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Case Report

Impact of the Atlasprofilax Method on a Patient with Degenerative Spine Disease and Chronic Myofascial Pain Syndrome: A Case Report

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Abstract

Background: The relationship between suboccipital musculature and cervical fascia abnormalities and myofascial pain syndrome in the presence of degenerative spine disease remains unclear based on current evidence.

Case report: We present the case of a 46-year-old white male patient with severe chronic myofascial pain syndrome affecting his neck, thoracic and lumbar regions, left sciatica, and lower limbs, resulting in high mobility restriction. The initial MRI examinations revealed the presence of multiple degenerative discopathies. The patient underwent a single intervention of the Atlasprofilax method, which yielded remarkable results with complete remission of pain and a significant reduction in the frequency of virtually all symptoms. To assess the outcomes, various standardized measures were used, including the visual analog scale, patient global impression of change questionnaire, and three neck, thoracic, and lumbar disability questionnaires. Throughout the 9-month follow-up period, the patient exhibited highly positive outcomes in terms of pain reduction, symptom improvement, recurrence rate, and overall patient satisfaction. The symptoms of myofascial pain syndrome were nearly eradicated, leading to a substantial decrease in the use of painkillers with a remarkable improvement in the patient's mobility and overall quality of life.

Conclusion: Further investigation is needed to explore the hypothesis that dysfunctions in the deep suboccipital musculature, deep cervical fascia, and upper cervical spine contribute to myofascial pain syndrome and degenerative spine disease. More clinical research is required to understand the role of the fascial continuum in degenerative spine disease and its impact on paravertebral muscle chains and intervertebral discs. The Atlasprofilax method, a non-invasive and conservative approach, shows promise as a potential therapeutic option in alleviating myofascial pain syndrome symptoms warranting further study.

Keywords: Neck pain; Lumbar Pain; Myofascial Pain Syndromesl Atlasprofilax; Fascia

Abbreviations

CCJ: Craniocervical Joint; DSD: Degenerative Spine Disease; ITSA: Interrupted Time-Series Analysis; MOLBPDQ : Modified Oswestry Lower Back Pain Disability Questionnaire; MFR: Myofascial Release; MPS: Myofascial Pain Syndrome; NDI: Neck Disability Index; LBP: Low Back Pain; PGIC: Patient's Global Impression of Change; ROTPDQ: Revised Oswestry Thoracic Pain Disability Questionnaire; STMT: Soft Tissue Mobilization Technique; SBL: Superficial Back Line; VAS: Visual Analogue Scale

Introduction

Myofascial Pain Syndrome (MPS) is a prevalent condition that affects a significant proportion of the population, with estimates suggesting a lifetime prevalence of up to 85% in the general population [1]. Despite several commonly used treatments, their moderate effectiveness and frequent characterization as inadequate highlight the pressing need for clinical research aimed at developing evidence-based guidelines for MPS treatment [1]. Meta-analysis revealed that 3.63% of individuals worldwide experience lumbar degenerative spine disease (DSD) with low back pain (LBP) each year [2].

The potential relationship between DSD or multiple degenerative discopathies and chronic generalized myofascial pain remains an intriguing topic with much to be elucidated. The mechanisms by which chronic biomechanical dysfunctions in the myofascial chains could cause joint overloads leading to the onset and progression of

degenerative discopathies remain unclear. Conversely, it is possible that damage to multiple discs can cause chronic pain and inflammation in the surrounding myofascial tissues, contributing to the development of generalized myofascial pain. The precise manner and degree to which degenerative discopathies may contribute to MPS in patients with both conditions is a question that needs to be addressed. It is important to consider the possible impact of chronic biomechanical dysfunctions in the myofascial chains as a potential underlying and contributing factor to degenerative discopathies, particularly in cases where genetic, autoimmune, natural aging, or traumatic causes are excluded. Further research is needed to fully understand the complex interactions between these conditions and determine optimal management strategies. A comprehensive understanding of the underlying mechanisms of DSD and MPS will facilitate the development of more effective treatment approaches.

