

PHANTOM MOTOR EXECUTION IN THE LOWER LIMB AIDED BY MYOELECTRIC PATTERN RECOGNITION AND VIRTUAL REALITY: A CASE STUDY ON A CHRONIC PHANTOM LIMB PAIN SUFFERER.

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BACKGROUND

Phantom Motor Execution (PME) facilitated by Myoelectric Pattern Recognition (MPR) and Virtual Reality (VR) poses itself as an effective treatment for Phantom Limb Pain (PLP). Notably, a recent clinical trial using the methodology on a population of 14 upper limb amputees with intractable chronic PLP showed statistically significant improvements (approx. 50% reduction) in all the metrics used to measure PLP².

AIM

This study aimed to assess, for the first time, the efficacy of PME facilitated by MPR and VR in reducing PLP in the lower limb.

METHOD

A 70-years-old male with traumatic trans-femoral amputation since 35 years on the right side was treated twice a week, for a total of 23 sessions. Each session consisted of pre-treatment pain assessment, electrode placement, PME treatment (2.0 h) and post-treatment pain evaluation. Pain was assessed in terms of Weighted Pain Distribution (WPD), Numeric Rating Scale (NRS), Pain Perception Frequency (PPF) and Short Form of McGill Pain Questionnaire (SF-MPQ)³.

Moreover, effects on quality of life, disability and participation levels as well as intrusion of PLP in activities of the daily living and sleep were monitored. The PME treatment consisted in using myoelectric signals produced in stump muscles during phantom motions in order to control a VR limb. This was made possible thanks to the MPR system BioPatRec⁴.

RESULTS

Figure 1 shows the visual representation of WPD as it is registered at the beginning of each session: a general, however not complete, reduction of pain can be noticed. The highest levels of PLP (4 and 5), usually present in the evening and at night disappeared over time. As a consequence, length and quality of sleep increase from 2h/night with interruptions to 7h/night undisturbed.

SF-MPQ showed a significant reduction (>50%) in the number of chosen pain descriptors as well as in the Pain Rating Index. Quality of life improved drastically: the patient reported less tiredness, improved mood and regained ability to drive for long distance (> 200 km at a time, not possible before). Moderate levels of PLP (1-3 in Figure 1) are still present, accounting for unchanged score in NRS and PPF.

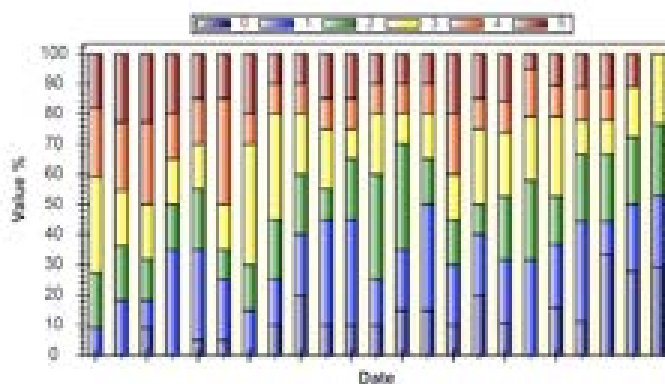


Figure 1. Weighted Pain Distribution (WPD). Each bar represents a treatment session. The pain rating is from 0 to 5 where 5 (red) is the worst possible pain