The Effects of Treadmill Gait Training with Obstacle Crossing on Temporal and Spatial Gait Parameters in Elderly Patients with Post Stroke Hemiplegia

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I. Introduction

Background

Elderly patients with hemiplegia have less time to support the paralyzed leg during walking, resulting in an asymmetric gait cycle and decreased gait time (Kirker, S. G. B et al., 2011). However, gait time alone is limited in determining the recovery of gait function in elderly patients with hemiplegia (Lord SE, Halligan PW, and Wad DT, 1998).

In addition, it is desirable to measure and evaluate not only temporal gait factors, but also spatial gait factors in elderly patients with hemiplegia because time and cycle of gait are not symmetrical and abnormal gait patterns (Patterson KK et al., 2010).

Purpose

The purpose of this study was to determine the effects of treadmill gait training with obstacle crossing on temporal and spatial gait parameters in elderly patients with post stroke hemiplegia.

II. Methods

Subjects

Table 1. Physical characteristics and equivalence check of subjects.

Variables	TOG (n=7)	TGG (n=7)	CON (n=7)	F	p
Sex (male/female)	4/3	4/3	4/3	.00	.99
Age (year)	75.00±8.35	76.57±6.21	78.29±4.82	.43	.66
Stroke type (infarction/hemorrhage)	6/1	6/1	4/3	2.79	.09
Affected side (right/left)	6/1	2/5	3/4	1.00	.39
Onset time (month)	32.57±21.72	56.57±27.24	59.71±20.21	2.85	.09
MMSE-K (score)	26.43±1.13	27.43±1.51	26.48±1.44	1.78	.20

Means ± SD.
TOG: treadmill gait training with obstacle crossing group, TGG: treadmill gait training group, CON: control group, MMSE-K: Korean version of mini mental status examination

Study design

20 minutes, three times a week, and 8 weeks gait training

Pre   Post (8 weeks)

