

Case report: Ultrasound-guided median nerve electrical stimulation on functional recovery of hemiplegic upper limb after stroke

ABSTRACT

Background: Functional restoration of hemiplegic upper limbs is a difficult area in the field of neurological rehabilitation. Electrical stimulation is one of the treatments that has shown promising advancements and functional improvements. Most of the electrical stimulations used in clinical practice are surface stimulations. In this case, we aimed to investigate the feasibility of a minimally invasive, ultrasound-guided median nerve electrical stimulation (UG-MNES) in improving the upper limb motor function and activity of a patient with right-sided hemiparesis. Case presentation: A 65-year-old male recovering from a left massive intracerebral hemorrhage after open debridement hematoma removal had impaired right limb movement, right hemianesthesia, motor aphasia, dysphagia, and complete dependence on his daily living ability. After receiving 3 months of conventional rehabilitation therapy, his cognitive, speech, and swallowing significantly improved but the Brunnstrom Motor Staging (BMS) of his right upper limb and hand was at stage I-I. UG-MNES was applied on the right upper limb for four sessions, once per week, together with conventional rehabilitation. Immediate improvement in the upper limb function was observed after the first treatment. To determine the effect of UG-MNES on long-term functional recovery, assessments were conducted a week after the second and fourth intervention sessions, and motor function recovery was observed after 4-week of rehabilitation. After completing the full rehabilitation course, his BMS was at stage V-IV, the completion time of Jebsen Hand Function Test (JHFT) was shortened, and the scores of FuglMeyer Assessment for upper extremity (FMA-UE) and Modified Barthel Index (MBI) were increased. Overall, the motor function of the hemiplegic upper limb had significantly improved, and the right hand was the utility hand. Electromyography (EMG) and nerve conduction velocity (NCV) tests were normal before and after treatment. Conclusion: The minimally invasive, UG-MNES could be a new alternative treatment in stroke rehabilitation for functional recovery of the upper limbs.