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Proposal for Treatment of Focal Dystonia in a Guitar Player: A Case Study

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ABSTRACT

Focal dystonia in musicians is classified as a task-specific movement disorder. It presents itself as a loss of voluntary motor control in extensively trained movements while musicians play the instrument. When such a disorder occurs in a professional life of a musician, it frequently leads to a definite interruption of his or her career after several frustrated attempts to recover. This paper presents a follow up of an individualized treatment and the evolution of focal dystonia in a diagnosed guitarist after three and six months of treatment. Instrumental practice conditions were registered before, during and after sessions of treatment. During the first phase, three techniques were applied: a) desensitization: rest, relaxation, and consciousness of muscular tension; b) sensory retraining: specific, repetitive, goal-oriented sensory activities; c) acupuncture: relaxation and balance of muscular tension. In the second phase, retraining was prioritized through: a) motor reprogramming/motor control; b) ergonomic adaptations: modifications of movements and instrument; c) use of ortheses: splints and gloves for restricting unwanted movements. At the last phase, easy technical methods were used in order to exercise arpeggios, scales, and, lately, chords with two or three notes.
The follow up of the last six months shows decrease of trembling and improvement of muscular relaxation, and acquisition of good postural consciousness during guitar practice. A better perception of muscular tension was observed. It was possible to verify direct emotional interferences impairing instrumental practice. The treatment proposed here, built on multiple strategies, carried off positive and varied results after six months of treatment.

I. INTRODUCTION

Focal dystonia in musicians is a type of occupational focal dystonia (unleashed by a motor-specific task), and its primary cause is unknown. As in all kinds of focal dystonia, it is localized, involuntary, and unleashed by simultaneous activities of agonist and antagonist muscles; it induces abnormal movements and/or postures, essentially those of hands and fingers. It may affect face muscles requested to shape the embouchure of brass players, and can occasionally cause neck cramps. This type of focal dystonia usually occurs in the absence of pain in a process classified as a task-specific movement disorder, and it is a result of highly specialized demands of specific tasks required in professional motor abilities. There are evidences of alteration in sensory-motor cortical representations (Altenmüller, 2003). Such poor representations are caused by an altered integration between sensory information that comes from peripheral to adjacent areas interfering in the motor programming. Unfortunately, in Brazil, focal dystonia has not been an object of discussion and interest in musical spheres, and, as a result, many cases are diagnosed too late, if diagnosed at all.

Surveys conducted by Nutt *et al.* (1988) and Tubiana (2003) point to a proportion of 1/500 musicians suffering from focal dystonia. It affects musicians more than other categories whose abilities require manual tasks, such as watchmakers, dentists, and surgeons. Tubiana (2003) researched 1320 musicians from 1992 to 1999, where 192 presented focal dystonia (12.5%). This research demonstrates that it occurs mostly in 20 to 50 year-old men. It rarely presents a precise unleashing factor as if it were related to a traumatic event.

According to databases for Dystonia and Ulnaropathy (Rietveld, 1999), the prevalence of dystonia in musicians is 4.5% in a survey conducted in 1998. Figure 1 shows the number of occurrences according to their instrument:

Table 1: Number of occurrences of focal dystonia in musicians according to their instruments.

Guitar	12
Piano/ Organ	7
Violin	3 + 1–neck cramp
Saxophone	3 + 1–embouchure
Flute	3
Accordion	2
Trumpet	1–embouchure
Bass	3
Cello	1
Harp	1
Percussion	1
English horn	1–neck cramp

In a study conducted in Germany with 144 dystonic musicians, Jabush & Altenmüller (2006) report a greater occurrence of dystonia in a population of musicians that play concert music. Among them (51%), the most affected are the soloists. The predominance here is, once again, greater in males (3:1), and the distribution among instruments corresponds to 28% of pianists, 26% of wind players, and 20% of guitarists. In relation to laterality, the most solicited hand in dexterity is the affected one; hence, the right hand of guitarists, pianists and woodwind players, and the left hand of string players. This information is compatible with Aránguiz *et al.* (2011) which included 86 cases of dystonic musicians. The most affected fingers are listed in Table 2.

Table 1: Most affected fingers as presented in the study of Aránguiz *et al.* (2011).

Affected finger	Flexor	Extensor
Middle finger	54.4%	24.1%
Ring finger	44.3%	24.3%
Little finger	22.8%	25.3%
Forefinger	16.5%	27.8%
Thumb	11.4%	6.3%

Recent studies in primates suggest that repetitive motions can induce plasticity changes in the sensory cortex which may degrade hand representations and interfere in motor control, causing movement disorders. Focal dystonia in musicians, in most cases, is classified as a task-specific movement disorder. In other words, it presents itself as a loss of voluntary motor control in extensively trained movements while musicians play the instrument only. When such a disorder occurs in a professional life of a musician, it frequently leads to a definite interruption of his or her career after several frustrated attempts to recover. There is no definite protocol of treatment.

II. AIMS

Follow up an individualized treatment and evolution of focal dystonia in a diagnosed guitarist after three and six months of treatment.

