Robot-assisted movement training compared with conventional therapy techniques for the rehabilitation of upper-limb motor function after stroke.


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https://doi.org/10.1053/apmr.2001.33101

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Abstract

Lum PS, Burgar CG, Shor PC, Majmundar M, Van der Loos M. Robot-assisted movement training compared with conventional therapy techniques for the rehabilitation...
Objective: To compare the effects of robot-assisted movement training with conventional techniques for the rehabilitation of upper-limb motor function after stroke. Design: Randomized controlled trial, 6-month follow-up. Setting: A Department of Veterans Affairs rehabilitation research and development center. Participants: Consecutive sample of 27 subjects with chronic hemiparesis (>6 mo after cerebrovascular accident) randomly allocated to group. Interventions: All subjects received twenty-four 1-hour sessions over 2 months. Subjects in the robot group practiced shoulder and elbow movements while assisted by a robot manipulator. Subjects in the control group received neurodevelopmental therapy (targeting proximal upper limb function) and 5 minutes of exposure to the robot in each session. Main Outcome Measures: Fugl-Meyer assessment of motor impairment, FIMâ“¢ instrument, and biomechanic measures of strength and reaching kinematics. Clinical evaluations were performed by a therapist blinded to group assignments. Results: Compared with the control group, the robot group had larger improvements in the proximal movement portion of the Fugl-Meyer test after 1 month of treatment ($P<.05$) and also after 2 months of treatment ($P<.05$). The robot group had larger gains in strength ($P<.02$) and larger increases in reach extent ($P<.01$) after 2 months of treatment. At the 6-month follow-up, the groups no longer differed in terms of the Fugl-Meyer test ($P>.30$); however, the robot group had larger improvements in the FIM ($P<.04$). Conclusions: Compared with conventional treatment, robot-assisted movements had advantages in terms of clinical and biomechanical measures. Further research into the use of robotic manipulation for motor rehabilitation is justified. © 2002 by the American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation

Keywords
Arm; Cerebrovascular accident; Movement; Rehabilitation; Robotics; Therapy
Supported by the Department of Veterans Affairs Merit Review (grant no. B2056RA).

No commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit upon the authors or upon any organization with which the authors are associated.

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