



Eun Ju Na, Eun Young Kang, Sung Hoon Lee, Youn Kyung Cho, Donghyuk Kim, Soo-hyun Soh,
Sumin Lee, Joonwon Seo, Seungok Nam
Department of Rehabilitation Medicine, Kwangju Christian Hospital

Introduction

- Post-stroke upper-limb hemiparesis and cognitive impairment severely limit daily functioning, and conventional occupational therapy (COT) often lacks sufficient training intensity.
- Although robot-assisted therapy (RAT) has shown promising results in improving upper-limb recovery, existing trials have largely excluded patients with significant cognitive or severe motor deficits.
- This study therefore retrospectively compared the effects of RAT versus COT, aiming primarily to investigate changes in motor and neurocognitive function within a real-world cohort.

Materials and Methods

Participants

- Single center, Retrospective comparative cohort study (Dec. 2024 and Dec. 2025)

Inclusion criteria

- (1) First-ever ischemic or hemorrhagic stroke
- (2) Within 6 months of stroke onset

Exclusion Criteria

- (1) Onset duration > 6 months
- (2) Tetraplegia or paraplegia
- (3) Other CNS lesions (e.g. Tumor, TBI, SCI)
- (4) Musculoskeletal conditions
- (5) Missing baseline or 4-week follow-up assessments

Intervention

- Total: 60 min/day, 5 days/week, 4 weeks (40 sessions)
- RAT group: 30 min RAT + 30 min COT
- COT group: 60 min standard COT

Equipment

- Rebliss Planar® (H-ROBOTICS Inc., Korea): end-effector type device enabling 2-DOF horizontal reaching movements with real-time visual feedback

Outcome Measures

- Upper-limb motor and Global function: MBI, FIM, FMA-UE, Grip strength, MFT
- Neurocognition: Boston Naming Test, Stroop Test, Clock Drawing Test, Construction Test

Results

Table 1. Baseline demographics

Variable	RAT (n=8)	COT (n=16)	P
Sex			0.66
Male	6	9	
Female	2	7	
Age (years)	69.00 ± 11.28	66.19 ± 10.21	0.56
Diagnosis			0.39
Hemorrhage	2 (25.0%)	8 (50.0%)	
Infarction	6 (75.0%)	8 (50.0%)	
Paretic side			0.19
Left	1 (12.5%)	7 (43.8%)	
Right	7 (87.5%)	9 (56.2%)	
MMSE	12.88 ± 10.53	19.94 ± 11.30	0.14

Continuous variables shown as mean ± SD; categorical as n (%)

Table 2. Motor and Global Function between group comparison Δ (Post-Pre).

Outcome	RAT Δ	COT Δ	P
MBI	30.75 ± 26.49	26.06 ± 16.47	0.66
FIM	20.62 ± 14.70	18.88 ± 17.55	0.65
FMA-UE	15.38 ± 19.21	5.56 ± 8.89	0.35
Grip Strength	12.12 ± 20.99	8.25 ± 9.17	0.65
MFT	7.50 ± 10.00	3.38 ± 4.87	0.65

Continuous outcome shown as mean ± SD

Table 3. Neurocognitive function between group comparison Δ (Post-Pre).

Outcome	RAT Δ	COT Δ	P
Language			
Boston Naming Test	3.38 ± 3.20	0.62 ± 1.50	<0.01
Execution			
Stroop test Color	9.00 ± 6.44	4.06 ± 9.45	0.05
Stroop test Word	17.25 ± 11.55	6.12 ± 7.50	0.03
Stroop test Color-Word	8.88 ± 13.15	4.25 ± 5.32	0.37
Visuospatial and Construction			
Right-Left Orientation Test	0.75 ± 0.89	-0.19 ± 0.75	0.04
Stick construction and Visual Recognition test	2.19 ± 4.22	1.91 ± 3.21	0.83
Multi – domain			
Clock Drawing Test	1.00 ± 1.20	0.62 ± 1.02	0.57

Continuous outcome shown as mean ± SD

Conclusion

- Both groups showed significant improvement after 4 weeks; however, the RAT group demonstrated greater gains in neurocognitive domains—including Language, Executive, and Visuospatial/Construction—than the COT group.
- These findings suggest that intensive, goal-directed, feedback-based robotic training may enhance frontoparietal and sensorimotor network engagement, contributing to additional cognitive recovery, although further studies are required to clarify the underlying mechanisms.