Predictive factors for the efficacy of myofascial infiltration in chronic cervicalgia: implications for technique indication criteria

María José Groizard Botella,[1] Adriana M. Buriticá Aguirre,[1] Marco Palumbo,[1] Mercè Matute Crespo,[1] F. Javier Vilà Justribó,[2] Antonio Montero Matamala[3]

[1]Anesthesiology and Resuscitation, Arnau de Vilanova University Hospital, Lleida; [2]Anesthesiology and Resuscitation, Head Department, Arnau de Vilanova University Hospital, Lleida; [3]University Full Professor in Pain, University of Lleida, Spain

ABSTRACT

Chronic cervicalgia is a widespread condition that severely impacts patients' quality of life and often presents with a myofascial pain component, characterized by the presence of trigger points (MTrPs). In clinical practice, myofascial trigger point infiltration with local anesthetics and corticosteroids has been used extensively as an interventional treatment to alleviate pain. However, not all patients experience the same level of improvement, which has prompted research into the identification of predictive factors for treatment success. This prospective study investigates the clinical and demographic predictors of positive outcomes following myofascial trigger point infiltrations in patients with chronic cervicalgia. Seventy-four patients were recruited from a chronic pain management unit and underwent three ultrasound-guided infiltrations of lidocaine and corticosteroids into active MTrPs over a six-week period. Pain intensity, quality of life, and physical function were measured at baseline and four weeks after the final infiltration using the visual analog scale (VAS), SF-36 health survey, and patient global impression of improvement (PGI-I). Results showed that 75.7% of patients reported significant improvement (PGI-I scores of 1-3) at four weeks post-treatment. Key predictors of positive outcomes included age greater than 50 years, a baseline VAS score of 5 or lower, and higher scores in the emotional role subscale of the SF-36. Conversely, younger age (<50 years), higher baseline pain intensity, and lower pressure pain thresholds (algometry scores <2500 g/cm²) were associated with poorer outcomes. These findings suggest that clinicians should consider patient age, baseline pain levels, and emotional well-being when selecting candidates for myofascial infiltrations to optimize treatment outcomes.

Correspondence: María José Groizard Botella MD, PhD, Anesthesiology and Resuscitation, Arnau de Vilanova University Hospital, Av. Alcalde Rovira Roure 80, 25198 Lleida, Spain.
E-mail: mjgroizard.lleida.ics@gencat.cat

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Introduction

Chronic cervicalgia, defined as pain located in the cervical region persisting for more than six months, is a prevalent cause of musculoskeletal discomfort, significantly impacting the quality of life in affected individuals. It is estimated to be the fourth leading cause of disability worldwide, with a substantial burden on healthcare systems. Cervical pain is not only disabling but often coexists with psychological and social consequences, further aggravating the health status of patients.[1] Myofascial pain, a significant contributor to cervicalgia, is characterized by hyperirritable points within skeletal muscle known as myofascial trigger points (MTrPs). These points can cause referred pain, muscle stiffness, and decreased range of motion, making them a target for various therapeutic interventions.[2]

The treatment of chronic cervicalgia often requires multimodal approaches, including pharmacological management, physical therapy, and interventional techniques.[3] One of the most widely used interventional treatments in chronic cervicalgia, par-

ticularly in patients with a myofascial pain component, is the infiltration of myofascial trigger points. Myofascial infiltration involves the injection of local anesthetics, corticosteroids, or other agents into MTrPs to alleviate pain and improve function. This technique, guided by anatomical landmarks or ultrasound, has been shown to be effective in reducing pain intensity and improving mobility in patients with chronic musculoskeletal pain, especially when combined with rehabilitative therapies.[4]

Despite the widespread use of MTrP infiltration, patient outcomes remain highly variable. Some patients experience significant pain relief and functional improvement, while others show little to no benefit.[5] This variability has prompted clinicians and researchers to investigate potential predictors of treatment success. Identifying predictors of positive outcomes can refine patient selection criteria, thereby optimizing the use of myofascial infiltrations and improving overall therapeutic outcomes. Factors such as patient age, baseline pain intensity, psychological status, and physical function may play a role in determining the efficacy of this intervention.[6]

Several studies have explored the role of age and baseline pain intensity in predicting the success of various pain management strategies, including myofascial infiltrations.[7] Older patients may respond differently to treatment compared to younger individuals, possibly due to age-related changes in muscle structure and function.[8] Similarly, patients with lower baseline pain levels may experience greater improvement than those with higher levels of chronic pain.[9] Emotional and psychological factors, such as anxiety, depression, and emotional resilience, have also been identified as potential moderators of treatment outcomes in chronic pain management.[10]

This study aims to identify predictive factors for the success of myofascial trigger point infiltration in patients with chronic cervicalgia. By analyzing a cohort of patients treated in a specialized pain management unit, we seek to determine which clinical and demographic variables are associated with positive and negative outcomes. This knowledge could help guide clinical decision-making and enhance patient selection criteria, leading to more targeted and effective treatment strategies for chronic cervicalgia.

