grupos apresentaram resultados positivos. O grupo USG mostrou redução de 4,20 pontos na EVA (p < 0,001) e 25,07 pontos no ODI (p < 0,001), enquanto o grupo FS apresentou redução de 5,67 pontos na EVA (p < 0,001) e 31,2 pontos no ODI (p < 0,001). Não houve diferença estatisticamente significativa entre as duas técnicas (p = 0,93 para ODI e p = 0,53 para EVA). Conclusão: As técnicas de bloqueio guiadas por USG e FS são igualmente eficazes para reduzir a dor e melhorar a capacidade funcional em pacientes com síndrome facetária lombar. ***Nível de Evidência IV; Estudo Retrospectivo, Observacional.***

Descritores: *Dor lombar; Dor Crônica; Fluoroscopia; Ultrassonografia; Bloqueio Nervoso.*

RESUMEN

Introducción: La lumbalgia crónica es una de las principales causas de discapacidad, especialmente en pacientes con síndrome facetario lumbar. El bloqueo de la rama medial lumbar puede guiarse mediante fluoroscopía o ecografía, con el objetivo de aliviar el dolor y mejorar la capacidad funcional. Este estudio comparó la efectividad de ambas técnicas. Métodos: Estudio observacional retrospectivo, que evaluó datos de 30 pacientes con síndrome facetario lumbar, divididos en dos grupos: USG (n = 15) y FS (n = 15). El dolor se evaluó mediante la Escala Visual Analógica y la capacidad funcional mediante el Índice de Discapacidad de Oswestry antes y 1 mes después

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del procedimiento. El análisis estadístico incluyó la prueba de Wilcoxon y la prueba de Mann-Whitney, con una significación de p<0,05. Resultados: Ambos grupos mostraron resultados positivos. El grupo USG mostró una reducción de 4,20 puntos en la EVA (p < 0,001) y 25,07 puntos en el ODI (p < 0,001), mientras que el grupo FS mostró una reducción de 5,67 puntos en la EVA (p < 0,001) y 31,2 puntos en ODI (p < 0,001). No hubo diferencias estadísticamente significativas entre las dos técnicas (p = 0,93 para ODI y p = 0,53 para EVA). Conclusión: Las técnicas de bloqueo guiado por USG y FS son igualmente efectivas para reducir el dolor y mejorar la capacidad funcional en pacientes con síndrome facetario lumbar. ***Nivel de Evidencia IV; Estudio Observacional Retrospectivo.***

Descriptores: *Dolor de la Región Lumbar; Dolor Crónico; Fluoroscopía; Ultrasonografía; Bloqueo Nervioso.*

INTRODUCTION

Chronic low back pain is a major problem to be tackled in the public health sphere because, in addition to generating a high demand for outpatient consultations and imaging tests, it also leads to absenteeism with a consequent socio-economic impact and is one of the main causes of years lived with disability.[1]

In terms of incidence, it is estimated that around 15% to 20% of the adult population experiences lower back pain every year, with peaks observed between the fourth and fifth decades of life.[2]

Recent data has shown that in Brazil, the prevalence of low back pain in adults is around 21.1%, depending on the region and the criteria used to define the problem. Among workers who exert intense physical effort, the prevalence may be even higher, highlighting the importance of preventive strategies, early interventions, and appropriate therapeutic approaches to mitigate the impact of low back pain on the population.[3,4]

The concept that the facet joints (also called the zygoapophyseal joint) could be the source of pain was introduced in the 1940s by Badgley, who demonstrated the neural innervation of the facet joint through cadaveric dissection.[5]

Facet syndrome can affect the cervical, thoracic, and lumbar regions, the latter being the most affected. Clinically, lumbar facet syndrome manifests with axial lumbar pain associated with lumbosacral stiffness, limitation of physical activity, and pain on lumbar palpation but without neurological deficit. In this context, the levels of the spinal column most affected are L4-L5, followed by L5-S1, a region that contributes approximately 60% of the lumbar lordosis.[6]

The diagnosis can be made through clinical examination combined with X-rays and magnetic resonance imaging to exclude other causes of pain. In the field of orthopedics, conventional treatments for chronic pain, especially the chronic use of opioids, show unsatisfactory results and a risk of serious long-term complications. Initial treatment is conservative, but lumbar infiltration guided by ultrasound or fluoroscopy can be performed in cases of refractoriness and limiting pain.[1,7]

