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Total Resorption of a Chronic L4-L5 Disc Extrusion After Application of the Atlasprofilax Method: A Case Report

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Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Conflict of interest: *José G. León:* Medical director of the Atlasprofilax Academy Switzerland Latin America Corp. *Lluís Manent:* Director of the Atlasprofilax Academy Switzerland Latin America Corp. *Kathleen Lewis:* Practitioner of the Atlasprofilax method. *Orlando Angulo:* Reports no declaration of interest

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Patient: **Male, 42-year-old**

Final Diagnosis: **The disc extrusion at L4-L5 was totally resorbed and improvement in the L3-L4 and L4-L5 disc bulges**

Symptoms: **Bilateral trapezius pain • right brachialgia • constant chronic lumbalgia • right sciatica • gait claudication • paresthesia and dysesthesias in the lower limbs with associated pain and numbness in the calves**

Medication: —

Clinical Procedure: **AtlasProfilax**

Specialty: **Rehabilitation**

Objective: **Unusual clinical course**

Background: The intervertebral disc extrusion resorption has been described in the literature by various authors. It occurs in up to 75% of patients with symptomatic extruded lumbar discs. The Atlasprofilax method favors osteo-musculo-articular rehabilitation processes, mainly impacting on 2 levels: the first is the bone anatomy of the atlanto-occipital joint, and the second is the fasciae located in the cervical region.


Case Report: A 42-year-old male patient diagnosed by MRI with dehydration of L2-L3 to L5-S1 intervertebral discs, disc bulging at L2-L3 and L3-L4, and disc extrusion at L4-L5, received a one-time neuromuscular treatment, called the Atlasprofilax method, to the suboccipital region. In a repeat MRI 6 months later, the disc extrusion at L4-L5 was totally resorbed and improvement in the L3-L4 and L4-L5 disc bulges was seen. The patient's symptoms prior to the Atlasprofilax treatment included bilateral trapezius pain, right brachialgia, constant chronic low back pain, right sciatica, gait claudication, and paresthesia and dysesthesias in the lower limbs with associated pain and numbness in the calves. These symptoms were ameliorated after the treatment. The sciatica disappeared 1 week after the treatment and did not recur. In a follow-up 5 years later, the remaining symptoms had improved even further.

Conclusions: We propose that alterations of the cervical musculature and deep fascia could predispose to the development of lumbar disc abnormalities. We therefore also propose that improvements in this patient, both in symptoms and in imaging findings, are due to a reduction of the asymmetric distribution of forces and elastic loading as a result of the Atlasprofilax treatment.

Keywords: **Cervical Atlas • Intervertebral Disc Displacement • Low Back Pain • Sciatica**

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Background

Disc pathology generally is classified according to the degree of severity. From less to most severe, they are classified as: disc bulging, disc protrusion, disc extrusion, and disc sequestration [1]. MRI studies have shown that patients with symptomatic extruded lumbar discs who undergo repeated non-surgical conservative treatments can exhibit non-regression, partial regression, or complete resolution [2]. Complete resolution or resorption of extruded discs occur in 75% of such patients [2]. The numeric rating scale (NRS) or visual analog scale (VAS), which are positively correlated [3], are commonly used to assess improvement in disc extrusion-related pain. Some authors suggest that macrophage infiltration can play an important role in the reabsorption of extruded discs through chemokine mediation and other mechanisms in the chemotaxis of the neovascularized zone [4,5]. In other studies, sequestered discs seem to have a better outcome for reabsorption when compared to extruded discs. For example, a study found 67% improvement in clinical symptoms, as measured by the Oswestry low back pain disability questionnaire, straight leg raising test, and VAS, but only a 33.3% reduction in disc size as measured on serial magnetic resonance imaging (MRI) [6]. Other studies showed a 20% size decrease in subligamentous, transligamentous, and sequestered herniations of [7]. In some studies, reduction of disc herniation-associated symptoms was correlated with a reduction in the size of the extrusion or bulging [2], while in others this correlation was not observed [8].