III. METHOD

Instrumental practice conditions were registered: before, during and after sessions of treatment. **During the first phase**, three techniques were applied:

1) Desensitization: rest, relaxation, and consciousness of muscular tension;

2) Sensory retraining: specific, repetitive, goal-oriented sensory activities;

3) Acupuncture: relaxation and balance of muscular tension.

In the second phase, retraining was prioritized through:

1) Motor reprogramming/motor control;

2) Ergonomic adaptations: modifications of movements and instrument;

3) Use of ortheses: splints and gloves for restricting unwanted movements.

At the third phase, relaxation techniques associated with body consciousness were applied, and psychological counseling was suggested. At this point, easy technical methods were used in order to exercise arpeggios, scales, and, lately, chords with two or three notes.

Table 2: Phases and techniques used during the three-to-six-month treatment.

Phase	First: Desensitization	Second: Sensory retraining	Third: Resume practice
Conduct	Rest, relaxation, consciousness of muscular tension, and acupuncture	Motor reprogramming/motor control; Ergonomic adaptations: modifications of movements and instrument; Use of ortheses: splints and gloves for restricting unwanted movements	Easy technical methods: arpeggios, scales; lately, chords with two or three notes
Results	Decrease of tension, and regularization of muscular tonus	Change of posture and movements	Resume practice and private lessons

IV. RESULTS

The follow up of the **first three months** shows:

1) Decrease of trembling

2) Improvement of muscular relaxation;

3) Acquisition of good postural consciousness during guitar practice;

4) A better perception of muscular tension, being possible to verify direct emotional interferences impairing instrumental practice.

After six months of treatment, the patient shows:

1) Increase of motor coordination;

2) Decrease of accessory movements;

3) Freer and dissociated movements;

4) More significant improvement. Resuming of methods and techniques applied to the guitar were crucial to perceive such an improvement;

5) Resume private lessons.

Table 3: Results

Results	
Muscles	Decrease of trembling
	Improvement in relaxation
Corporal consciousness	Acquisition of good postural consciousness
Degree of relaxation	Direct interference of emotions in the body and practice

V. DISCUSSION/CONCLUSION

A. Comparative Studies

Some studies point to improvements of motor patterns close to normality in musicians once they experience a therapy aiming at motor controlling. The topography of somatosensory representations of the fingers, along with improvement of motor behavior, became normalized in Candia *et al*. (2003). They believe that the method of sensory motor retuning directs alterations in the functional organization of the somatosensory cortex. Their results confirm that plastic changes coming from sensory stimulation during manifestation of focal dystonia can revert this specific context.

Jabusch *et al*. (2011) believe that alteration of somatosensory input (*e.g.* by wearing a latex glove) can improve the motor control in patients with focal dystonia of musicians. They say that there is a "potential association between this so-called sensory trick phenomenon and the outcome after consequent" pharmacological treatment and/or pedagogical retraining in 24 pianists. The glove effect seems to have a prognostic value in the treatment of musicians with dystonia.

Another study (Altenmüller *et al.,* 2011) involving 72 pianists in treatment for dystonia that utilized retraining associated with pharmacological intervention obtained variable results during a process that included three phases: de-programming; correction of posture, and retraining. It concludes by saying that reprogramming is a valid tool for treatment, but prognostic factors determining the rate of success in an early stage of this long procedure remain to be identified.

Another group has focused on reinstalling the orderly topography of the somatosensory maps with fairly good results on motor performance (Zeuner *et al.,* 2002).

Focal dystonia presents multiple factors associated with professional condition and its physiopathology. However, some principles facilitate its prevention and treatment. The treatment should focus on a diversity of strategies, denying to fixating in a specific form. It is necessary to associate different possibilities to obtain the best symptomatic result possible, focusing on interdisciplinary intervention.

It is well known that this type of dystonia takes long spans of time to acquiring reasonable results in treatment. It requires openness from the instrumentalist to be calm, determined, and flexible enough for a change. It also requires of the health professional to be acquainted with the evolution of movements at the instrument so that there is no regression in the treatment. In focal dystonia, the process of recovering requires a great span of time in order to be possible reading a patient response. Changes should be individualized, depending on previously defined motor planning, instrument played, inherent and individual facilities. The treatment proposed here, built on multiple strategies, carried off positive and varied results after a six-month treatment.

The instrumentalist here responded well to the proposed alterations in technique such as changes of hand and arm position. He predisposed himself to interrupt his course program at the university so that he could follow all the orientations received. At the same time, he had a psychiatric follow up during that period, and, even in moments of discouragement, he tried hard to understand his prognosis, attaching himself firmly to his goal. He was aware of the possibility of aggravating the picture of his disease in case he didn't look for help at the right moment. As a reaction to symptoms of dystonia, it is not uncommon to see musicians doing exactly the opposite; in other words, they practice more, insisting on the continuity of his or her work, increasing the physical and emotional stress through it.

There are different proposals of treatment for dystonia. We think that modifications of motor patterns should be the focus of the treatment, since it is necessary to create new forms of motor control so that old and vicious patterns created by tension and accessory movements do not return.

Since we have strong and direct evidence of abnormal neuroplasticity mechanisms in focal dystonia, we can even imagine how applying external associative stimulation protocols tailored to reverting physiological abnormalities can work as an adjunct to behavioral therapy of this disabling disorder.

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