Materials and Methods

Study design

This study was conducted as a prospective observational trial in the Pain Management Unit of Arnau de Vilanova University Hospital in Lleida, Spain. The study included patients diagnosed with chronic cervicalgia, defined as persistent cervical pain for more than six months. The recruitment period spanned from January 2020 to December 2021. All patients provided informed consent before participating in the study. The Ethics Committee for Clinical Research with Medicines (CEIm) of the Hospital Universitari Arnau de Vilanova, Lleida, approved the study under Protocol No. CEIC 2094 Act No. 07/2019, dated June 27, 2019.

Patient selection

Inclusion criteria for the study included adults aged 18 to 80 years diagnosed with chronic cervicalgia, confirmed by clinical examination, with at least one active myofascial trigger point in the cervical musculature. Patients were required to have persistent symptoms despite conservative treatments, such as physical therapy, analgesics, and muscle relaxants. Exclusion criteria included patients with cervical radiculopathy, confirmed by neurophysiological data (electromyography or nerve conduction studies), prior cervical spine surgery, pregnancy, psychiatric disorders requiring ongoing treatment, and those on anticoagulation therapy.

Intervention

All patients underwent three ultrasound-guided myofascial trigger point infiltrations, spaced two weeks apart. The infiltrations were performed using a combination of 0.25% bupivacaine (1.5 mL per trigger point) and corticosteroids (dexamethasone, 0.8 mg/mL). Injections were administered to the Trapezius 2 point and the levator scapulae point**,** identified as the most prominent trigger points. The choice of these specific trigger points was based on clinical assessment and patient-reported pain locations. After each session, the corresponding measurements were taken, and special attention was given to patient education, focusing on improving daily habits, encouraging regular stretching, and incorporating tonifying exercises to promote long-term musculoskeletal health.

Outcome measures

The primary outcome measure was pain intensity, assessed using the visual analog scale (VAS), with scores ranging from 0 (no pain) to 10 (worst imaginable pain). Secondary outcomes included quality of life measured using the SF-36 health survey score, and physical function, assessed through range of motion (ROM) testing and algometry which measured the pressure pain threshold in trigger points. Pain intensity and quality of life were evaluated at baseline, after the third infiltration, and at the 4-week follow-up.

Data collection

Patient demographics (age, sex, employment status), baseline pain characteristics (duration, intensity), and psychological factors (emotional role, mental health subscales from SF-36) were recorded. The patient global impression of improvement (PGI-I) was used to categorize patients' perceptions of improvement after treatment. A PGI-I score of 1-3 indicated significant improvement, while scores of 4-7 indicated no improvement or worsening.

Statistical analysis

Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Continuous variables were reported as mean ± SD, and categorical variables were presented as percentages. Univariate and multivariate logistic regression analyses were performed to identify PGI-I (scores of 1-3). Variables included in the regression models were age, baseline VAS, duration of symptoms, emotional role score (SF-36), and algometry values. Statistical significance was set at $p<0.05$ for all analyses.

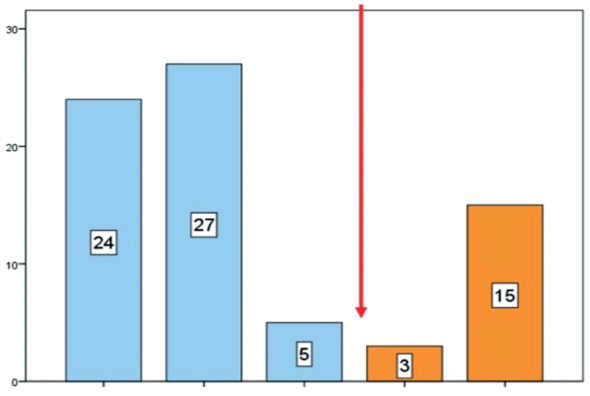
Results

A total of 74 patients with chronic cervicalgia were included in the study. The demographic and clinical characteristics of the study population are summarized in Table 1. The average age of the participants was 55.2 years (SD±8.3), with a majority being female (64%). All patients had experienced cervical pain for more than six months, with an average pain duration of 2.3 years (SD±1.4). The

baseline VAS score for pain intensity was 6.4 (SD±1.1), and the average score on the emotional role subscale of the SF-36 was 45.3 (SD±10.8), indicating moderate emotional distress.

