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Original article

ROLE OF EXERCISES IN FASCICULATION ANXIETY SYNDROME

DOCU ANY AXELERAD[1], DOCU DANIEL AXELERAD[2]

Abstract

Objective. The goal of this study is to make a connection between physical exercise and clinical features of fasciculation anxiety syndrome. We randomized a cohort of 30 patients in three groups: first group included 10 patients with symptomatic fasciculation and anxiety, second group included 10 patients fasciculations associated with sensory symptoms or muscle weakness and were diagnosed with neuropathy or SLA and the third group included 10 patients with fasciculations associated with cramps (cramp- fasciculation-syndrome). All three groups were included in a 3 times/week programme of exercises of 30 minutes each and we evaluated the electomyographic changes.

Methods: We randomized 30 patients in three groups: first group included 10 patients with symptomatic fasciculation and anxiety, second group includes 10 patients fasciculations associated with sensory symptoms or muscle weakness and were diagnosed with neuropathy or SLA and the third group included 10 patients with fasciculations associated with cramps (cramp - fasciculation-syndrome). All three groups were included in a 3 times/week programme of exercises of 30 minutes each on a 3 month period of following and we evaluate electomiographic changes.

Results: In the present study, a cohort of 30 patients with sympthomatic fasciculations was assessed with clinical, neurophysiological and laboratory studies.The majority of cases with fasciculations were female. Triggers in all 3 groups was stress, caffeine and exercises.

Anxiety appeared as a proeminent feature in the patients in the present cohort and may contribute to pathogenesis of symptomatic fasciculations in symptomatic fasciculation and anxiety, acting to promote fasciculations in Symptomatic fasciculation and anxiety.

Conclusions: The present study described a cohort of 30 patiens presenting for evaluation of fasciculations and identified group which includes 10 patients with symptomatic fasciculation and anxiety, second group which includes 10 patients fasciculations associated with sensory symptoms or muscle weakness and were diagnosed with neuropathy or SLA and the third group which includes 10 patients with fasciculations associated with cramps (cramp-fasciculation-syndrome). All three groups were included in a 3 times/week programme of exercises of 30 minutes each and we evaluate electomiographic changes.

In the Symptomatic fasciculation and anxiety cramp- fasciculation-syndrome role of exercise appear to aggravate their simptomatology, but in the second group of patients with neuropathy and lateral amyotrophic sclerosis role of exercise is unclear but for sure it doesn't have a negative role.

Key words: fasciculations, amyotrophic lateral sclerosis, anxiety, benign fasciculation syndrome, cramp-fasciculation syndrome, neuropathy.

Introduction

Clinically, fasciculations reflect spontaneous discharges that arise from single motor units that result in isolated contraction of a small portion of a muscle. Fasciculations often go unnoticed or may be merely discerned as a brief '' twitch'' of the muscle. Fasciculations are very common in healthy population, and from part of benign fasciculation syndrome, a disorder characterized by symptomatic fasciculations without progression to a more fasciculations sinister neurological condition (Friedman et all, 2002, Punjabi et all, 2009).

Alternatively, fasciculations may be present following peripheral nerve injury (Dumitru et all, 2001, Roth et all, 1987) or in peripheral nerve hyperexcitability syndromes (Hart et all, 2002, Newsom-Davis et all, 1993). Finally, fasciculation is the prominent feature in amyotrophic lateral sclerosis (Kiernan et all, 2011).

While fasciculations potentials can be detected by surface electromyography recording in almost 90% of normal subjects (Mitisikostas, et all, 1998), these fasciculations potentials are symptomatic in only 50% (Jansen et all,1991).

Methods

We randomized 30 patients in three groups: first group included 10 patients with symptomatic fasciculation and anxiety, second group includes 10 patients fasciculations associated with sensory symptoms or muscle weakness and were diagnosed with neuropathy or SLA and the third group included 10 patients with fasciculations associated with cramps (cramp - fasciculation-syndrome). All three groups were included in a 3 times/week programme of exercises of 30 minutes each on a 3 month period of following and we evaluate electomiographic changes.

Age varies between 25 and 83 years old, mean age 53.42 (SD 15.75), 12 male patients and 18 female patients, with duration of fasciculations between 3 and 17 years, mean duration 3.90 (SD 11.03).

All three groups were included in a 3

[1] General Medicine Faculty, Ovidius University of Constanta, ROMANIA
[2] Physical Education and Sport Faculty, Ovidius University of Constanta, ROMANIA
E-mail address: docuaxi@yahoo.com
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times/week programme of exercises of 30 minutes each and we evaluated electomyographic changes.

Each patient underwent neurological assessment including muscle strength grading using the Medical Research Council clinical gradings of power.