✓ Temporal gait parameters: 10 m walk test, gait velocity, stride time, step time
✓ Spatial gait parameters: stride and step length, stance and swing phase rate
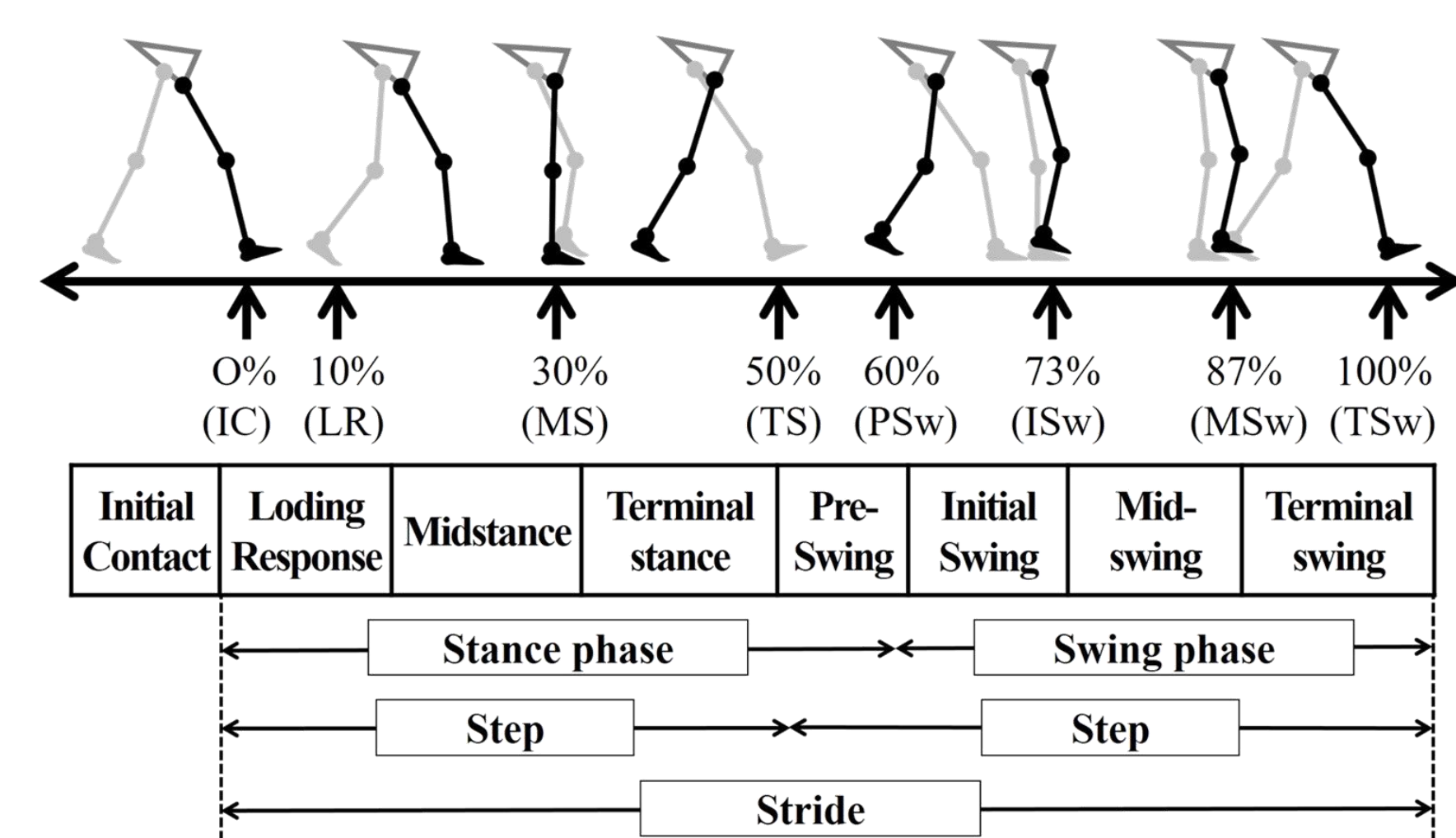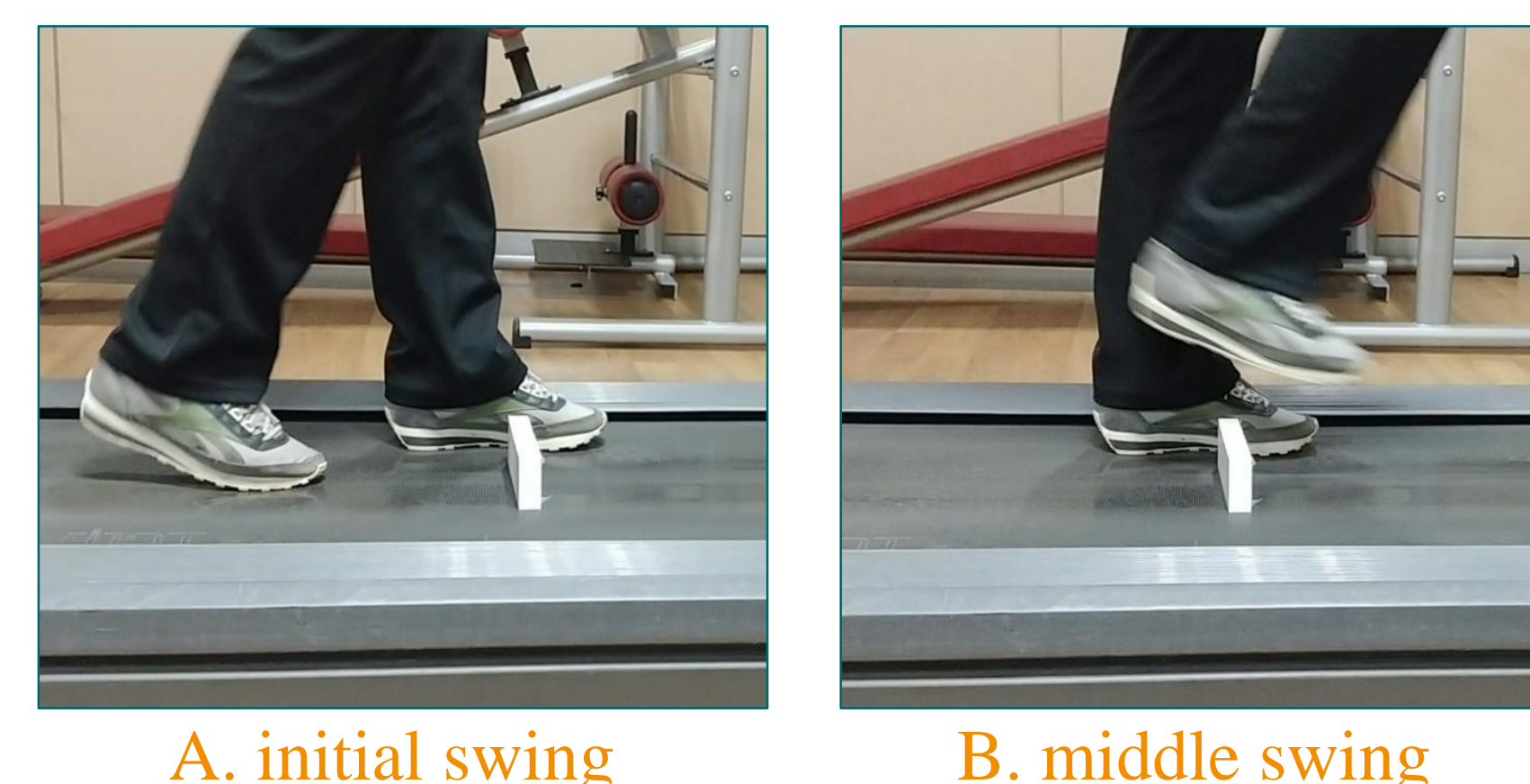
Measurements

