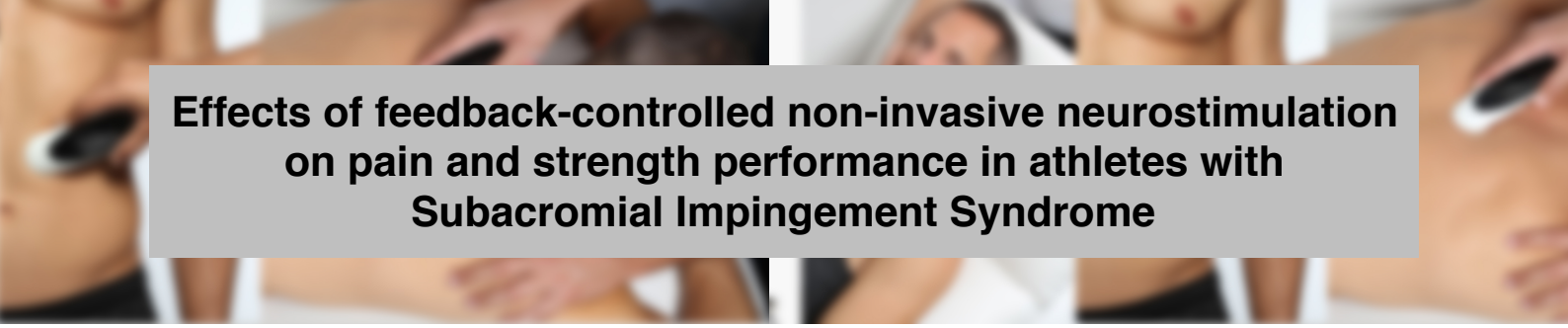


Effects of feedback-controlled non-invasive neurostimulation on pain and strength performance in athletes with Subacromial Impingement Syndrome

University of Potsdam
Dr Dieter Lazic
Dr Steffen Müller

Definition of symptoms

The term impingement syndrome describes rotator cuff impingement to the literature, stating that it results from mechanical impingement of the rotator cuff tendon beneath the anteroinferior portion of the acromion, especially when the shoulder is placed in the forward-flexed and internally rotated position.[1] Symptoms are often presented through a small range of motion, the so called “painful arc”, though abduction between 90 and 120°. [2] In the regions below or above this, the pain becomes lessened or even does not present at all.

Study Design

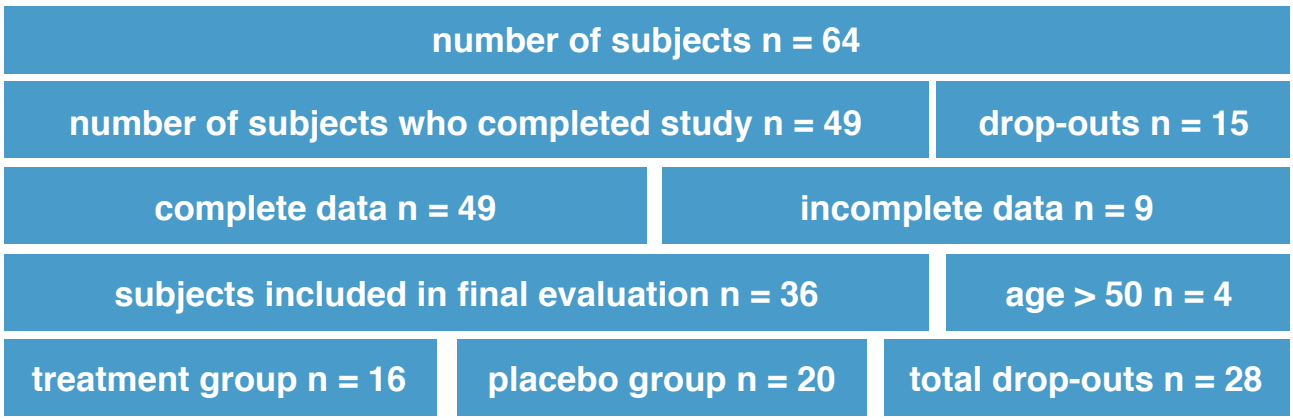
To investigate the effect of feedback-controlled non-invasive neurostimulation on the pain and the power efficiency in sports people with Subcromial Impingement Syndrome, a single blind, randomised study design was chosen. Athletes with the above symptoms were chosen at random and allocated to two different groups. One group received feedback-controlled non-invasive neurostimulation, the other group received a placebo application with the same equipment. Participants in the study did not know at any time which group they belonged to as the treatment plan was identical for both groups, meaning the number of treatments and the length of the treatment sessions were identical. In this study, there were 64 athletes with shoulder pains in one shoulder who were between the ages of 18 and 50.