According to a study by Kesikburun et al [2] on 40 patients with symptomatic extruded lumbar discs diagnosed by MRI, the average time for a complete reabsorption of extruded discs with repeated conservative treatment was around 17 months and included 75% of the cases. Rates of regression and resolution for extruded lumbar discs seems to be higher over a longer follow-up period. A study of 37 patients with an average follow-up time of 23.2 months [8] found that complete and sustained recovery of conservatively treated massive prolapsed discs was observed in 83% of patients, and there was an average reduction of 64% in volumetric disc size. Interestingly, there was a poor correlation between clinical improvement and the extent of disc resolution [8]. Komori et al [9] reported no complete resolution after a mean of 6.3 months follow-up time, but a partial reabsorption or regression was observed in 30.7% (8/26) of the patients. A study on 17 patients found that all patients with extruded disc herniation had a partial regression of more than half of the disc morphological size within a 2-year follow-up [10]. Thus, it seems that higher rates of regression and resolution of extruded lumbar disc herniation are correlated and can be achieved in accordance with the follow-up time. A meta-analysis on the subject [11] found that disc sequestration had the highest rates of regression (even

if not total reabsorption) with 96%, followed by 70% for disc extrusion, 41% for disc protrusion, and 13% for disc bulging, with a total reabsorption rate of 43% of sequestered discs and 15% for extruded discs.

Nevertheless, and to the best of our knowledge, the available studies on partial or total regression of extruded herniated discs contain small samples of patients. Larger samples are required to elucidate the correlation between improvement of clinical symptoms and disc morphological size and disc regression. The role of time and the body's natural mechanisms for disc regression with regard to nonsurgical conservative treatments or spontaneous regression also require elucidation.

Relapses or recurrent lower-extremity radicular pain after conservative nonsurgical treatment of lumbar disc herniation seem to occur quite frequently. Radicular pain relapses occur in about 25% of patients over 1 year after resolution of leg pain. The recurrence of back pain is even more common, occurring at a younger age and in 43% of the patients [12].

There are several conservative nonsurgical or minimally invasive treatments for the various types of herniated discs, ranging from corticosteroid injections and intradiscal ozone therapy to all types of physical therapy and myofascial manual manipulation techniques.

The Atlasprofilax method has an innovative approach, as it focuses on improving myofascial deformities in the atlanto-occipital hinge at a structural and metabolic level, usually in a single session. Suboccipital muscle deformities have been well-reported in the scientific literature in various pathologies such as whiplash-related disorders, chronic tension headache, and musculoskeletal disorders with associated pain, including those of non-traumatic origin [13-19]. Those muscles are also connected to the myodural bridge [20,21], a membrane that links the dura with the occiput, C1-C2, and the suboccipital muscles. Overstretching or chronic tension of the myodural bridge has been suggested to cause many ailments [20,22].

The craniocervical joint (CCJ) is a key factor in human biomechanics and posture, playing an important role as a co-factor in the development of some spine-related ailments and vertebral pathologies. In humans, standing influences the biomechanics of the CCJ via transfer of forces from the head through the transitional craniocervical hinge (including its bony and soft structures). These biomechanical forces differ from those in quadruped mammals, in which straight posture, spinal alignment, and integration of physical force vectors from the skull downward are not so relevant for the CCJ.

Complex sensorimotor feedback mechanisms are involved in maintaining the human standing position [23,24]. Certain

suboccipital muscles play an important role in the proprioception necessary to maintain this posture [25,26]. A forward head position can influence the activation of the rectus capitis posterior muscles [27], causing a significant load-bearing of these muscles [30]. The rectus capitis posterior minor muscle is a proprioceptive monitor [26] involved in posture and balance. Trigger points and forward head posture can activate tension-type headaches [28]. The thoracic spine's sagittal balance parameters and anatomic angles in the region of the lumbar spine are morphological predictors for distorted disc load [29]. Some studies have described a positive correlation between disc degeneration and multifidus muscle atrophy [30,31].

Thus, subclinical abnormalities and asymmetries at the CCJ level could lead to mechanical and metabolic alterations of the muscle and fascial continuum, affecting posture, muscle chains (such as the deep paravertebral muscles), vertebrae, and discs. This is because the deep posterior cervical fascia is interconnected with the thoracolumbar fascia in a structural and metabolic tridimensional network and, if deformed, can contribute to alterations and asymmetrical loads on muscle chains. This deformation could be a co-factor in predisposing certain discs to herniation.

