

A COMBINATION OF CONSTRAINT-INDUCED THERAPY AND MOTOR CONTROL RETRAINING IN THE TREATMENT OF FOCAL HAND DYSTONIA IN MUSICIANS

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ABSTRACT

Introduction

Focal hand dystonia (FHD) in musicians is a painless task-specific motor disorder characterized by an involuntary loss of control and coordination of individual finger movements. It is associated with decreased cortical inhibition, and maladaptive cortical reorganisation showing fusion of the representational zones of the digits in the primary somatosensory cortex. Research into rehabilitation strategies for FHD is lacking. The aim of this study was to investigate the effects of an innovative behavioural therapy intervention, aimed at normalising movement patterns, in eight musicians affected by FHD.

Methods

Eight musicians volunteered to take part in this retraining protocol. Intensive constraint-induced therapy¹ involved playing specific finger combinations for the dystonic finger, with a splint immobilising adjacent digits to reduce co-contraction. Motor control retraining involved playing without splints at slow speed, while maintaining good movement patterns. Video recordings of the subjects playing an easy and a medium difficulty piece were used for data analysis every two months up to 12 months. The Frequency of Abnormal Movements scale (FAM),² the change in metronome speed achieved during motor control retraining,³ and two ordinal dystonia evaluation scales (DES)^{4,5} were chosen as outcome measures. It was hypothesized that there would be significant differences in the FAM scores and metronome speeds achieved over time.

Results

For the FAM scores, the two-factor repeated measures ANOVA revealed a very significant decrease in the number of abnormal movements (AM) per second of instrumental playing over the 12-month period ($F = 6.32$, $df = 7$, $p < 0.001$) (figure 1). For the DES scores, results from the one-factor repeated measures ANOVA showed a significant improvement in scores over time for both ordinal scales used: the Tubiana and Chamagne Scale ($F = 4.96$, $df = 7$, $p < 0.001$), and the Arm Dystonia Disability Scale ($F = 3.60$, $df = 7$, $p = 0.004$). Tukey's post-hoc tests carried out for the FAM and the DES scores revealed that significant changes occurred after 8 months of therapy. For the metronome speed scores, results from the two-factor repeated measures ANOVA revealed a very significant increase in the speed achieved by subjects over time without occurrence of AM ($F = 20.73$, $df = 7$, $p < 0.001$).

Discussion

These results suggest that a combination of constraint-induced therapy and specific motor control retraining may be a successful strategy for the treatment of musicians' focal hand dystonia, with a significant trend towards normalisation of movement patterns over time. Furthermore, the results suggest that retraining strategies need to be carried out for at least 8 months before statistically significant changes are noted. Tailored task-specific retraining may allow normal cortical segregation to be re-established and normal fine motor control to be restored.

Keywords

Focal dystonia; hand injuries; musicians; motor control; rehabilitation; cortical plasticity; sensory motor performance; movement disorder.

References

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FIGURE 1. Frequency of abnormal movements (FAM) scale: mean values for each piece and all subjects.

