

뇌신경재활

게시일시 및 장소 : 10 월 18 일(금) 13:15-18:00 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 15:45-16:30 Room G(3F)

P 2-78

Effect of Augmented Reality Occupational Therapy for Upper Limb Rehabilitation in Subacute Stroke

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Objective

To evaluate the effectiveness of augmented reality occupational therapy (AR-OT) in recovery of post-stroke patients in comparison with conventional occupational therapy (C-OT)

Design

Randomized controlled trial in a rehabilitation institute tertiary referral hospital

Participant

First-ever subacute stroke patients (within 6 month) with unilateral upper limb weakness (Brunnstrom stage 2~6)

Interventions

The experimental treatment was based on AR-OT, whereas control treatment was based on same amount of C-OT. Both treatments were performed for 1 hour/day, 5days/week during 2weeks.

Main outcome measure

Fugl-Meyer upper extremity scale(F-M)(primary outcome), box and block test, modified barthel index(MBI), hand strength, berg balance test, motor activity log(MAL), EQ-5D-3L, NASS, Hand response.

Statistics

Mann-Whitney U test were used to determine significant difference of continuous variables between two groups. Chi-square test were used to determine significant difference of categorical variables between two groups. Wilcoxon test was used for comparison within each group. All statistical analysis were performed with the IBM SPSS Statistics, version 24.0(Armonk, NY: IBM Corp). The statistical significance level was set at p-value<0.05.

Results

We prospectively enrolled 17 subacute stroke patients. The baseline characteristics were not different between groups except frequency of DM. After 2 weeks of treatment, there was no significant difference between two groups (AR-OT group versus C-OT group). However, in group comparison, AR-OT group show statistically significant improvement in F-M score, hand strength, EQ-5D-3L after treatment which is not significant in C-OT group.

Conclusion

In our study, AR-OT showed comparable effect to C-OT. In AR-OT, upper limb motor recovery and quality of life showed significant improvement which was not shown in C-OT. Considering the motivation of patients, less burden of therapist, and effective performance as home-based or group-therapy, AR-OT might be promising therapy for upper limb rehabilitation.

Table 1. Demographic and clinical characteristics of the patients

	Total (n=17)	AR-OT (n=10)	C-OT (n=7)	<i>p</i> -value
Age(year old)	67.8 (57.5-80.5)	67.1 (56.2-78.0)	68.7 (58.0-84.0)	0.740 ^{a)}
Sex				0.162 ^{b)}
Male	11 (80%)	8 (80%)	3 (42.9%)	
Female	6 (20%)	2 (20%)	4 (57.1%)	
DM	4 (0%)	0 (0%)	4 (57.1%)	<0.05 ^{b)}
HTN	14 (70%)	7 (70%)	7 (100%)	0.228 ^{b)}
Heart disease	1(10%)	1(10%)	0 (0%)	1.0 ^{b)}
Lung disease	0 (0%)	0 (0%)	0 (0%)	
Depression	2 (20%)	2 (20%)	0 (0%)	0.485 ^{b)}
NIHSS	4.6 (2.5-6.5)	4.2 (2.0-6.3)	5.3 (4.0-)	0.381 ^{a)}
MMSE	22.8 (17.0-27.0)	23.7 (20.8-27.5)	21.4 (15.0-27.0)	0.364 ^{a)}
B-S stage(arm)	4.6 (4.3-5.0)	4.2 (3.0-5.0)	5.1 (5.0-5.0)	0.174 ^{a)}
B-S stage(hand)	4.8 (4.3-5.0)	4.4 (4.0-5.0)	5.1 (5.0-5.0)	0.174 ^{a)}

Values are presented frequency(%) or mean(interquantile range). AR-OT; augmented reality occupational therapy, C-OT; conventional occupational therapy, B-S; Brunnstrom, NIHSS; NIH Stroke scale, MMSE; mini mental status evaluation.