According to Myers' model, the Superficial Back Line (SBL) of the myofascial chains originates in the suboccipital region [3]. Strong evidence supporting the existence of the Superficial Back Line is available in the literature [4]. This line extends from the occipital bone at the base of the skull, down the back of the neck, over the shoulders, along the spine, and down the back of the legs to the heels. It includes the muscles of the back, gluteal muscles, and the plantar fascia of the feet, with its origin emerging at the suboccipital region level. In this area, the suboccipital muscles are connected to the myodural bridge [5,6], a membrane that links the dura with the occiput, suboccipital muscles, posterior atlantooccipital membrane terminating at C3 level [7], and the C0-C1-C2 joint [6,8,9]. Overstretching or abnormal tensile forces in the myodural bridge have been suggested as potential causes of various ailments [10,11] including changes in blood volume [12] and CSF flow dynamics [13,14]. The craniocervical joint (CCJ) plays a crucial role in human biomechanics and posture, acting as a co-factor in the development of some spine-related ailments and vertebral pathologies. The biomechanics of the CCJ are influenced by standing and the transfer of forces from the head through the transitional craniocervical hinge, encompassing both bony and soft structures.

The Atlasprofilax method is a novel approach to treating myofascial abnormalities in the atlantooccipital hinge [15]. This technique targets both the structural and metabolic aspects of these abnormalities and can typically be completed in a single session. This intervention has already shown benefits in relieving pain associated with lumbar discopathies [16], in fibromyalgia syndrome [17], temporomandibular disorders and cervicobrachialgia [18,19], as well as in improving joint misalignments in the CCJ [20,21].

Scientific literature supports the presence of suboccipital muscle deformities in various conditions, including whiplash-related disorders, chronic tension headache, and musculoskeletal disorders accompanied by pain, regardless of whether they are caused by trauma [22-28]. The maintenance of human standing posture is governed by complex sensorimotor feedback mechanisms [29,30], and the suboccipital muscles play a crucial role in providing the proprioceptive input required to sustain posture [31,32]. Impairment of the load-bearing capacity of the suboccipital muscles due to head position can lead to dizziness [33,34], and activation of tension-type headaches due to trigger points and forward head posture [35]. Morphological predictors for distorted disc load include sagittal balance parameters of the thoracic spine and anatomic angles in the lumbar region [36], as well as a positive association between DSD and paraspinal muscle atrophy [37,38].

Undetected structural anomalies and imbalances at the level of the craniocervical junction (CCJ) can induce both biomechanical and metabolic modifications in the myofascial complex, potentially affecting posture, muscular chains, vertebrae, and intervertebral discs. Studies have shown changes in trunk myofascial tissue that contribute to the pathogenesis of low back pain observed in real and simulated microgravity [39]. Additionally, soft tissue mobilization techniques (STMT) or myofascial release (MFR) have been found to increase muscular flexibility and joint range of motion along the Superficial Back Line (SBL) structures. For example, applying STMT/MFR to the plantar fascia has shown immediate improvements in hamstring muscle flexibility along the SBL [40]. Remote application of MFR on the hamstrings or lumbar muscles has also demonstrated a positive bidirectional effect in relieving lumbar pain and hamstring tightness [41]. Myofascia tension can be transferred between adjacent structures [42] throughout the fascial, supporting the principles of fascial tensegrity, biotensegrity, and mechanotransduction [43,44]. Fascia possesses the ability to adapt to various states by changing its biomechanical and physical properties. The presence of trigger points, tension, and pain is a characteristic of MPS. Myofibroblasts are involved in maintaining sustained myofascial tension, which can result in pain. The propagation and support of fascial tension within the tensegrity framework may contribute to this phenomenon [45]. MPS can be seen as a pathological state of imbalance that arises from the inherent properties of fascia and is triggered by disrupted biomechanical interplay. Over time, this disorder may progress to MPS due to aberrant myofibroblasts in connective tissue, also known as "fascial armoring," leading to degeneration of spinal discs due to sustained myofascial atrophy and vectors of physical forces. The deep cervical and thoracolumbar fascia form a three-dimensional network, and their deformation can result in muscle chain alterations and asymmetrical loads. Unresolved dysfunctions within the suboccipital myofascial region can extend to the deep cervical fascia, affecting the thoracolumbar fascia and the SBL, thus contributing to MPS

and creating a "vicious circle" that ultimately leads to chronic distal muscle dysfunction and DSD.

