Cerebral and clinical effects of carpal tunnel syndrome

Background
Carpal tunnel syndrome (CTS), where the median nerve is compressed at the wrist, is the most common compression neuropathy. Patients experience discomfort, pain and impaired function in the hand. The diagnosis is often clinical and the treatment is surgical decompression of the nerve. The need for electroneurography (ENG) in the diagnostic work-up is controversial. Furthermore, it is well known that a significant number of patients operated for CTS do not improve after surgery. Possible reasons for lack of improvement after surgery is wrong diagnosis and incorrect surgery. It is well known that a change in afferent signaling from the hand to the brain, seen for example in patients with nerve injuries or neuropathy, cause cerebral changes. Thus, one possibility for sub-optimal outcome could be changes in the brain caused by CTS. Brain plasticity can be used to improve outcome in patients with nerve injuries, i.e. guided plasticity.

Aims
Can multifrequency vibrometry be used to diagnose CTS? Do CTS result in cerebral changes? Can CTS be treated with guided plasticity?

Methods
Patients with ENG verified CTS are examined using multifrequency vibrometry where the ability to detect vibrations at different frequencies are assessed. The results are combined with clinical tests.
Guided plasticity using cutaneous forearm anesthesia (EMLA) is applied to patients with ENG verified CTS who are randomized to EMLA or placebo treatment for 8 weeks.
Functional MR using BOLD technique at 3T is used to assess cerebral changes following CTS and cerebral effects of guided plasticity. Furthermore, connectivity analyses are done on the functional MR images to further assess cerebral changes in patients.

Preliminary results
Multi-frequency vibrometry can diagnose CTS. However, it can’t assess the severity of the nerve compression.
Guided plasticity using EMLA leads to a slight decrease of symptoms. However, the improvement in treatment was not significant in comparison with placebo treatment.
All patients (n=25) in the studies on cerebral effects of CTS and guided plasticity have been examined. However, data have not been analyzed.

Significance
Multifrequency vibrometry can be used to diagnose CTS.
Guided plasticity using cutaneous anaesthesia does not improve symptoms in patients with CTS.

Published studies
2. Vibration thresholds in carpal tunnel syndrome assessed by multiple frequency vibrometry: A case-control study.