4337-A-2227

Eye-hand-coordination assessment as an objective tool for functional outcome evaluation after peripheral nerve injury and repair

Per Nordmark

Background and Methods: The current clinically used assessments for evaluation of functional outcome after injuries affecting nerves that support the hands sensorimotor control include density of reinnervated afferents (2PD) and their mechanical thresholds (Semmes-Weinstein-monofilaments), regained motor function (active force/ROM) or batteries of compound manual tests performed on time. However, the tactile sensory deficit in a hand after nerve injury is partly compensated by increased dependence on visual guidance for the hand, suggestive of a changed eye-hand-coordination behavior.

To assess such a change after peripheral nerve injury, we put together an equipment that simultaneously samples gaze direction, hand location and forces applied when performing a manual task resembling the nine-hole-peg-test. Here, we show the ability of this method to detect changes in eye-hand-coordination behavior in healthy individuals with simulated peripheral nerve injury.

Results and Conclusion: In the first study using this method, five healthy individuals were investigated. They performed the manual task with their left and right hands in separate sessions, and then again after simulation of a sensory deficit of a low median nerve injury with digital nerve block induced to their thumb, index and middle finger.

Analyses of the participants eye-hand-coordination show that a simulated nerve injury, i.e., lack of tactile sensory feedback, forces the participants to heavily rely on gaze for manual control during peg-pick-up-, hand-movement- and peg-put-down-phases of the manual task.

Future studies using this equipment will investigate changes in eye-hand-coordination of patients with digital, median or ulnar nerve injuries to evaluate functional outcome of treatment.