PROCEEDINGS

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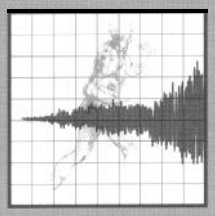

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Differences in Neuromuscular Activity of the Upper Trapezius Muscles Between WAD Grade II Patients and Healthy Controls

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INTRODUCTION

The Whiplash Associated Disorder (WAD) is charactarised by a discrepancy between symptoms and signs. The most frequently mentioned symptoms are pain in the neck, head and the shoulders accompanied by a feeling of stiffness. The only consistent finding at physical examination that is described seems to be the 'muscle spasm'. In the proposed clinical classification of the Quebec Task Force this 'musculoskeletal sign' is one of the criteria that defines WAD II (1). In chronic low back pain patients (CLBP) there is some evidence of abnormal EMG-patterns but in literature on WAD there are no reports concerning the use of SEMG to asses muscle activity.We want to try to develop an instrument to discriminate the WAD II patients according to the alterations in muscle activity. A first step in this proces is to identify abnormal muscle activity in these patients. Therefore the goal of the following exploratory crosssectional study is to demonstrate differences between the EMG-activity of the neck musculature of WAD II patients and healthy controls during different physical tasks.

METHODS

Subjects: A group of 18 chronic WAD II-patients and 19 healthy controls participated in the study. All patients complained of pain in the neck, head or shoulder region for more than 6 months without the presence of either the preexisting or trauma related orthopedic or neurological signs. In all of them pain started within the first 48 hours after a rear-end motor vehicle collision.

Measurements: The participants performed several simple tasks with a varying physical demand after an initial normalisaton procedure of the SEMG amplitude from the upper trapezius muscle using submaximal voluntary contractions (2). Measurement were done during:

A) static activity comprising of 3 assessments: 1) sitting in a comfortable chair with head supported. 2) sitting on a stool and 3) standing.

B) dynamic activity: the participant sat at a table and then was asked to put marks with a pencil held in the dominant hand on three spots arranged in a triangular fashion. The non-dominant arm rested on the table. This activity was carried out for around 2½ minutes (3). During this activity EMG-activity of both the dominant 'active' side and the non-dominant 'passive' side was measured at 10 sec., 60 sec. and 120 seconds.

C) a condition requiring relaxation: a second standing task was performed following the dynamic task and was compared to the first standing task.

Each EMG-signal was recorded during 15 seconds and processed to produce a Smooth Rectified Electromyography (SRE). The averaged SRE-value was expressed as a percentage of a reference voluntary electrical activation (%RVE).

RESULTS

No statistically significant differences between groups during the static activity (A) were found (MANOVA, $p< 0.154$) (fig. 1). No statistically significant differences between groups during the dynamic activity (B) were found (MANOVA, $p<0.411$) (fig. 2). During this activity there was some muscle activity in the 'non-dominant' passive side. Differences between the two groups were greater in the passive side than in the active side but these were not statistically significant (fig. 2). The difference between the first and second standing task (C) for both groups for the active side (fig. 3a) as well as for

the passive side (fig. 3b) was determined. Statistically significant differences were found in the change of EMG-activity between groups for either side (t-test: p<O.OOl, fig. 3a; p< 0.0001, fig.3b).