Primary outcomes

At the four-week follow-up, 56 patients (75.7%) reported significant improvement in their pain and function, as measured by the PGI-I, with scores of 1-3 indicating a positive outcome (Figure 1). Among these patients, the average reduction in VAS scores was 3.8 points, from a baseline of 6.4 to a post-treatment score of 2.6 (SD±1.2). The remaining 18 patients (24.3%) reported no significant improvement, with PGI-I scores of 4-7. The average VAS reduction in this group was minimal, from 6.3 to 5.7 (SD±1.5).

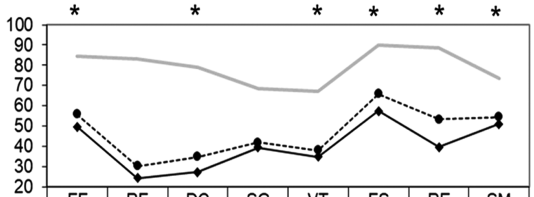


	Frequency	Percentage	Percentage validated	Cumulative percentage
Much better	24	32,4	32,4	32,4
Better	27	36,5	36,5	68,9
Something better	5	6,8	6,8	75,5
No change	3	8	4,1	79,7
Something worse	15	20,3	20,3	100,0
Total	74	100,0	100,0	

Figure 1. Variable outcome. PGI-I at one month: Improvement: PGI-I scores of 1, 2, and 3 (blue); no improvement: PGI-I scores of 4 and 5 (orange); no patients recorded scores of 6 or 7 (representing "much worse" or "very much worse"); red arrow cut-off point for improvement and NOT improvement.

Secondary outcomes

Improvement in quality of life was also observed in the majority of patients. The SF-36 Health Survey showed a significant increase in scores for physical function and emotional role post-treatment, particularly in patients who reported significant pain relief. On average, the emotional role subscale score increased from 45.3 to 58.7 (SD±12.3) among patients with positive outcomes. Conversely, no significant changes were observed in patients who did not experience improvement (Figure 2).



	FF	RF	DC	SG	VT	FS	RE	SM
START	49.7	24.3	27.3	39.4	34.7	57.3	39.6	51.1
1 MONTH	55.7	30.1	34.8	41.8	37.9	65.9	53.4	54.5
SP REF	84.7	83.2	79.0	68.3	66.9	90.1	88.6	73.3

Figure 2. SF-36 domain values between the beginning of the study and at one month. Grey line, reference values healthy Spanish population; continuous line, patients at baseline; dashed line, patients one month after the end of treatment. FF, physical function; RF, functional role; DC, body pain; SG, general health; VT, vitality; FS, social function; RE, emotional role; SM, mental health. *Statistical significance at $p<0.05$.

Table 1. Demographic and clinical characteristics of the study population. Values as percentages.

	Total (n=74)	Improved (n=56)	Not improved (n=18)	*p*
Age (years)	55±11	57±10	51±10	0.051
Age <50 years	29.7	23.2	50.0	0.031
Sex ♀	71.6	73.2	66.7	0.592
Fibromyalgia	17.6	16.1	22.2	0.555
Studies (%)				0.328
Read-write	5.4	2.2	10.7	
Primary	31.1	30.4	32.1	
Secondary	48.6	54.3	39.3	
University	14.9	13.0	17.9	
Smoking				0.422
Smoker	28.4	25.0	38.9	
Ex-smoker	18.9	21.4	11.1	
Non smoker	52.7	53.6	50.0	
Occupation				0.594
Working	45.2	45.5	44.4	
Pensioner	20.5	23.6	11.1	
Homemaker	8.2	9.1	5.6	
Unemployed	4.1	3.6	5.6	
On leave	21.9	18.2	33.3	
Other procedures	89.2	89.3	88.9	0.962
Conflict	45.9	41.1	61.1	0.138

Algometry results

Algometry was used to measure pressure pain thresholds at the trigger points before and after each infiltration session. Patients who showed significant improvement had an average pressure pain threshold of 2800 g/cm² at the final session, compared to a baseline value of 2100 g/cm². In contrast, patients with poor outcomes had consistently lower algometry scores, averaging 1800 g/cm² after the final session, indicating a lower tolerance to pressure at the trigger points (Figure 3).