We propose that altered suboccipital myofascia and deep cervical fascia could be co-factors in the development of MPS and DSD. Non-pharmacological approaches to MPS usually involve manual, active, or passive treatments that focus on the affected areas but overlook the potential core issue, which is the soft tissues of the complex CCJ structure. Therefore, based on the presented case, utilizing a non-invasive device that generates a deep mechanotransductive vibropercussive stimulus may induce the release of suboccipital myofascia, triggering a cascade effect that redistributes forces throughout the fascial continuum. This, in turn, can have a favorable impact on MPS symptoms. The objective of this case report is to evaluate the impact of a single intervention of Atlasprofilax on pain, quality of life, and symptoms in a patient with DSD and chronic MPS. While the primary goal of this intervention is not to ameliorate or regenerate the preexisting DSD, it aims to release the myofascial chains by targeting the suboccipital region, with the expectation of improving MPS symptoms. Consequently, the findings on pain and MPS-related symptoms may provide insights into the significance and contribution of MPS in the development of DSD, highlighting the interplay between the two conditions and the associated pain.

Case Report

The male patient, 46 years of age, with a BMI of 26.3, presented to the orthopedist with severe and chronic myofascial pain affecting the neck, thorax, lumbar region, left sciatica, and lower limbs. The patient reported mobility restrictions and underwent radiological evaluation to investigate potential spinal and disc disorders. A series of MRI examinations were performed, yielding the following results.

July 15, 2014: Degenerative disc disease observed at T11-T12, L1-L2, L4-L5, and L5-S1 levels, with greater involvement of the lower two levels and associated osteoarthritis. Right-sided protruded disc herniation with osteophytes at the L4-L5 level, impinging on the L4 root. Two disc bulges observed at the L5-S1 level. On April 18, 2017, bulging discs were noted at the C3-C4 and C4-C5 levels that indent the dural sac, with left-sided uncinate arthrosis changes. A central disc protrusion was seen at the C5-C6 level, which indents the dural sac. There were mild left-sided apophyseal and uncinate arthrosis changes, left-sided apophyseal arthrosis changes at the C6-C7 level, and right-sided predominance at the C7-T1 level. On February 17, 2019, mild to moderate cervical spondylosis changes were seen at the C3-C4, C4-C5, and C5-C6 levels, with the formation of posterolateral bony bridges and moderate interfacetary arthrosis changes. There was also a left-sided extruded paracentral herniation at the C5-C6 level, with a slight reduction in the canal amplitude of the left C5 and C6 without signs of compressive myelopathy. Multifactorial foraminal stenosis was observed at the C4-C5 and C5-C6 levels, which contacted the emerging left C5 and C6 nerve roots, and there were signs of interspinous rubbing between the C5, C6, and C7 levels. On April 10, 2019, radiological examination revealed disc dehydration and diffuse bulging of the fibrous ring at the L1-L5 levels. At the L5-S1 level, a dehydrated disc with diffuse bulging of the fibrous ring was observed, along with a central, subarticular, and bilateral foraminal-based protrusion causing compression of the L5 roots in the conjugation foramen. Mild foraminal stenosis was associated with facet arthrosis and the protrusion. The observed osteochondrotic and degenerative disc changes are consistent with herniations and nerve root compression. Additionally, facet arthrosis of the L5-S1 segment with foraminal stenosis was noted.

During a medical consultation on June 25, 2022, the patient presented with chronic pain and provided a summary of his clinical symptoms, including the time of onset, frequency, and intensity measured using the Visual Analog Scale (VAS) ranging from 0 to 10. A detailed description of clinical symptoms associated to PMS is provided in table 1.