All structures of the human body have a certain level of elasticity. Bones, cartilage, muscles, fascia, tendons, and ligaments have coefficients of elasticity. The coefficient of elasticity refers to the ability of a tissue to stretch and then return to its original length (hysteresis). Forward head posture changes the center of gravity of the skull and can result in irregular downward distribution of load. Structural asymmetries and metabolic abnormalities in the upper cervical myofascia due to this forward head translation or other factors also can contribute to distal muscle dysfunction and myofascial imbalance, including lumbar intervertebral discs. An MRI study found that lower lumbar level discs such as L4-L5 are more likely to present disc collapse and disruption [32], but their higher viscoelastic capacity compared to other intervertebral discs provides them with a higher capacity for resorption.

Thus, we preliminarily hypothesized that alteration of the suboccipital musculature and deep cervical fascia could be an important co-factor that predisposes to the development of lumbar disc herniations. Such alterations are little-considered and understudied (probably being subclinical in most cases). The principle of fasciointegrity explains how such alterations at the cervical and suboccipital level could be transferred distally [33-35]. From this perspective, the extracellular matrix and its metabolism [36] could contribute to fascial deformities and abnormalities, affecting not only movement abilities of the spine and the limbs, but also leading to muscle and vertebral joint imbalance. Chronic asymmetrical overload and improperly

directed downward vector forces could therefore predispose discs to bulging or even herniation.

Case Report

A 42-year-old man, with a BMI of 27.8, came to the medical office for the application of the Atlasprofilax method, a single-session non-invasive method that involves the use of a vibration and mechano-transduction device on the suboccipital muscles and deep cervical fascia. The suboccipital region alone was therapeutically targeted for ameliorating symptoms and lumbar disc extrusion. No treatment on the lumbar region was performed on this patient. The patient received no physiotherapy before or after receiving the Atlasprofilax treatment. The patient was previously diagnosed by MRI with dehydration of intervertebral discs L2-L3 to L5-S1, diffuse disc bulging at L2-L3 and L3-L4 with left posterolateral annular ligament tear at L3-L4, cephalic migrated right posterolateral annular ligament tear, and extrusion at L4-L5 with contact and compression on the thecal sac and in the lateral recess of the left L5 nerve root, and a small disc bulge at L5-S1. Clinical symptoms prior to therapy were of 5 years' duration and included: pain in the trapezius muscles (VAS=8), right brachialgia (VAS=5), daily chronic low back pain (VAS=6, sometimes reaching 10), right sciatica that increased with sitting (VAS=7, frequently reaching 10), paresthesia, dysesthesia and pain in both lower limbs (VAS=8), numbness in the calves, and very frequent epistaxis (Table 1). The patient required a cane to walk. At a follow-up visit 6 months after the Atlasprofilax treatment, the patient reported a score of 6 ("Better and a definite improvement that has made a real and worthwhile difference") on the patient's global impression of change (PGIC) scale regarding the pain in the trapezius and VAS=1. The right brachialgia decreased to VAS=1 with a PGIC score of 7; daily chronic low back pain was assessed as VAS=1 and PGIC=6. The patient stated he was able to engage in sports and daily activities that were previously impossible. He no longer required the use of a cane to walk. The sciatica disappeared 1 week after the treatment and did not recur (VAS=0/PGIC=7). Improvement in paresthesia and dysesthesia in the lower limbs measured 6 on the PGIC. The pain in the lower limbs also decreased (VAS=2), and numbness and stiffness in the calves had become sporadic, with PGIC=6 (Table 2). The epistaxis had disappeared. An MRI also was performed 6 months after the Atlasprofilax treatment, using the same magnetic resonance equipment. The L4-L5 annular ligament tear and disc extrusion were no longer visible, showing a total resorption of the disc extrusion at L4-L5. The radiologist's report also noted improvement in the L3-L4 and L4-L5 bulging. The radiological analyses before and after the Atlasprofilax treatment were independently analyzed so that the radiologists were not aware of the application of this method in this patient. An additional clinical follow-up 5 years after the application of the

Table 1. VAS results for pain pre-treatment, 6 months after treatment and 60 months after treatment.