A standard electrodiagnostic study was performed using conventional techniques with a Medelec Synergy. Electromyography was performed using a concentric needle electrode, with wide sampling of affected and unaffected muscles from all limbs

Laboratory studies included creatine kinase (CK).

Results

Clinical characteristics

We randomized 30 patients in three groups: a group of 10 patients with symptomatic fasciculation and anxiety, second group of 10 patients fasciculations associated with sensory symptoms or muscle weakness and were diagnosed with neuropathy or SLA (3 patients with SLA and 7 patients with neuropathy) and a third group of 10 patients with fasciculations associated with cramps (cramp- fasciculation-syndrome). All three groups were included in a 3 times/week programme of exercises of 30 minutes each and we evaluated electomyographic changes.

The present study shows that in some groups exercise aggravates the fasciculations.

Fasciculations were associated with sensory symptoms in 5 cases in the first group, 1 patient in the second group and 3 patients in the third group. In the second group 3 of them presented with fasciculations and distal lower limb sensory impairment and was diagnosed with a sensorymotor neuropathy of the axonal type. Finally, fasciculations were associated with limb weakness in three cases that was subsequently diagnosed with ALS.

The remaining 18 cases presented with isolated fasciculations, without other neurological symptoms.

All of these cases presented with symptomatic frequent fasciculations. Fasciculations were generalised in 4cases, predominately affecting the lower limb in 20 cases, the upper limbs only in 2 cases, and both upper and lower limbs in 4 cases.

Exacerbating factors were identified by 20 cases, the most common trigger of these being exercise (in 20 of 30 cases), followed by phychological stress (15 of 30 cases), fatigue (10 of 30 cases) and caffeine consumption (5 of 30 cases) (Table 1)

Muscle weakness was not present on history or clinical examination in any case with isolated fasciculations. Anxiety about the possibility of ALS was described by all the cases in this group.

Electrodiagnostic findings

Motor and sensory nerve conduction studies were within normal limits in all cases presenting with isolated fasciculations.Needle EMG demonstrated the presence of FPs in 10 out of 30 cases. In all cases FPs were simple morphology (<4turns), multiple discharges were noted in 1 out of 10 cases and cramp in 1 out of 10 cases in symptomatic fasciculation and anxiety .Neuromyotonic discharges were not detected in any of the studied cases.In terms of localization, spontaneous discharges were evident in the lower limbs in 26 of 30 cases (64%), in the upper limbs in 1 of 30 cases, and in both the upper and lower limbs in 4 cases.

Motor unit morphology was within normal limits in all muscles, including on assessment with quantitative EMG.Motor unit recruitment and interference pattern with voluntary activation was also normal.

Table 1 Clinical features and EMG findings in 30 cases with fasciculations

Case	Distribution of fasciculations	Triggers	EMG		Other abnormal tests	Diagnosis
			Before exercise	After exercise		
1	Upper and lower limbs, face	Stress, Coffeine, exercise	Normal	Multiplet discharges-TA, VL		Symptomatic fasciculation and anxiety
2	Upper and lower limbs	Stress, Coffeine, exercise	Normal	Triplet- discharges-TA, VL		Symptomatic fasciculation and anxiety
3	Lower limbs	Stress, Coffeine, exercise	Normal	FPs- bilateral TA, MG		Symptomatic fasciculation and anxiety
4	Lower limbs	Stress, Coffeine, exercise	Normal	FPs-and cramp discharges-AH		Symptomatic fasciculation and anxiety
5	Lower limbs	Stress, Coffeine, exercise	Normal	Normal		Symptomatic fasciculation and anxiety
6	Lower limbs	Stress, Coffeine, exercise	Normal	FPs-TA		Symptomatic fasciculation and anxiety
7	Lower limbs	Stress, Coffeine, exercise	Normal	FPs-TA, MG		Symptomatic fasciculation and anxiety
8	Distal upper and	Stress, Coffeine,	Normal	Triplet- discharges-TA,		Symptomatic fasciculation