a) Mann-Whitney U test, b) Chi-sqaure test

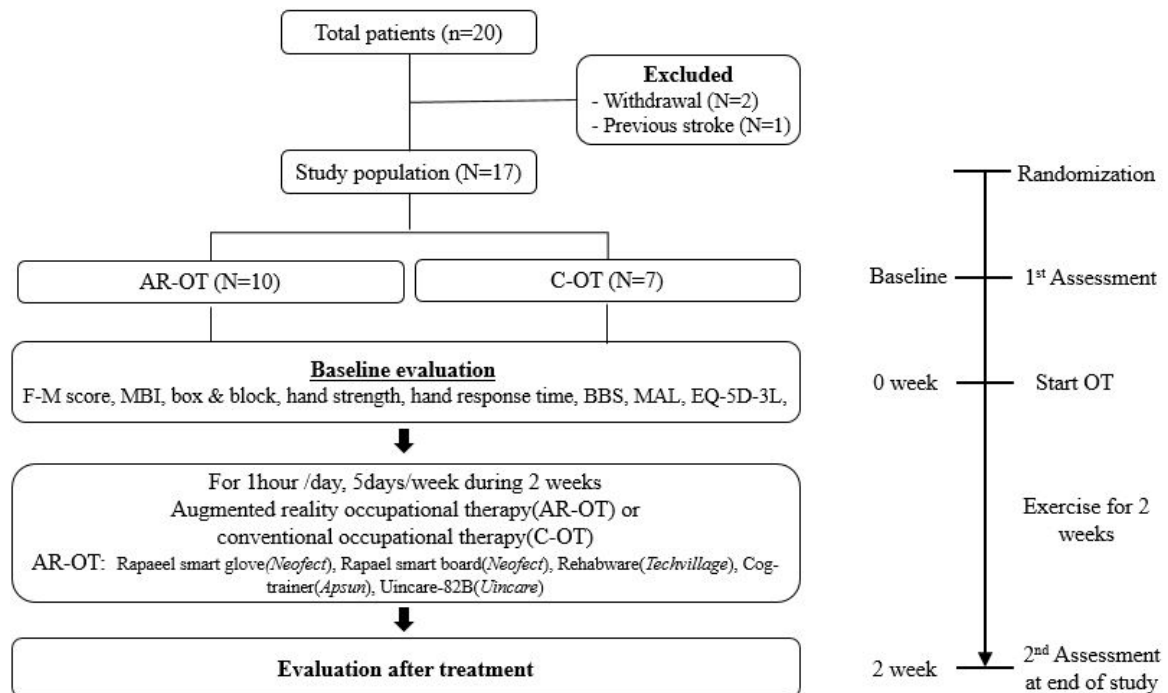
Table 2. Effect of AR-OT and C-OT on outcomes in all patients with stroke

	AR-OT (N = 10)			C-OT (N = 7)		
	Before	After	p-value	Before	After	p-value
F-M (total)	101.9 (84.0-118.3)	111.4 (103.8-119.3)	<0.05 ^{a)} *	113.0 (112-119)	115.9 (112.0-120.0)	0.1 ^{a)}
F-M (above wrist)	28.2 (21.8-36.0)	32.4 (28.3-36.0)	<0.05 ^{a)} *	32.3 (29.0-36.0)	33.4 (29.0-36.0)	0.16 ^{a)}
F-M (wrist)	5.8 (0.0-9.0)	7.5 (5.0-9.3)	0.06 ^{a)}	8.6 (9-9)	8.7 (9.0-10.0)	0.32 ^{a)}
F-M (hand)	5.7 (2.0-9.0)	7.6 (6.3-9.0)	0.07 ^{a)}	8.6 (8-9)	8.7 (9.0-9.0)	0.32 ^{a)}
F-M (coordination)	2.7 (0.0-5.0)	4.1 (3.8-5.0)	<0.05 ^{a)} *	4.1 (4-5)	4.3 (4.0-5.0)	0.32 ^{a)}
Box and block	9.3 (0.0-18.8)	18 (1.8-28.5)	<0.05 ^{a)} *	19.1 (1.0-38.0)	23.7 (10.0-44.0)	<0.05 ^{a)} *
MBI	40 (27.5-51.8)	52.6 (35.5-68.5)	<0.05 ^{a)} *	38.6 (14.0-63.0)	46.6 (21.0-76.0)	<0.05 ^{a)} *
Hand strength	6.7 (1.5-11.3)	11.0 (4.0-16.3)	<0.05 ^{a)} *	9.6 (2-16)	11.6 (5.0-20.0)	0.07 ^{a)}
Pinch strength	1.1 (0.0-2.3)	2.0 (0.75-3.0)	<0.05 ^{a)} *	1.0 (0.0-1.0)	1.7 (1.0-3.0)	0.10 ^{a)}
BBS	25.8 (10.3-37.3)	38.6 (29.3-50.3)	<0.05 ^{a)} *	27.1 (1.0-50.0)	35.6 (6.0-54.0)	<0.05 ^{a)} *
MAL(AOU)	0.5 (0.0-0.7)	1.3 (0.1-2.0)	<0.05 ^{a)} *	1.1 (0.1-2.5)	1.9 (0.6-3.9)	<0.05 ^{a)} *
MAL(QOM)	0.5 (0.0-0.8)	1.4 (0.1-2.2)	<0.05 ^{a)} *	1.2 (0.1-2.9)	1.9 (0.4-4.0)	<0.05 ^{a)} *
EQ-5D-3L	43.0 (30-60)	60.5 (50.0-82.5)	<0.05 ^{a)} *	70 (50-90)	57.1 (50.0-70.0)	0.17 ^{a)}
NASS		1.5 (1-2)			1.2 (1.0-1.3)	0.48 ^{b)}
Hand response	1.3 (0.6-2.0)	0.9 (0.4-1.4)	0.09 ^{a)}	1.6 (0.7-2.5)	1.3(0.6-2.0)	<0.05 ^{a)} *

Values are presented mean (interquartile range)

F-M; Fugl Meyer assessment of motor recovery, MBI; modified bathel index, BBS; Berg balance test, MAL; motor activity log, AOU; amount of use, QOM; quality of movement. AR-OT; augmented reality occupational therapy, C-OT; conventional occupational therapy.

a) Wilcoxon test b) Mann-Whitney U test, *: p-value<0.05



Figures 1. Flowchart of participants through the study