O% (IC)   10% (LR)   30% (MS)   50% (TS)   60% (PSw)   73% (ISw)   87% (MSw)   100% (TSw)

Initial Contact	Loding Response	Midstance	Terminal stance	Pre-Swing	Initial Swing	Mid-swing	Terminal swing

Stance phase / Swing phase
Step / Step
Stride

✓ Temporal gait parameters: 10 m walk test, gait velocity, stride time, step time
✓ Spatial gait parameters: stride length, step length, stance phase rate, swing phase rate
✓ Dartfish program

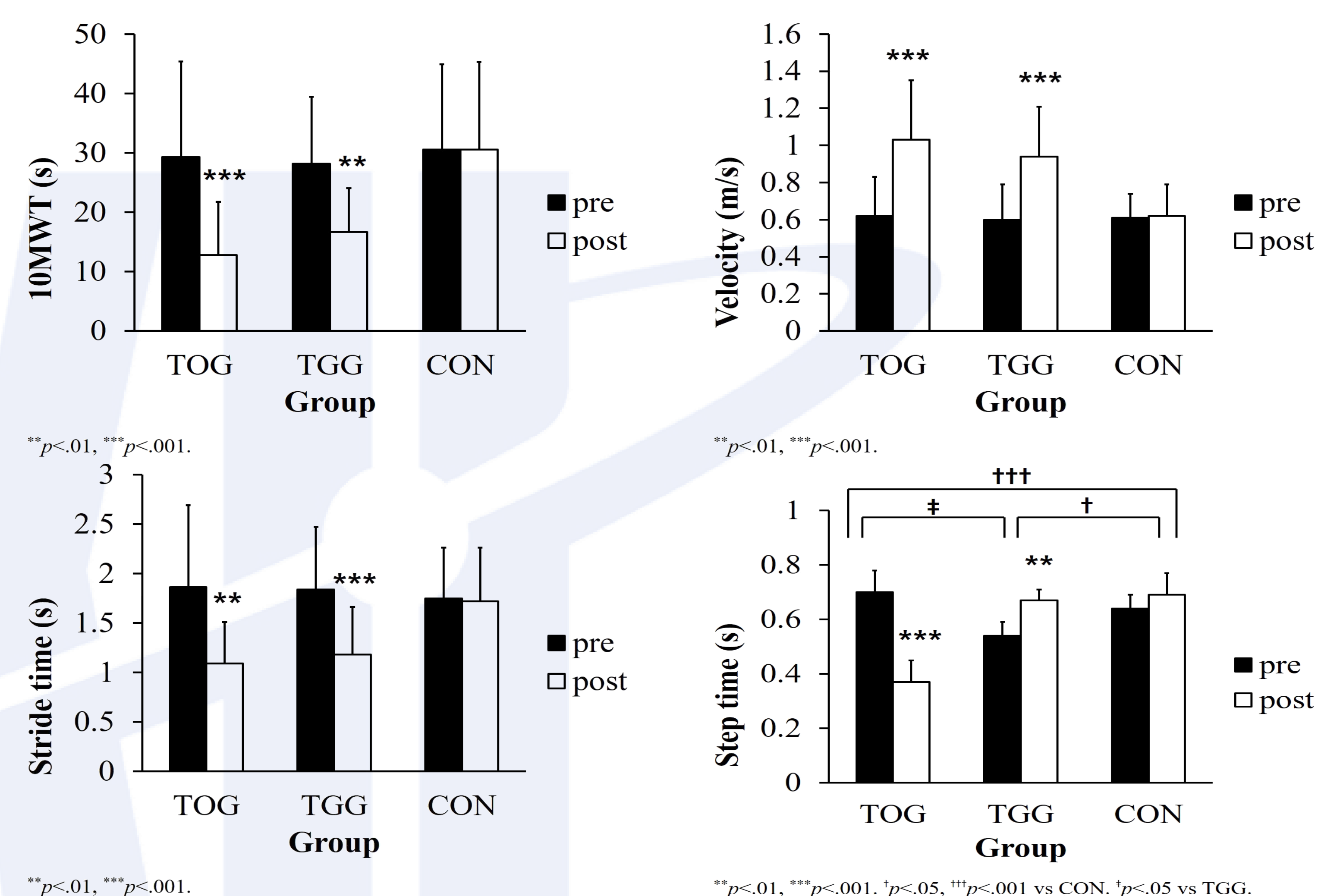Figure 1. Gait cycle in the sagittal plane.

