EFFECTS OF BILATERAL RESISTANCE-INDUCED ARM MOVEMENT TRAINING ON ARM MOTOR FUNCTION IN CHRONIC STROKE

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INTRODUCTION

This study designed an arm movement trainer, called bilateral resistance-induced arm movement trainer, for stroke arm motor rehabilitation. The arm movement trainer integrated robot-aided therapy with bilateral arm movement and arm strength training strategies (Figure 1). The purpose of this study was to analyze the effects of bilateral resistance-induced arm movement training on arm motor recovery in chronic strokes.

METHODS

Twenty unilateral chronic strokes, length of onset over 6 months, were recruited in this study. Each subject received 8 weeks' arm trainer training program and followed up for 8 weeks. The pretest, posttest and follow-up measures of clinical arm motor function and reaching kinematics were compared and analyzed. Data analysis was performed by using repeated ANOVA and post hoc analysis.

RESULTS AND DISCUSSION

After comparing the pretest and posttest of arm motor function and reaching kinematics, We found that arm motor function were significantly improved in total arm strength, grip strength, Fugl-Meyer upper limb scale (Table 1). Reaching kinematics was significantly improved in movement time, normalized jerk score, pick velocity, and percent time to pick velocity (Table 2). There were not significant differences between posttest and follow-up measures in arm motor function and reaching kinematics. Findings from this study might provide evidence that robot-aided therapy combined with bilateral resistance movement training would promote inter-hemispheric disinhibition likely to allow reorganization by sharing of normal movement commands from the undamaged hemisphere. Such "overflow" effect may be more marked under movement with resistance. It is suggested that effect of bilateral resistance-induced arm movement training may also promote a balancing effect on between-hemisphere cortical motor excitability that is associated with brain reorganization and finally contribute to motor recovery.

CONCULUSIONS

Bilateral resistance-induced arm movement trainer might enhance arm motor recovery for chronic strokes. Such simple robot-assisted devices will be more feasible in clinical application for stroke arm rehabilitation.

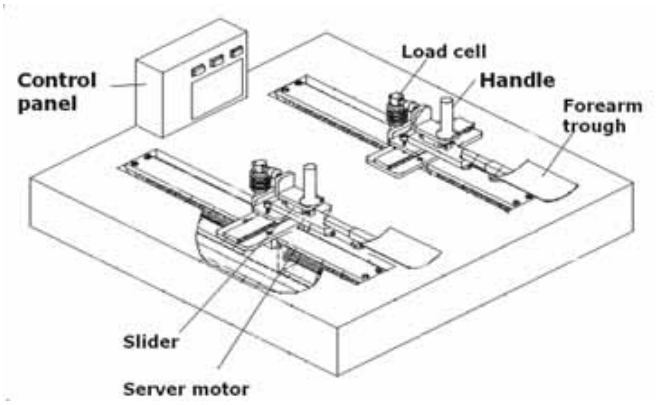

Figure 1. bilateral resistance-induced arm movement trainer

Table1: Measures of arm motor function among pretest, posttest and follow-up (N=20)

Motor	Pre-test	Post-test	Follow-up	F	*P*
FMS	32.70(15.26)	35.55(14.50)	35.35(14.63)	15.09	.0001
FAT	1.75(2.24)	1.80(2.23)	1.80(2.23)	1.00	.33
GS(kg)	7.54(6.60)	9.75(7.32)	9.27(7.19)	5.65	.009
TAS(kg)	10.85(8.37)	15.71(10.67)	16.59(11.00)	11.41	.0001
MAS	0.95(0.74)	0.77(0.63)	1.00(0.70)	1.18	.31

FMS: Fugl-Meyer Score FAT: Frenchay Arm Test GS: Grip strength
TAS: Total arm strength MAS: Modified Ashworth Scale

Table 2:Measures of reaching kinematics among pretest, posttest and follow-up (N=15)

Kinematics	Pre-test	Post-test	Follow-up	F	*P*
MT(sec)	1.24(0.45)	0.80(0.29)	1.16(1.02)	4.91	0.015
PV(cm/sec)	81.14(34.71)	100.40(33.3)	82.48(36.46)	4.39	0.035
PTPV(%)	30.42(10.33)	37.82(11.66)	31.90(11.66)	6.70	0.004
NJS	173.35(11.41)	76.15(69.44)	136.94(93.95)	5.68	0.008

MT: Movement time PV: Pick velocity PTPV: Percent time to pick velocity NJS: Normalized jerk score

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