Epidural injections are effective and minimally invasive procedures that often significantly improve pain, contribute to earlier rehabilitation and improved quality of life, and can be performed by fluoroscopy and ultrasound.[8]

Fluoroscopy is an imaging technique that uses X-rays in real time and is considered the gold standard for guiding these procedures due to its high precision in anatomical localization. This feature is especially important in nerve blocks and joint injections, where precise needle placement is essential for therapeutic success. On the other hand, the method requires a greater structure to be carried out, requiring the logistics of an operating room with a qualified professional to handle the equipment and greater exposure to radiation.[9]

The ultrasound approach appears as an option for lumbar facet infiltrations, making it convenient for patients who cannot be exposed to radiation or want to avoid hospitalization. In addition, it does not require a technician with fluoroscopy equipment. It can be a safe procedure in a smaller hospital, thus generating less costs for the public health service.[10,11]

An assessment of the specialized literature highlights the need for studies to evaluate this therapy's effectiveness, aiming to promote knowledge for a better treatment approach. This study compared the effectiveness of ultrasound-guided (USG) and fluoroscopy-guided (FS) lumbar medial branch blocks in terms of reducing pain and improving functional capacity in patients with chronic low back pain secondary to Lumbar Facet Syndrome.

METHODS

This is an observational, cross-sectional study. Data were collected retrospectively by analyzing the medical records of patients seen between March 2023 and August 2024. The study was conducted in a specialized orthopedic and traumatology service at the Mário Covas State Hospital in São Paulo, Brazil.

Patients of both sexes over the age of 30 with lumbar facet syndrome, refractory to conservative treatment for at least 03 months, with only axial pain, without previous orthopedic surgery on the spine, without chronic opioid use, and who were undergoing their first nerve block were included. All those included underwent infiltrations at the bilateral L4-L5/L5-S1 levels, using 2ml of 2% lidocaine solution without vasoconstrictor at each point.

Patients with a history of previous lumbar surgery, coagulopathies, opioid addiction, tumors, sciatica, psychiatric pain and who reported allergies to any of the drugs to be used in the proposed therapy were excluded, since all patients should have received the same treatment, differing only in the imaging technique required for the procedure, i.e. FS or USG.

The researcher in charge collected data at the local study unit by consulting the medical records of patients seen during the study period.

After reading the medical records, it was decided whether the patient met the inclusion criteria and became part of the study population. The same examiner collected information from the patients to make up the database, namely: sociodemographic data (age, gender, level of education, profession/absenteeism); health data (height, weight, BMI, lifestyle habits, comorbidities, medication used, fitness for work); functional capacity (Oswestry Disability Index - ODI) and pain intensity (Visual Analogue Scale - VAS) in the period before the procedure and one month afterwards.

After collecting the data on a specific form, it was tabulated in a Microsoft Office Excel 2013 spreadsheet.

The statistical analysis involved describing the sociodemographic and clinical characteristics of the patients in each group by calculating the mean and standard deviation for continuous variations. For variables, absolute and relative frequencies were calculated.

The difference between ODI and VAS scores per group before and after the procedure was assessed using the paired t-test for normal data and the Wilcoxon test for data that did not show a normal distribution.

The difference between the groups was compared using the Mann-Whitney test, which is suitable for non-parametric data as it did not meet the normality assumptions of the Shapiro-Wilk test. Statistical significance was established at p-values <0.05. All statistical analyses were carried out using SPSS software version 26.0.

In terms of ethics, it should be noted that this is a retrospective observational study. The information was collected from medical records in compliance with the Privacy Policy, analyzed anonymously, and disclosed in aggregate data without identifying the patients. The provisions of Resolution 466/12 were respected at all stages. Data collection began only after approval by the Human Research Ethics Committee (CAAE): 77170824.5.0000.0082.

RESULTS

The medical records of 30 patients were evaluated. Fifteen underwent USG-guided lumbar medial branch block, and 15 had the procedure guided by FS. The results of the comparative analysis between the USG and FS groups showed no statistically significant differences in the sociodemographic characteristics of the study participants (Table 1).

Regarding the clinical characteristics, statistical homogeneity between the treatment groups strengthened the hypothesis that the differences observed in the clinical outcomes can be attributed to the blockade technique used (Table 2).

