

## **Ultrasound-guided median nerve electrical stimulation to promote upper limb function recovery after stroke**

### **ABSTRACT**

Peripheral electrical nerve stimulation enhances hand function during stroke rehabilitation. Here, we proposed a percutaneous direct median nerve stimulation guided by ultrasound (ultrasound-guided median nerve electrical stimulation, UG-MNES) and evaluated its feasibility and effectiveness in the treatment of stroke patients with upper limb extremity impairments. Sixty-three stroke patients (2-3 months of onset) were randomly divided into control and UG-MNES groups. Both groups received routine rehabilitation and the UG-MNES group received an additional ultrasound-guided electrical stimulation of the median nerve at 2 Hz, 0.2 ms pulse-width for 20 minutes with gradual intensity enhancement. The Fugl-Meyer Assessment for upper extremity motor function (FMA-UE) was used as the primary outcome. The secondary outcomes were the Functional Test for the Hemiplegic Upper Extremity (FTHUE-HK), Hand Function Rating Scale, Brunnstrom Stages, and Barthel Index scores for motor and daily functions. All the participants completed the trial without any side effects or adverse events during the intervention. After 4 weeks of intervention, the functions of the upper limbs on the hemiplegic side in both groups achieved significant recovery. Compared to the control group, all evaluation indices used in this trial were improved significantly in the UG-MNES group after 2 and 4 weeks of intervention; particularly, the first intervention of UG-MNES immediately improved all the assessment items significantly. In conclusion, the UG-MNES is a safe and feasible treatment for stroke patients with upper limb extremity impairments and could significantly improve the motor function of the affected upper limb, especially in the first intervention. The UG-MNES could be an effective alternative intervention for stroke with upper limb extremity impairments.