

EFFECT OF TWO-POINT DISCRIMINATION TRAINING BY INDIVIDUALS WITH LOWER LIMB AMPUTATION ON PHANTOM LIMB PHENOMENA

Schneider S.¹, Koller T.², Meichtry A.¹, Luomajoki H.¹

¹Zurich University of Applied Sciences, School of Health Professions, Institut of
Physiotherapy, Winterthur, Switzerland, ² Reha Klinik Bellikon, Bellikon, Switzerland

Introduction

Phantom limb phenomena (PLP) such as phantom limb pain, non - painful and painful phantom sensations occur in up to 80% of people with amputation. This chronic pain leads to great psychological distress and limitations in activities of daily living.

Phantom limb phenomena are often accompanied by altered brain structure and function, which is visible as reduced tactile acuity. Previous studies in patients with neuropathic conditions such as chronic regional pain syndrome (CRPS) ³ or in patients with upper limb amputation with phantom limb pain ⁴, demonstrated that training of two-point discrimination (TPD) induced an improvement of tactile acuity, a decrease in pain and normalization of cortical reorganization.

Purpose

Does training of two-point discrimination (TPD) threshold reduce phantom limb phenomena in people with lower limb amputation?

Acknowledgments

All patients had to give written informed consent. The ethical approval was given by the Ethical committee of canton Aargau, Switzerland in May 2011.

References

- ³ Moseley, G. L., Zalucki, N. M., & Wiech, K. (2008). Tactile discrimination, but not tactile stimulation alone, reduces chronic limb pain. *Pain*, 137(3), 600-608.
⁴ Flor, H., Elbert, T., Knecht, S., Wienbruch, C., Pantev, C., Birbaumers, N., . . . Taub, E. (1995). Phantom-limb pain as a perceptual correlate of cortical reorganization following arm amputation. [10.1038/375482a0]. *Nature*, 375(6531), 482-484.

Methods

A pilot single-blind placebo controlled, crossover study with eight patients with lower limb amputation with phantom limb phenomena (phantom limb pain, painful or non-painful phantom sensations)

The patients were randomly allocated to an intervention-control and control - intervention sequence. The wash-out period between the two treatments was two weeks.



Intervention

Daily 10-minute training of tactile stimulation on the amputated limb over 14 days. On a digital photo of their stump, the participants had to show the area of stimulation and to distinguish between one or two points of stimulation.



Control (placebo) treatment

Wearing a toweling stocking, 40-minutes daily on their amputated limb for 14 days.

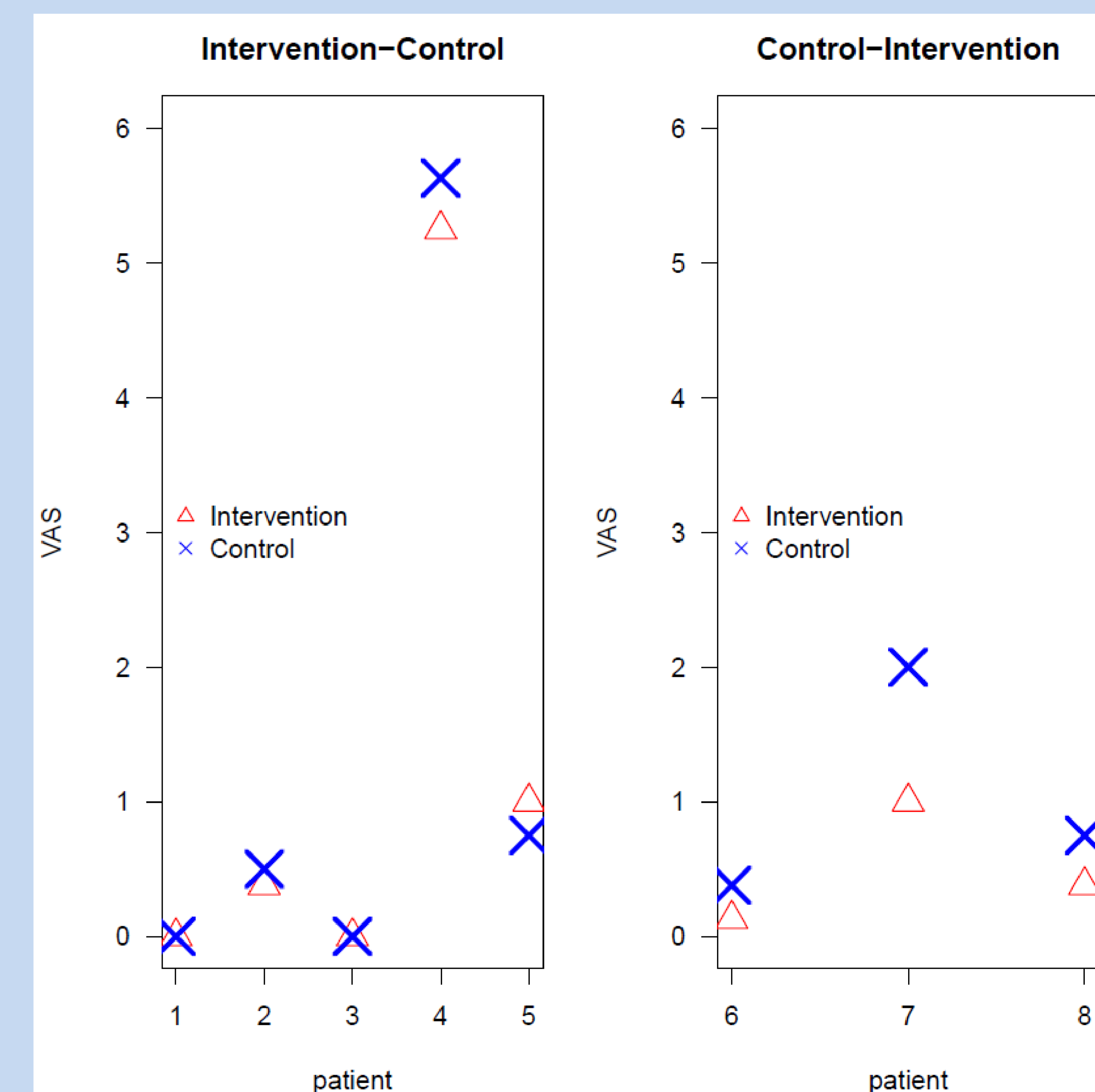
Contact:

Sandra Schneider, MPhty, OMT svomp
sandra.schneider@zhaw.ch
Thomas Koller, MPhty, OMT svomp
thomas.koller@rehabellikon.ch

Results

	Period1	Period2
Group E-K-I	$E(Y_{11}) = \mu$	$E(Y_{12}) = \mu + \pi + \delta + \lambda_I$
Group E-I-K	$E(Y_{21}) = \mu + \delta$	$E(Y_{22}) = \mu + \pi + \lambda_K$

- δ as treatment effect,
 - π period effect
 - $\lambda = \lambda_I - \lambda_K$ as carry-over effect (period-treatment interaction).
- E is the expected value.



Discussion & Conclusion

There was a small, but statistically significant treatment effect for the phantom limb phenomena "painful phantom sensation" (point estimate: 0.29 in VAS, 95% CI: 0.02 – 0.69). In this pilot study, the training of TPD threshold decreased one of the qualities in phantom limb phenomena. The treatment effect is clinically not relevant, but shows a positive tendency.

The results have to be confirmed in further studies with larger sample sizes to prove whether the results are generalizable.