When assessing intra-group functional capacity, it was possible to see that in the USG group, the difference in means between the pre- and post-procedure was 25.07 points ($p<0.001$), suggesting a significant functional improvement after the procedure. In the FS group, the findings were of greater magnitude, revealing a difference of 31.2 points ($p<0.001$) (Figure 1).

Regarding pain assessment, the USG group showed a reduction of 4.20 points in the difference between the means ($p<0.001$), showing an improvement in pain up to one month after the procedure. In the FS group, the results were more significant, with a difference in means of 5.67 points ($p<0.001$) (Figure 2).

There was a significant positive correlation between pain improvement and functional capacity in both groups (USG $r=0.735$; $p=0.0018$ and FS $r=0.676$; $p=0.0057$), indicating that patients with a greater pain reduction also had better functionality.

The intergroup analysis revealed no statistically significant differences between the USG and FS groups for the ODI and VAS scores, which suggests that both methods are equally effective (Figure 3).

Analysis of the boxplots showed that although there was a trend towards more consistent results in the USG group, the overlaps between the findings for the two groups and the statistical tests indicate no significant difference between the techniques regarding analgesic efficacy and functional capacity.

Table 1. Sociodemographic characterization of the study population, Mario Covas Hospital, 2024 (n=30).

	FS (n = 15)	USG (n = 15)	p
Age	58.6 (±6.83)	55.34 (±11.54)	0.27
Female	11 (73.3%)	09 (60.0%)	0.70
High school	06 (40.0%)	05 (33.4%)	0.94
Physical activities	05 (33.3%)	06 (40.0%)	0.92
Smoking	02 (13.4%)	05 (33.3%)	0.38
Alcoholism	03 (20.0%)	07 (46.7%)	0.24

Table 2. Clinical characterization of the study population, Mario Covas Hospital, 2024 (n=30).

	FS (n=15)	USG (n=15)	p
IMC	32.0 (±11.53)	28.8 (±2.70)	0.79
Hypertension	08 (53.3%)	07 (46.7%)	0.91
Diabetes mellitus	03 (20.0%)	05 (33.3%)	0.68
Other comorbidities	06 (40.0%)	02 (13.0%)	0.44

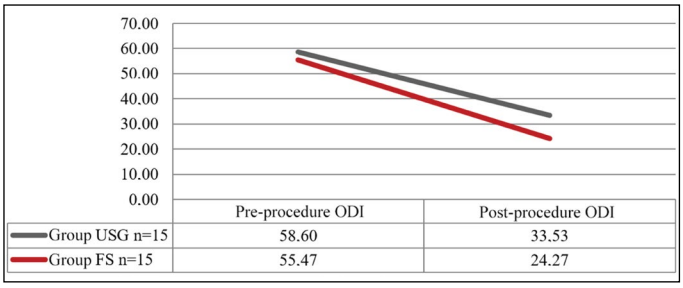

Figure 1. ODI values for the follow-up times according to the procedures performed.

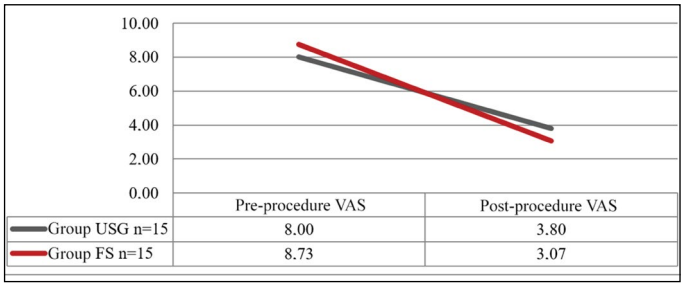

Figure 2. VAS values for the follow-up times according to the procedures performed.