Treadmill gait training with obstacles crossing

✓ Obstacles size: Length 250 mm, width 25 mm, height 25 mm (5 min), 52 mm (5 min), 80 mm (5 min) + (5 min)
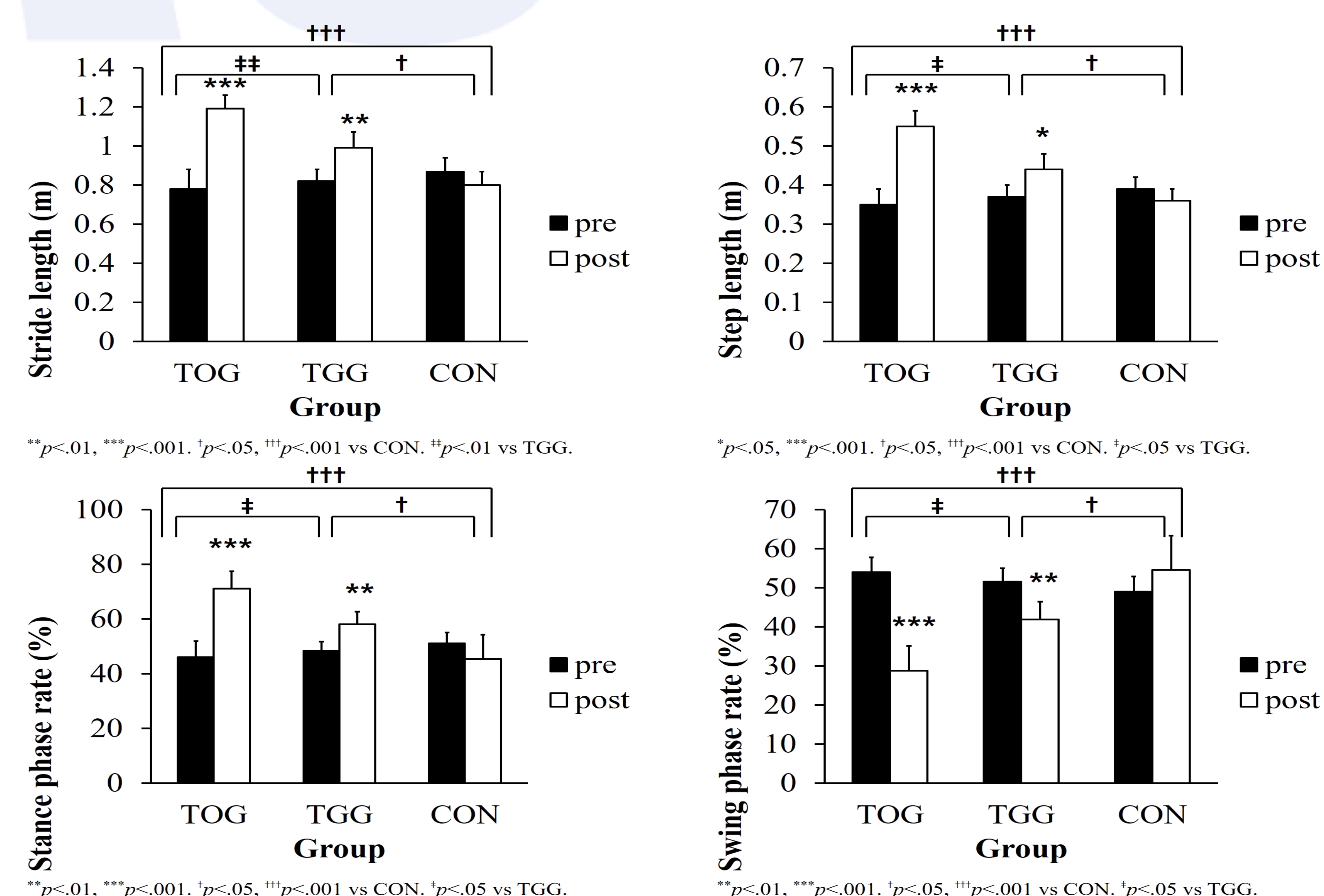✓ The paralyzed leg: A-B

A. initial swing   B. middle swing

Figure 2. Treadmill gait training with obstacles crossing.

III. Results & Discussion

Temporal gait parameters

**p<.01, ***p<.001.

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**p<.01, ***p<.001. ‡p<.05, †††p<.001 vs CON. †p<.05 vs TGG.

Spatial gait parameters

**p<.01, ***p<.001. ‡p<.05, †††p<.001 vs CON. ‡‡p<.01 vs TGG.

*p<.05, ***p<.001. ‡p<.05, †††p<.001 vs CON. †p<.05 vs TGG.

**p<.01, ***p<.001. ‡p<.05, †††p<.001 vs CON. †p<.05 vs TGG.

**p<.01, ***p<.001. ‡p<.05, †††p<.001 vs CON. †p<.05 vs TGG.

IV. Conclusion

In this study, treadmill gait training with obstacle crossing was more effective than that without obstacle-crossing to improve temporal and spatial gait parameters in elderly patients with post-stroke hemiplegia.