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A RANDOMISED CONTROL TRIAL COMPARING THE FUNCTIONAL OUTCOMES IN PATIENTS WITH IMMEDIATE POSTOPERATIVE HAND STIFFNESS MOBILISED BY CONVENTIONAL HAND THERAPY AND A NOVEL AUTOMATED ASSISTIVE GLOVE

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Introduction:

Postoperative hand stiffness is a significant problem encountered in trauma related to the upper extremity. Patients often require rigorous hand therapy, the results of which are often unpredictable. Our study attempts to develop a portable, lightweight, low-cost, novel motorized assistive glove designed in house and test the null hypothesis that there is no significant improvement in the functional outcomes than conventional therapy.

Methods and Materials:

Patients with fractures, tendon, and neurovascular injuries who developed hand stiffness at three weeks were recruited, randomized, and allocated to trial. The device includes a Hand in Motion-2 motor, a synthetic polymer glove, cables, and a power bank. The glove drives the fingers by continuous passive movement and has one hour/twice-daily sessions of mobilization. In the conventional group, patients will be under the physio and occupational therapist's guidance, who will follow the standard mobilization protocols. Intervention is provided for six weeks. All the patients were assessed for total active motion and Quick DASH scores at the baseline, six weeks, and three months.

Result and Discussion:

100 patients (control group n=50; study group N=50) were randomized; no patients were lost to follow up. An Independent T-test and non-parametric Wilcoxon rank-sum test were applied for the Quick dash score and TAM. The mean TAM and Quick dash score in the study group improved from ($137.86 \pm 14.8^\circ$, 55.19 ± 11.3) to ($233.3 \pm 10.0^\circ$, 8.25 ± 9.1) respectively. The mean TAM and Quick dash score in the control group improved from ($144.68 \pm 20.3^\circ$, 57.19 ± 11.4) to ($209.14 \pm 18.4^\circ$, 25.13 ± 15.2) respectively. Since the p-value <0.05, the study rejects the null hypothesis and concludes that there is a significant difference in the two groups (study and control) across TAM and Quick Dash scores from 3 weeks to 3 months. No harms/adverse effects were reported in the study.

Conclusion:

The automated assistive device therapy has a potential to promote functional gains for patients with postoperative hand stiffness; this approach should be widely applied within the routine clinical

practice as the assistive glove makes physical therapy more accessible, reduction of the treatment cost, assist or augment activity at home by providing safer human-device interactions, reduce repeated hospitalization for mobilization and thus improve patient care.

References:

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