Temporal progression of improvement

The temporal progression of improvement was also analyzed, with patients demonstrating the most notable reduction in pain after the first infiltration session. This trend continued with gradual improvement through the second and third sessions, as well as at the four-week follow-up. On average, the most substantial pain relief occurred after the first session, with a further but less pronounced decrease in pain after subsequent sessions (Figure 4).

Discussion

The results of this study provide valuable insights into the efficacy of myofascial trigger point infiltrations for the treatment of chronic cervicalgia and highlight important clinical predictors of treatment success. In particular, the findings demonstrate that older patients, those with lower baseline pain intensity, and patients with higher scores on the emotional role subscale of the SF-36 are more likely to experience significant improvement following treatment. These predictors align with previous research on pain management, which suggests that emotional and psychological factors, in addition to physical symptoms, play a crucial role in the response to pain interventions.

Age as a predictor of positive outcomes

Age emerged as a significant predictor of treatment success, with patients over the age of 50 showing better outcomes than younger patients. This finding is consistent with prior studies, which suggest that older patients may respond more favorably to trigger point infiltrations due to factors such as decreased muscle elasticity and increased tissue sensitivity. However, the specific mechanisms underlying this age-related difference remain unclear and warrant further investigation. One possible explanation is that younger patients, particularly those under 50, may present with more complex or severe forms of musculoskeletal pain that are less responsive to local interventions like trigger point infiltrations.[11]

Baseline pain intensity and emotional health

Baseline pain intensity, as measured by the VAS, was another key predictor of treatment outcomes. Patients with a baseline VAS score of 5 or lower were significantly more likely to report positive outcomes than those with higher pain scores. This finding suggests that patients with moderate pain may derive greater benefit from myofascial infiltrations compared to those with severe pain. It is possible that patients with higher pain levels have more extensive myofascial involvement or comorbid conditions that diminish the effectiveness of local infiltration therapy.[12]

Emotional health, as reflected in the emotional role subscale of the SF-36, also played a significant role in predicting treatment outcomes. Patients with higher emotional role scores, indicating better psychological resilience, were more likely to experience positive results. This finding supports the growing body of literature that highlights the importance of psychological factors in pain management. Chronic pain is often associated with emotional distress, and interventions that address both physical and emotional aspects of pain are more likely to yield successful outcomes.[13] Future studies should explore the potential benefits of combining myofascial infiltrations with psychological or behavioral therapies to improve patient outcomes.

Clinical implications for patient selection

The identification of these predictors has important clinical implications for the selection of patients for myofascial trigger point infiltrations. Clinicians should consider factors such as

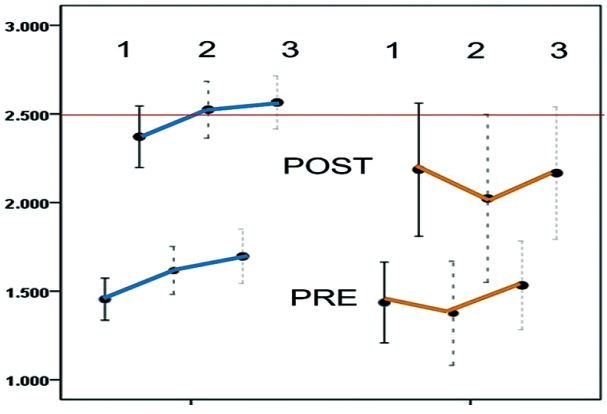


Figure 3. Evolution of the pre- and post-session algometric values and according to group improvement (blue)/no improvement (orange).

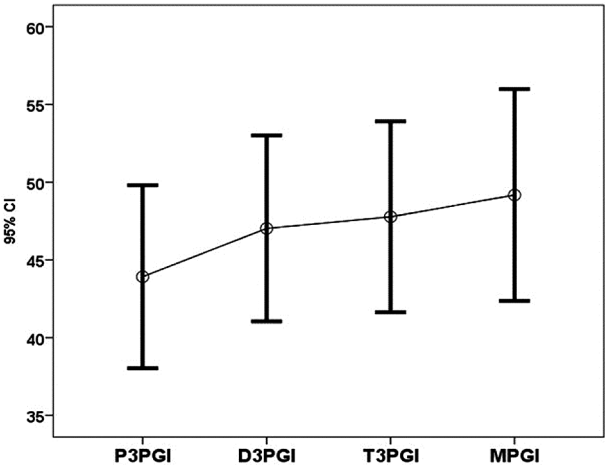


Figure 4. Evolution of PGI values: first, second, third session and one month after the end of the treatment.