Symptom	VAS before therapy	VAS after therapy (after 6 months)	VAS after therapy (after 60 months)
Pain in trapezius	8	1	0
Right brachialgia	5	1	0
Lower back pain	6	1	0
Right sciatica	7	0	0
Pain in both lower limbs	8	2	0

Table 2. PGIC scores 6 months and 60 months after therapy.

Symptom	PGIC score after therapy (after 6 months)	PGIC score after therapy (after 60 months)
Pain in trapezius	6	7
Right brachialgia	6	7
Lower back pain	6	6
Right sciatica	7	7
Pain in both lower limbs	6	7
Paresthesia and dysesthesia in lower limbs	6	7
Numbness and stiffness in the calves	6	7

Atlasprofilax method found that all clinical improvements observed in the 6-month follow-up were maintained and even improved upon. After 5 years, the patient had a BMI of 26.6 and reported he now could regularly engage in high-impact physical activities such as Taekwondo without any problems. The patient did not undergo any additional treatment or surgery after the application of the Atlasprofilax method.

We used 1.5T superconductor equipment and an SE sequences study was performed, obtaining single T1- and T2-weighted images in sagittal and axial planes, as well as STIR sequences in the sagittal plane.

The radiologist was always blind to the patient's clinical information during this case study. The volume of herniation (mm³) was determined by measuring the area (mm²) in each axial image and multiplying this value by the scan thickness and adding the inter-slice gap of 1 mm.

The visual analog scale (VAS) was used to determine the level of pain in the trapezius region, right brachialgia, lower lumbar pain, sciatica-associated pain, and pain in lower limbs, where 0 was no pain and 10 was maximum pain. The VAS has been commonly used to determine improvements of different treatments in patients with radicular chronic low back pain associated with lumbar disc herniation [37].

The patient's global impression of change (PGIC) scale was also used to determine improvements in the trapezius region, right brachialgia, lower lumbar pain, sciatica, gait claudication, pain, paresthesia and dysesthesia in both lower limbs, numbness in the calves, and performance of daily activities.

The PGIC initially was developed to assess changes in activity limitations, symptoms, emotions, and overall quality of life related to post-concussive conditions. Its use has been expanded to assess the perceived impact of disease and pain management in many diseases and pain-related syndromes [38], including treatment outcomes for MRI-confirmed symptomatic lumbar disc herniations [39,40]. The PGIC uses the following scale:

- 1) No change (or condition has gotten worse),
- 2) Almost the same, hardly any change at all,
- 3) A little better, but no noticeable change,
- 4) Somewhat better, but the change has not made any real difference,
- 5) Moderately better, and a slight but noticeable change,
- 6) Better and a definite improvement that has made a real and worthwhile difference,
- 7) A great deal better and a considerable improvement that has made all the difference.