Symptom	Onset (in years)	Frequency (in days per month)	VAS (0-10)
Tensional headache	4	1	7
Sleep disorders	10	8	n/a
TMJD (jaw pain)	3	30	4
Neck pain	4	30	8
Trapezius pain	4	12	8
Scapular pain	4	30	8
Right upper limb paresthesia	4	4	n/a
Thoracic pain	8	30	8
Low back pain	8	30	8
Sciatica	2	30	4
Knee pain (left)	10	30	4
Gait claudication	10	30	n/a

Table 1: Description of clinical symptoms at baseline pre-intervention associated to PMS with onset in years, frequency in days per month and pain according to VAS (0-10). n/a = not applicable.

The patient experienced significant difficulties due to pain and motion restriction when it came to bending down, as well as performing a backward bend or left and right lateral twists of the trunk (See video 1). Furthermore, the patient reported significant impairments in his quality of life and daily activities, experiencing limitations in lifting, standing, sitting, remaining seated, lying down, and walking or traveling for more than 15 minutes due to

pain. The patient's current pain management regimen included naproxen (400mg, three times daily), ten drops of medical CBD daily, diclofenac injections (two per month), and dexamethasone injections (two per month), in addition to morphine administered during two hospitalizations for severe pain crises.

The patient's medical history unveiled a series of multiple traumas, encompassing a fall from a third floor at the age of 12, a concussion resulting from football play at age 16, two motorcycle accidents, a lateral whiplash due to a car accident, and an incident involving a rollover in a motor vehicle eleven years ago. Surgical procedures the patient underwent included two right knee arthroscopies, two umbilical hernia operations, tonsillectomy, and septoplasty.

The patient, a 46-year-old male computer engineer, sought medical attention for the Atlasprofilax intervention, a single-session, noninvasive therapy that involves device-mediated mechano-transductive and vibropercussive stimulation of the suboccipital myofascia. The intervention specifically targets the suboccipital region to assess its potential impact on the patient's overall pain condition and symptoms associated with his MPS. No additional treatments or interventions were administered to the patient, and he did not receive physiotherapy during the follow-up period.

Before the intervention, a thorough clinical examination was conducted, encompassing a review of the patient's medical, surgical, pharmacological, and radiological history. Additionally, various health scales and questionnaires were employed, including the Visual Analog Scale (VAS) to assess pain intensity, the Neck Disability Index [46] to evaluate neck-related disability, the Modified Oswestry Lower Back Pain Disability Questionnaire (MOLBPDQ) [47] to assess lower back-related disability, and the Revised Oswestry Thoracic Pain Disability Questionnaire (ROTPDQ) to evaluate thoracic-related disability. These scales and questionnaires were also administered during the follow-up period at 1 month, 6 months, and 9 months, respectively. The patient's satisfaction with the therapy outcomes was assessed using the Patient's Global Impression of Change (PGIC) scale. Furthermore, changes in pain medication usage were documented.

Intervention

The patient received a one-time intervention using the Atlasprofilax method, which involves the use of a device that applies mechano-transduction principles through vibropressure at specific frequencies to the suboccipital myofascia. The non-invasive intervention utilized a special device that provided controlled percussion vibropressure at specific frequencies with an adapted head. This was applied for 8 minutes on various key points in the suboccipital area to stimulate specific muscle and fascial receptors with the goal of achieving a deep mechano-transductive effect on the suboccipital muscles and deep cervical fascia, which extends in its continuum to other fascial chains.

Endpoints and Results

The primary endpoints were the improvement in symptomatology associated with chronic MPS using the questionnaires mentioned above (see Table 2). The secondary endpoints were the measurement of reduction in pain (VAS) and symptoms frequency, the patient satisfaction regarding the therapy by means of the PGIC (See Table 3), and the reduction in analgesic medication consumption.

	Baseline	1 month	6 months	9 months
NDI	19 (38%) Moderate disability	0 (0%) No disability	0 (0%) No disability	0 (0%) No disability
MOLBPDQ	30 (30%) Moderate disability	0 (0%) No disability	0 (0%) No disability	0 (0%) No disability
ROTPDQ	33 (66%) Severe disability	0 (0%) No disability	0 (0%) No disability	0 (0%) No disability

Table 2: Scores at baseline pre-intervention and at 3 follow-ups (after 1 month, 6 months, and 9 months) according to the Neck Disability Index (NDI), the Modified Oswestry Low Back Pain Disability Questionnaire (MOLBPDQ) and the Revised Oswestry Thoracic Pain Disability Questionnaire (ROTPDQ).