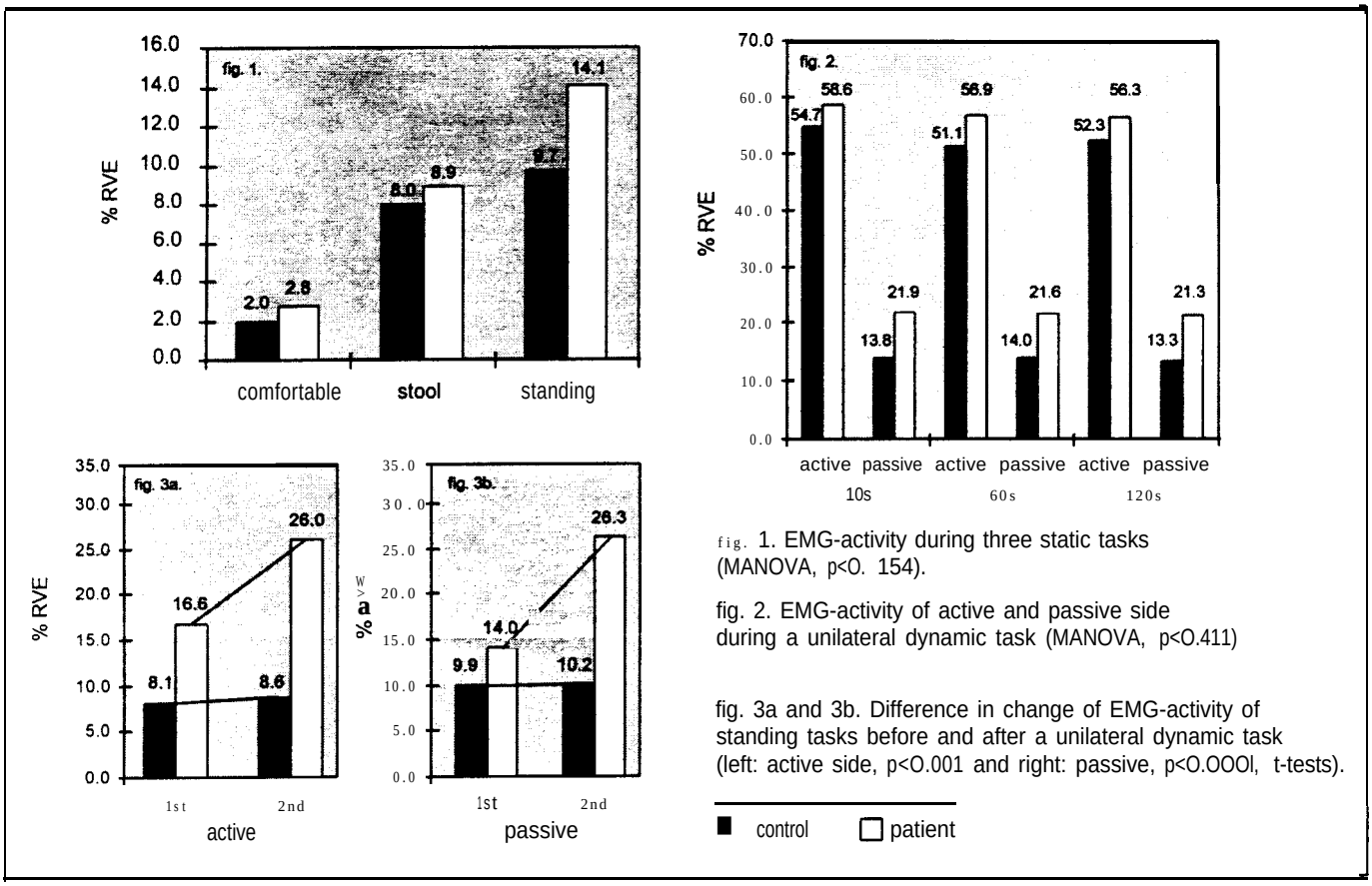

fig. 1. EMG-activity during three static tasks (MANOVA, p<O. 154).

fig. 2. EMG-activity of active and passive side during a unilateral dynamic task (MANOVA, p<O.411)

fig. 3a and 3b. Difference in change of EMG-activity of standing tasks before and after a unilateral dynamic task (left: active side, p<O.001 and right: passive, p<O.OOOl, t-tests).

CONCLUSIONS

1. Statistical significant differences in EMG-activity between WAD-2 patients and healthy controls do not appear during a physical activity, but rather after a physical task, reflecting the inability to relax to a baseline EMG-level.
2. During a unilateral dynamic task WAD-2 patients show a tendency of more co-contractions on the relaxed side than healthy controls, which supports the first conclusion that patients are unable to relax.

DISCUSSION

In this first attempt to find an instrument to identify WAD II-patients , especially the inability to relax after physical activity appeared to be a sensitive indicator. However in determining the diagnostic value of EMG-measurements in WAD II additional information of the differences between aspecific chronic neck pain patients and chronic WAD II patients is needed.

REFERENCES

1. Cassidy J.D. (ed). Scientific monograph of the Quebec Task Force on Whiplash Associated Disorders: Redifining Whiplash and its management, Spine 1995; 20 (8s): 9-73
2. Mathiassen S.E., Winkel J., Hagg G.M. Normalisation of surface EMG amplitude from the upper trapezius muscle in ergonomic studies - A review. Electromyogr. Kinesiol. 1996; 5(4): 197-226
3. Westgard R.H., Bjorklund R. Generation of muscle tension additional to postural muscle load.Ergonomics 1987; 30(6): 91 l-923