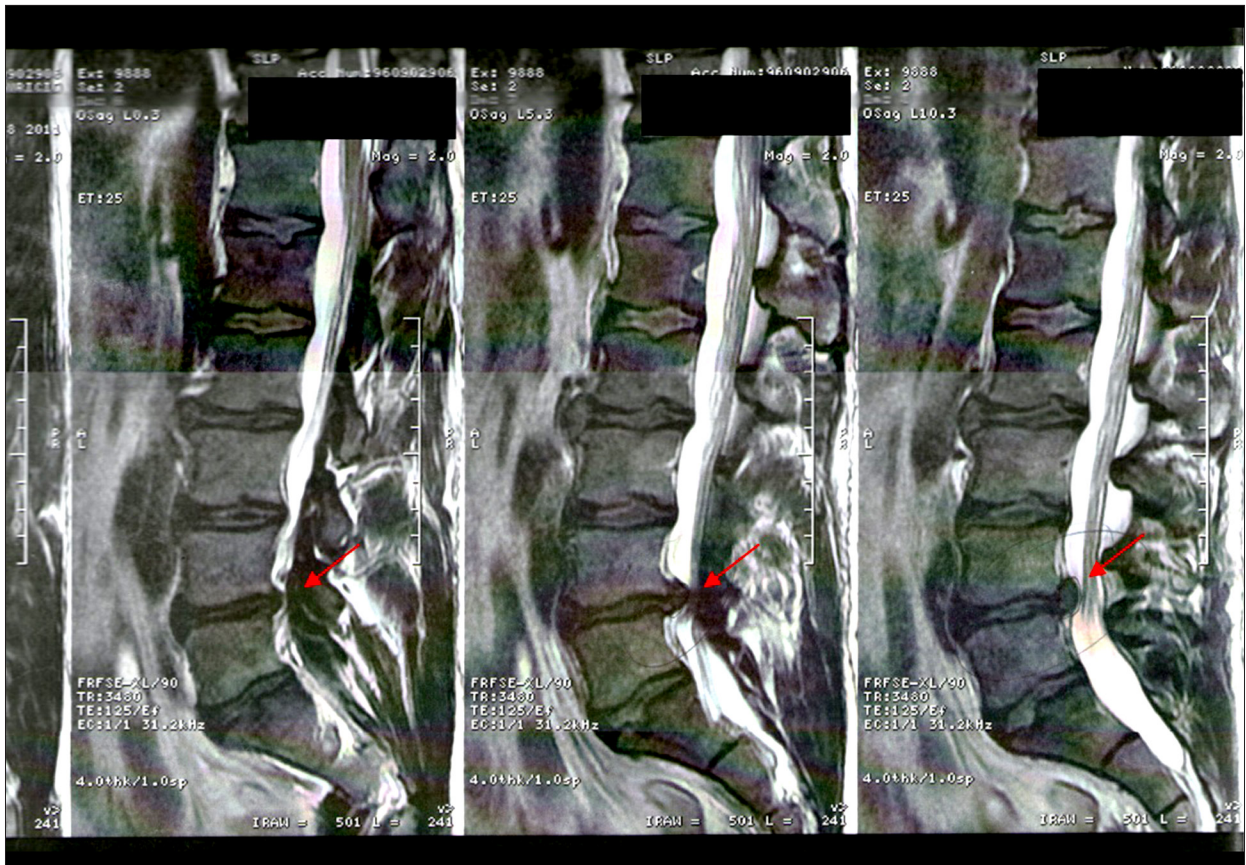


Figure 1. Lateral MRI view of the lumbar spine showing disc extrusion at L4-L5 level prior to Atlasprofilax treatment. The red arrows in this MRI show an extrusion of the intervertebral disc at the L4-L5 level prior to the treatment with the Atlasprofilax method, after which a rectification of the lumbar spine from L1 to L5 is evidenced.

Intervention

The patient underwent the intervention by means of the Atlasprofilax method in a single session. The method involves working the myofascial structures of the neck with a device that uses the principles of mechano-transduction by vibropressure at specific frequencies.

The intervention consisted of a non-invasive neurostimulation with a special device that used controlled percussion vibropressure at special frequency with an adapted head that was applied during 8 min on several key points of the suboccipital area to stimulate certain muscle and fascial receptors aiming at a deep mechano-transduction effect on the suboccipital muscles.

Endpoints

The objective of the study had 2 purposes: observing imaging improvement reduction of the size and morphology of the herniated disc by means of MRI, and the associated clinical manifestations.

At the imaging level, variations in size and morphology of affected extruded discs were analyzed and taken as endpoints, to see if an improvement such as disc reabsorption was achieved.

At the clinical level, the differential result of pain according to the VAS was used as an endpoint to determine improvement of pain in trapezius, right brachialgia, lower back pain, right sciatica, and pain in both lower limbs. The PGIC scale was used to determine improvement in life quality and therapy outcome satisfaction for associated ailments such as pain in the trapezius, right brachialgia, lower back pain, right sciatica, pain in both lower limbs, paresthesia and dysesthesia in lower limbs, as well as numbness and stiffness in the calves.