The outcomes for the secondary endpoints can be seen in table 3.

Upon analyzing the NDI (19, 38% indicating moderate disability), MOLBPDQ (30, 30% indicating moderate disability), and ROTPDQ (33, 66% indicating severe disability) questionnaire scores at baseline and their subsequent evolution at 1, 6, and 9 months (resulting in a score of 0, 0% indicating no disability in all 3 questionnaires for all follow-ups), a total evolution in the disability indexes of the questionnaires was observed, which was sustained until the final follow-up at month 9. The secondary endpoints demonstrated a significant reduction in pain (VAS = 0) for almost all symptoms, and the frequency of symptoms either disappeared or substantially decreased for all symptoms (see Table 3). Patient satisfaction, assessed by the PGIC scale, was rated as 7 for all symptoms at the final follow-up and in all follow-ups, except for sciatica, which was scored as 6 in the 1st and 2nd follow-up (see Table 3). The patient's severe limitations and pain in performing a backward bend of the trunk (VAS 6-7/10) or left and right lateral twists of the trunk (VAS

Symptom	Onset (in years)	Frequency (in days per month)	VAS (0-10)	Frequency (in days per month)	VAS (0-10)	PGIC	Frequency (in days per month)	VAS (0-10)	PGIC	Frequency (in days per month)	VAS (0-10)	PGIC
	Baseline	Baseline	Baseline	1 month	1 month	1 month	6 months	6 months	6 months	9 months	9 months	9 months
Tensional headache	4	1	7	0	0	7	0	0	7	0	0	7
Sleep disorders	10	8	n/a	0	n/a	7	0	n/a	7	0	n/a	7
TMJD (jaw pain)	3	30	4	0	0	7	0	0	7	0	0	7
Neck pain	4	30	8	0	0	7	0	0	7	0	0	7
Trapezius pain	4	12	8	0	0	7	0	0	7	0	0	7
Scapular pain	4	30	8	0	0	7	0	0	7	0	0	7
Right upper limb paresthesia	4	4	n/a	0	n/a	7	0	n/a	7	0	n/a	7
Thoracic pain	8	30	8	1	1	7	2	1	7	0	0	7
Low back pain	8	30	8	0	0	7	0	0	7	0	0	7
Sciatica	2	30	4	0	2	6	1	1	6	0	0	7
Knee pain (left)	10	30	4	0	0	7	0	0	7	0	0	7
Gait claudication	10	30	n/a	0	n/a	7	0	n/a	7	0	n/a	7

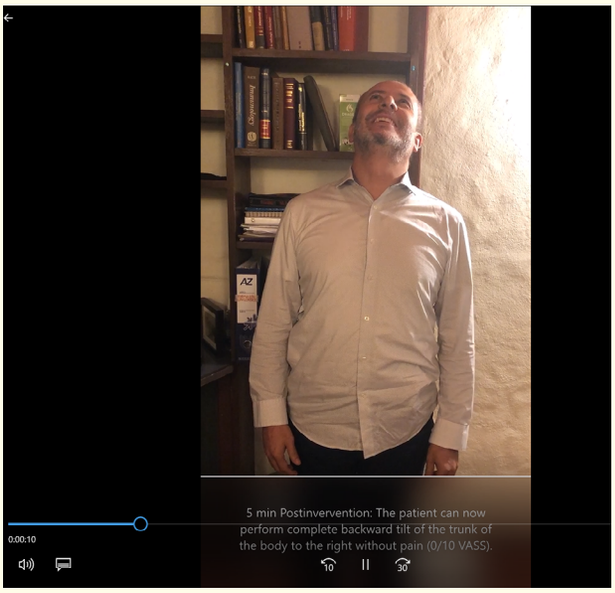
Table 3: Results in the evolution of pain levels measured on the Visual Analog Scale (VAS), symptoms, and their frequency assessed from baseline to the follow-up visits, up until the final follow-up at month 9. Additionally, the Patient Global Impression of Change (PGIC) assessment was performed at each follow-up visit.