age, baseline pain intensity, and emotional health when deciding whether a patient is a good candidate for this intervention. Patients who fall within the favorable predictive range (i.e., older age, moderate baseline pain, good emotional health) are more likely to experience significant improvements, while those outside this range may require alternative or adjunctive treatments to achieve optimal results.[14]

Limitations and future research

While the findings of this study provide valuable insights into the predictors of treatment success, several limitations should be acknowledged. First, the sample size was relatively small, and larger studies are needed to confirm these results. Second, the follow-up period was limited to four weeks, and longer-term studies are required to assess the durability of treatment effects. Finally, the study relied on self-reported measures of pain and quality of life, which may be subject to reporting bias. Future research should aim to include objective measures of function and explore the potential benefits of combining myofascial infiltrations with other modalities, such as physical therapy or cognitive-behavioral therapy.

Conclusions

The present study demonstrates that myofascial trigger point infiltrations are an effective treatment modality for managing chronic cervicalgia, particularly in older patients and those with moderate baseline pain. However, the outcomes of this intervention are not uniform across all patients, and certain demographic and clinical variables, including age, pain intensity, and emotional health, significantly influence the likelihood of treatment success. By considering these predictors, clinicians can improve patient selection and optimize the therapeutic efficacy of myofascial infiltrations. This study offers valuable insights that can guide clinical decision-making, optimize patient selection, and enhance the overall therapeutic efficacy of myofascial infiltrations. Additionally, the integration of psychological therapies and multimodal treatment approaches may enhance the overall management of chronic cervicalgia, particularly in patients with complex pain profiles.

Further research is needed to validate these findings in larger populations and to explore the long-term benefits of this intervention.

References

1. Bogduk N. The anatomy and pathophysiology of neck pain. Phys Med Rehabil Clin N Am 2003;14:455-72.
2. Simons DG, Travell JG, Simons LS. Myofascial pain and dysfunction: the trigger point manual. Vol. 1. Upper half of body. 2nd ed. Baltimore, Williams & Wilkins; 1999.
3. Fernández-de-las-Peñas C, Dommerholt J. Myofascial trigger points: peripheral or central phenomenon? Curr Pain Headache Rep 2014;18:356.
4. Borg-Stein J, Simons DG. Focused review: myofascial pain. Arch Phys Med Rehabil 2002;83:S40-7.
5. Gerwin RD. A review of myofascial pain and fibromyalgia--factors that promote their persistence. Acupunct Med 2005;23:121-34.
6. Tough EA, White AR, Richards SH, Campbell JL. Variability of criteria used to diagnose myofascial trigger point pain syndrome--evidence from a review of the literature. Clin J Pain 2007;23:278-86.
7. Alonso-Blanco C, Fernández-de-las-Peñas C, Morales-Cabrera JM, et al. Multiple active myofascial trigger points and pressure pain sensitivity maps in the temporalis muscle are related to the clinical parameters of chronic tension-type headache. Pain Med 2011;12:341-51.
8. Hong CZ. Lidocaine injection versus dry needling to myofascial trigger point. Am J Phys Med Rehabil 1994;73:256-63.
9. Gerwin RD, Shannon S, Hong CZ, et al. Interrater reliability in myofascial trigger point examination. Pain 1997;69:65-73.
10. Travell JG, Simons DG. Myofascial pain and dysfunction: the trigger point manual. Vol. 2. The lower extremities. Baltimore, Williams & Wilkins; 1992.
11. Lugo LH, García HI, Rogers HL, Plata JA. Treatment of myofascial pain syndrome with lidocaine injection and physical therapy: a randomized controlled trial. BMC Musculoskelet Disord 2016;17:94-103.
12. Ay S, Evcik D, Tur BS. Comparison of injection methods in myofascial pain syndrome: a randomized controlled trial. Clin Rheumatol 2010;29:19-23.
13. MacDermid JC. An introduction to evidence-based practice for hand therapists. J Hand Ther 2004;17:105-17.
14. Kietrys DM, Palombaro KM, Azzaretto E, et al. Effectiveness of dry needling for upper-quarter myofascial pain: a systematic review and meta-analysis. J Orthop Sports Phys Ther 2013;43:620-34.