	lower limbs	exercise		VL		and anxiety
9	Distal upper limbs	Stress, Coffeine, exercise	Normal	Normal		Symptomatic fasciculation and anxiety
10	Lower limbs	Stress, Coffeine, exercise	Normal	Normal	↑ck	Symptomatic fasciculation and anxiety
11	Lower limbs	Coffeine, exercise	Normal	FPs-TA		cramp- fasciculation-syndrome
12	Lower limbs and trunk	Stress, exercise	Normal	FPs-TA, MG	↑ck	cramp- fasciculation-syndrome
13	Proximal lower limbs and face	Stress	Normal	FPs-ADM		cramp- fasciculation-syndrome
14	Distal upper and lower limbs	Stress, Coffeine, exercise	Normal	FPs-Bilateral MG		cramp- fasciculation-syndrome
15	Lower limbs, left shoulder	Coffeine, exercise	Normal	Normal		cramp- fasciculation-syndrome
16	Trunk and lower limbs	Exercise	Normal	FPs-TA		cramp- fasciculation-syndrome
17	Distal lower limbs	Stress, exercise	Normal	Normal		cramp- fasciculation-syndrome
18	Distal upper and lower limbs	Coffeine, exercise	Normal	FPs-ADM		cramp- fasciculation-syndrome
19	Lower limbs	Coffeine	Normal	Normal		cramp- fasciculation-syndrome
20	Generalised	Stress, Coffeine, exercise	Normal	Multiplet discharges-TA, VL	↑ck	cramp- fasciculation-syndrome
21	Distal lower limbs	-	Chronic neurogenic MU Changes in Distal Limb Muscles	Chronic neurogenic MU Changes in Distal Limb Muscles		Polineuropathy
22	Distal lower limbs	-	Chronic neurogenic MU Changes in Distal Limb Muscles	Chronic neurogenic MU Changes in Distal Limb Muscles		Polineuropathy
23	Distal lower limbs	Stress	Chronic neurogenic MU Changes in Distal Limb Muscles	Chronic neurogenic MU Changes in Distal Limb Muscles		Polineuropathy
24	Distal lower limbs	-	Chronic neurogenic MU Changes in Distal Limb Muscles	Chronic neurogenic MU Changes in Distal Limb Muscles		Polineuropathy
25	Distal lower limbs	-	Chronic neurogenic MU Changes in Distal Limb Muscles	Chronic neurogenic MU Changes in Distal Limb Muscles		Polineuropathy
26	Distal lower limbs	-	Chronic neurogenic MU Changes in Distal Limb	Chronic neurogenic MU Changes in Distal Limb Muscles		Polineuropathy

27	Distal lower limbs	-	Muscles Chronic neurogenic MU Changes in Distal Limb Muscles	Chronic neurogenic MU Changes in Distal Limb Muscles		Polineuropathy
28	Generalised	-	Wide spread active denervation changes		↑ck	Amyotrophic Lateral Sclerosis
29	Generalised	-	Wide spread active denervation changes			Amyotrophic Lateral Sclerosis
30	Generalised	-	Wide spread active denervation changes			Amyotrophic Lateral Sclerosis

TA tibialis anterior, MG medial gastrocnemius, ADM abductor digiti minimi, AH abductor halluces, FDI first dorsal interosseous, VL vasus lateralis, MU motor unit.

Laboratory findings

Abnormal laboratory findings were not identified in any of the studied cases presenting with isolated fasciculations.CK was elevated in 4 cases.

Discussion

In the present study, a cohort of 30 patients with sympthomatic fasciculations was assessed with clinical, neurophysiological and laboratory studies. The majority of cases with fasciculations were female. Triggers in all 3 groups was stress, caffeine and exercises.

Anxiety appeared as a proeminent feature in the patients in the present cohort and may contribute to pathogenesis of symptomatic fasciculations in symptomatic fasciculation and anxiety, acting to promote fasciculations in Symptomatic fasciculation and anxiety.

Anxiety states are associated with heightened sensitivity to bodily sensations and separately may precipitate disordered breathing regulation, including persistent hyperventilation, Hyperventilation is known to induce increased excitability of motor axons and provoke ectopic discharges such as fasciculations, through the selective activation of lower –threshold persistent Na+ conductances, in addition to the effects of H+ and Ca++ on axonal ion channels. Such processes may explain the high-frequency of fasciculations evident at presentation in the current cohort of patients and also the subjective reduction in fasciculation frequency after the reported improvement of the anxiety state.

Accordingly, anxienty management strategies appear useful in the treatment of Symptomatic fasciculation and anxiety and exercise appear to aggravate de picture of this syndrome.

Cognitive behavioural therapy for health anxiety frequently involves education to correct idiosyncratic beliefs about health and illness, and, hence it is noteworthy that proeminent anxiety about the significance of fasciculations may still be reported by highly educated patients and similar in cramp-fasciculation-syndrome exercise appear to aggravate de picture of this syndrome and behavioural therapy is also indicated. In the second group exercise not influence evolution of diseases.

Conclusion

The present study described a cohort of 30 patiens presenting for evaluation of fasciculations and identified group which includes 10 patients with symptomatic fasciculation and anxiety, second group which includes 10 patients fasciculations associated with sensory symptoms or muscle weakness and were diagnosed with neuropathy or SLA and the third group which includes 10 patients with fasciculations associated with cramps (cramp- fasciculation-syndrome).

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