8/10) were recorded 5 minutes before the intervention (see video 1). Immediately after the intervention, a follow-up recording was done, showing a significant improvement in trunk mobility along with the disappearance of pain (0/10) (see video 2). These mobility improvements were maintained throughout the monitoring period, up until the final check-up at 9 months. Additionally, a noticeable decrease in analgesic medication consumption was observed, with the patient only requiring one tablet of naproxen (400 mg) on two days during the 9-month monitoring period. No diclofenac, CBD drops, or dexamethasone were taken by the patient during this time. In addition, the patient was able to resume a normal lifestyle without encountering any further limitations in performing daily activities such as bending, lifting, standing, sitting, remaining seated, lying down, and traveling or walking for more than 15 minutes.

Video **1:** Pre-intervention (filmed 5 min. before): The patient was asked to perform a backward bend of the trunk as well as a right and left rotation. As seen in the video, the patient could barely achieve a backward bend and rotate the trunk to the left and right, experiencing a pain level of 6-7/10 during the backward bend and 8/10 during the left and right rotation.

Discussion

This case report presents the clinical outcome of the Atlasprofilax intervention in a patient with PMS and DSD, with a chronic



Video **2:** Post-intervention (5 minutes later): The patient was asked to perform again a backward bend of the trunk and a right and left rotation again. As seen in the video, the patient's trunk mobility ranges significantly increased, allowing them to lean backward and rotate to the left and right without any pain (VAS 0/10).

pain history of more than four years. The patient was monitored for nine months, during which three consecutive follow-up evaluations were conducted. The results showed that the patient experienced a total or near-total reduction in all symptomatology and chronic pain related to PMS, as well as disappearance or significant decrease in symptom frequency. The patient's disability questionnaires revealed an improvement in scores from "moderate to severe disability" to "no disability". There was a remarkable decrease in analgesic consumption, and the patient rated the therapy outcome satisfaction using the Patient Global Impression of Change (PGIC) scale as the highest possible score (7). It is noteworthy that the Atlasprofilax procedure, which involves a single 8-minute application on the suboccipital myofascia, had an immediate effect on pain relief and mobility straight after the intervention. This effect was sustained throughout the nine months of follow-up. The results indicate that the Atlasprofilax method was effective in releasing the suboccipital myofascia, which in turn led to a total improvement in pain and PMS symptoms at month 9.

These results may have several implications. Despite the long duration of the patient's chronic symptoms and the presence of multiple degenerative discopathies, it is noteworthy that the Atlasprofilax treatment was able to significantly improve the patient's MPS symptoms with a single session. However, it should be noted that this treatment does not have any effect on the underlying DSD or osteoarthritic degeneration of the spine. Therefore, it is suggested that the improvement observed in the patient's symptoms was due to the intervention in the suboccipital myofascia, which extended into a change in the entire myofascial system, positively affecting the fascial mechanoreceptors and nociceptors. It is likely that the various traumatic antecedents involving the craniocervical region of the patient could be the basis for a biomechanical and/or metabolic harm of the CCJ that was preliminary improved with the intervention.

The outcomes of this case report may imply and support the hypothesis that chronic myofascial imbalances originating in the suboccipital myofascia, which extend to the SPL and descending myofascial continuum, are potentially responsible for MPS and DSD, in the absence of genetic or autoimmune causes. It is possible that chronic biomechanical dysfunctions in the myofascial chains may cause joint overloads, leading first to the arousal of PMS and progressing to the onset and evolution of DSD. This seems to be in agreement with the research of several authors on myofascial tensegrity and its importance in the development of certain pathologies associated with benign chronic pain such as PMS. These results reinforce the scientific and clinical data on the therapeutic potential of the Atlasprofilax intervention in myofascial pain. Moreover, suboccipital alterations in the CCJ segment may play a more significant role than currently believed in such pathological and painful conditions and syndromes.

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