Procedure

Each study participant underwent a sports medicinal, orthopaedic entry check up at the start of the study to investigate whether they met the entry requirements for the study. Following this, the actual level of pain they experienced was ascertained through a numerical rating scale (NRS) and the initial isokinetic measurement was taken in order to define a basal level. There followed six non-invasive neurostimulation treatments within a period of four weeks. The final therapy session was concluded with further investigation into the actual pain level and a second isokinetic measurement. After four further weeks without treatment, the pain levels and the strength levels were investigated again to enable judgement to be made about the longer term efficacy of the treatment. The pain history of each patient was not only taken on the measurement days as described above, but also before and after each treatment.

[1] Neer CS 2nd. Anterior acromioplasty for the chronic impingement syndrome in the shoulder: a preliminary report. J Bone Joint Surg Am. 1972 Jan. 54(1):41-50.

[2] Birrer R.B., O’Connor F.G., Sports medicine for the primary care physician. 3rd edition, Boca Raton: RCR PRESS, 2004: p507- 10



Measurement

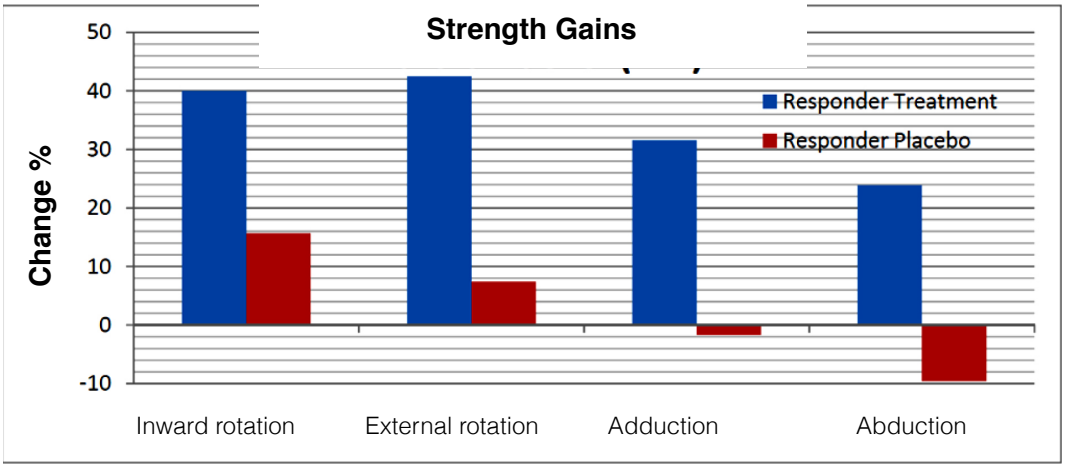
All isokinetic measurements took place on the Con-trex® Multi Joint Dynamometer under the same conditions.

Inward Rotation	External Rotation	Adduction	Abduction
Concentric	Concentric	Concentric	Concentric
60°+180°/s	60°+180°/s	60°+180°/s	60°+180°/s
Isometric	Isometric	-	-

Results

The resting pain prior to the strain test was 2.8 in the treatment group and climbed to 4.1 points after exercise on the NRS. After the investigation period, not just the resting pain halved, but also the pain experienced under strain was below the original resting values experienced at the start of the study. The follow up measurements, four weeks after the investigation were used to show if the results achieved during therapy lasted over time or if the participant began to deteriorate to the prior pain levels again. Contrary to expectations, the pain levels in the treatment group actually continued to fall, while the effects on the placebo group had a tendency towards regression. The greatest pain relieving effect was therefore recorded a further four weeks after the treatment period.

An enormous strength increase of up to 42% in the participants who were treated with feedback-controlled non-invasive neurostimulation compared to small strength increase or even reduction in strength in the group who were not treated with feedback-controlled non-invasive neurostimulation give further evidence of success in the treatment. In summary, the following results can be documented. Six treatments with low frequency feedback-controlled non-invasive neurostimulation affected the perception of pain in the terms of a measurable soothing effect. There was a reduction in resting pain of 69% on average and a reduction of the pain under strain of 62% on average at the closing measurements of the study which allows us to surmise there was a possible further reverberating effect in the treatment group.



Conclusion

A conclusion for practice is that the clinician who takes the individual reaction pattern of a patient into account and fully utilises the treatment principles of low frequency electrotherapy, in this case feedback-controlled non-invasive neurostimulation therapy, should be able to achieve even more effective pain relief in their day to day clinical life.