Radiological Findings

Radiologist's diagnosis prior to the application of the Atlasprofilax method was:

“Dehydration of the intervertebral discs from L2-L3 to L5-S1 (Figure 1). At L2-L3, small diffuse disc bulging. At L3-L4, diffuse disc bulging and left posterolateral annular ligament tear.

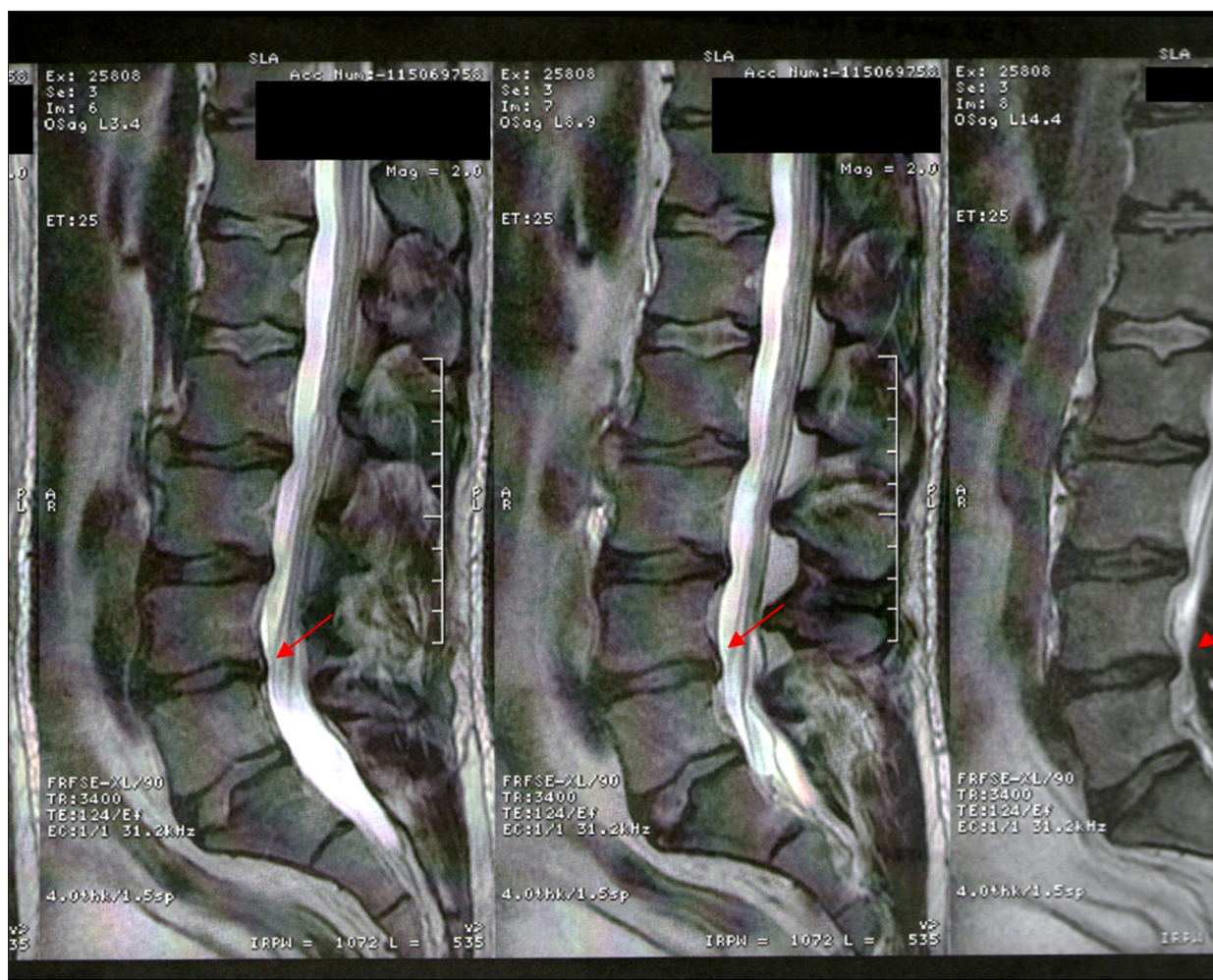


Figure 2. Lateral MRI view of the lumbar spine 6 months after Atlasprofilax treatment, showing disc extrusion reabsorption at L4-L5 level. The red arrows in this MRI show the regression of the intervertebral disc extrusion at the L4-L5 level. After treatment with the Atlasprofilax method, the rectification of the lumbar spine continues from L1 to L5.