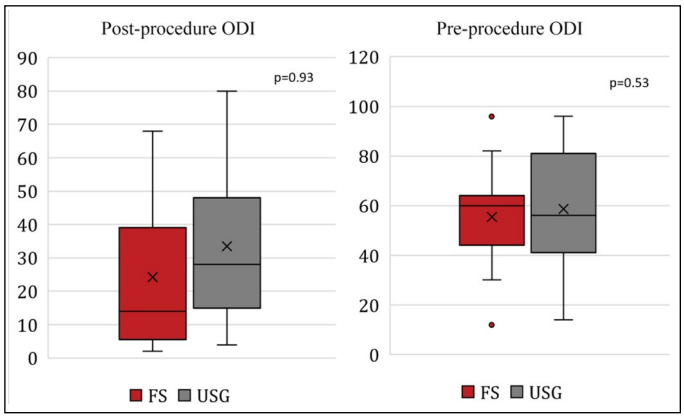

Figure 3. An intergroup analysis of ODI and VAS scores was performed using the procedure.

DISCUSSION

The study evaluated 30 patients with lumbar facet syndrome, refractory to conservative treatment for at least 03 months, divided into two groups: those who underwent USG-guided lumbar medial branch block and those who had the procedure guided by FS. The retrospective evaluation of two moments (preoperative and one month postoperative) revealed a significant clinical improvement regardless of the surgical technique used; however, the results in terms of functional capacity and pain reduction did not differ statistically between the groups.

In this study, the evaluation of clinical results by procedure showed that both the USG group and the FS group showed significant reductions in ODI and VAS scores, indicating that regardless of the method used to guide the lumbar block, patients experienced an improvement in pain and functional capacity after the procedure. These findings are consistent with the study carried out by Han et al,[7] where both groups (USG and FS) showed significant improvements in ODI and pain scale after lumbar medial branch block.

Recent scientific evidence has shown that ultrasound and fluoroscopy-guided techniques have reduced pain intensity up to three months after the procedure. Regarding post-operative functionality, fluoroscopy-guided injections offered better results than ultrasound--guided injections. However, despite the statistically significant difference, they had little clinical relevance.[12]

The correlation between pain reduction and improved functional capacity is widely documented in the specialized literature. Successful pain relief is strongly associated with improvement in the daily functional activities of patients with chronic facet pain. Improved functional capacity is closely linked to adequate pain control, reinforcing the importance of interventions that promote adequate pain management of this clinical condition.[8,13]

These findings reinforce the idea that successful analgesic management not only improves the patient's perception of pain but also directly impacts their ability to perform physical activities and remain active, increasing their quality of life.[14]

A comparison of the effectiveness of the lumbar medial branch

block guided by the different techniques revealed no statistically significant differences between the two groups regarding pain reduction and functional improvement one month after the procedure. Our findings are corroborated by previous studies demonstrating USG guidance as a viable alternative to FS, with comparable results in pain relief and increased functionality.[15,16]

A study by Nisolle et al.[11] showed a slightly greater reduction in pain in the USG group (3.7 points) compared to the FS group (4.3 points) but without statistical significance. The findings revealed almost identical performance of the USG and FS techniques for functional capacity: 15.2 points and 15.4 points, respectively. Statistical significance was also not observed.

Other results show that both techniques significantly improved pain reduction and patient functionality, with no statistically significant difference between the two groups. However, the USG group had a shorter procedure time than FS, a variable to consider when evaluating the patient's convenience and safety.[12,14]

Another important aspect to note is that USG guidance, in addition to not exposing patients to radiation, allows better real-time visualization of neurovascular structures near the injection site, facilitates interventions on facet joints without the need for specific fluoroscopy rooms, and allows procedures to be performed in outpatient settings by requiring less infrastructure,[13,17] making it feasible within the Unified Health System.

On the other hand, patients with more challenging anatomical features may benefit more from the fluoroscopy-guided approach, where visualization of deep structures is clearer.[1,9]

Although this study provides important evidence on the equivalence of efficacy between USG and FS for lumbar branch block, it is important to note that the small number of patients and the short follow-up time may limit the extrapolation of the findings. Future studies with larger samples and longer segments are needed to confirm our findings and assess the impact of variables such as obesity and comorbidities on choosing the best imaging method.

Using statistical analyses compatible with the study data, using more than one instrument to measure the outcome measures, and the methodological rigor adopted in conducting the research strengthened our findings, which were consistent with the specialized literature.

CONCLUSION

Ultrasound-guided lumbar medial branch block is as effective as fluoroscopy-guided lumbar medial branch block in relieving pain and improving function in patients with chronic low back pain associated with facet syndrome. Given the absence of radiation exposure and the shorter procedure time, ultrasound is a safe and effective alternative to the conventional fluoroscopy-guided method.

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

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