At L4, annular ligament tear and right posterolateral cephalic migrated disc extrusion, which contacts and compresses the thecal sac and probably the left L5 root in its lateral portion. At L5-S1, small diffuse disc bulge.”

The radiologist’s diagnosis 6 months after the application of the Atlasprofilax method was (Figure 2):

“There is bulging of the annulus fibrosus of the intervertebral discs of L3-L4 and L4-L5 with presence of tearing of the annulus fibrosus in the posterior aspect of the intervertebral disc of L4-L5, this bulging associated with fascicular degenerative changes moderately decreases the width of the spinal canal in these locations, without relevant associated narrow, central, or lateral canal. The right paracentral disc herniation visualized in the previous study is not observed and the width of the spinal canal has improved for this reason in this location. Currently, the right paracentral disc herniation L4-L5 visualized in the

previous study is not observed. In the present study there is bulging of the fibrous ring L3-L4 and L4-L5 with moderate decrease in the amplitude of the spinal canal, which, however, has improved with respect to the previous study.”

Clinical Findings

A clear improvement was observed in the reduction of pain using the VAS as well as in the perception of the favorable impact of the intervention on quality of life according to the PGIC scale as presented in Tables 1 and 2.

Discussion

The case described here reports a rapid resorption of a disc extrusion after the application of the neuromuscular Atlasprofilax method (Figure 3). The resorption of this disc extrusion could



Figure 3. Physician performing the Atlasprofilax® method on the patient's suboccipital area.

be due to spontaneous remission within the parameters observed in other studies of similar cases of disc extrusion. However, it is interesting to note that despite the chronicity and severity of the patient's described symptoms – correlated and consistent with the disc herniation, with an onset of more than 5 years – such spontaneous regression would have occurred much earlier, since spontaneous regressions occur at 4 months to 2 years after herniation. It is therefore feasible to conclude that the Atlasprofilax therapy could have contributed to the reabsorption. Further studies with larger sample sizes are required to answer this question. From a clinical point of view, it is noteworthy that none of the patient's symptoms had improved in the 5 years prior to the Atlasprofilax therapy. The sciatica disappeared within 1 week after the treatment, and symptoms not directly related to the disc herniation (eg, brachialgia and trapezius pain) improved significantly shortly after therapy. The symptoms associated with the disc extrusion and those with other origins were greatly reduced, and mostly disappeared, over a period of 5 years. No relapse or

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recurrence occurred within the 5 years of the study, despite the patient regularly practicing high-impact activities such as Taekwondo. This is interesting since recurrence of radicular pain (25%) and lower back pain (43%) associated with a herniated disc are relatively common after nonsurgical conservative treatment. These recurrences are common and persist in younger people, as in the age group of this patient. The Atlasprofilax method has been shown to be an effective method in reducing pain and improving quality of life in patients with fibromyalgia [41], temporo-mandibular joint-associated disorders, and cervico-brachialgia disorders [42,43]. This case report agrees with previous studies and case reports, broadening preliminary the use of the Atlasprofilax method for herniated discs and their associated ailments.

Conclusions

The hypothesis that abnormalities in the deep suboccipital musculature, deep cervical fascia, and upper cervical spine soft structures that exhibit morpho-pathologic correlations with many other pathologies are probable preliminary co-factors that may predispose to or cause disc herniations should be a candidate for further clinical consideration and extensive studies. The involvement of the fascial continuum and its downward impact on paravertebral muscle chains with possible chronic asymmetrical overload on intervertebral discs should also be investigated in the case of lumbar disc herniations to elucidate its role and, if applicable, its probable pathophysiologic mechanism. The Atlasprofilax method, being an innovative, non-invasive, and conservative approach, could be preliminarily proposed as a candidate for further study and more clinical therapeutic attention.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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