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The relationship between time of line bisection test and neglect prognosis in stroke patients

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Purpose

Hemispatial neglect is characterized by reduced awareness of stimuli on one side of space. Although it can be caused by various pathologic conditions, it is most often observed after stroke patients. Hemispatial neglect is associated with patient cognition, especially attention. The line bisection test (LBT) is most commonly performed to confirm hemispatial neglect. However, it has not been paid attention to the time it takes to perform the LBT. In this study, we measured the time of LBT and tried to confirm the relationship with prognosis of hemispatial neglect in stroke patients

Methods

Thirty-one patients who were admitted to the department of rehabilitation medicine at university hospital with stroke were enrolled from December 2017 to March 2019. The patients were included 1) Age ≥ 20 years, 2) stroke confirmed by MRI or CT, 3) no abnormalities in otology and ophthalmology 4) more than 1 step verbal command obey. Korean Mini-Mental State Examination (K-MMSE), Motor Free Visual Perception-3 (MVPT-3), LBT were performed at the time of admission, and 4 weeks later. The analysis of the LBT is as follows; Less than 1/4 inch in length from true center and test conducted within 90 seconds (0 point, normal), at least 1/4 inch in length from center (1 point, mild), at least 1/2 inch in length from center and test conducted for more than 90 seconds (2 point, severe). The time to complete the LBT was also measured. Based on the changes in LBT score, patients divided into two groups; Improved group and non-improved group. The LBT initial time, K-MMSE score change, and MVPT-3 score change of the two groups were compared using t-test and Wilcoxon signed-rank test.

Results

The demographic factors of the patients were as shown in Table 1. There were significant differences between improved group and non-improved group in initial LBT time (p=0.03) and changes of MVPT-3 score (p=0.02). However, changes of K-MMSE score did not show statistical differences. (Table 2, 3)

Conclusion

LBT are one of the most commonly used testing tools for patients with hemispatial neglect. In this study, there is significant association between LBT time and the prognosis of hemispatial neglect. Measuring time when performing LBT is simple and can be used as a tool to predict the prognosis of neglect and visual perception. Further study with larger sample size and follow up study is necessary.

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Table 1. Demographics and clinical characteristics of patients

Variables	Total (n=31)	Improved group* (n=18)	Non-improved group (n=13)
Age (years)	62.2±11.2	59.0±10.1	66.5±11.4
Sex (M/F)	20/11	11/7	9/4
Etiology (n)			
Cerebral infarction	18	10	8
Cerebral hemorrhage	13	8	5
Affected side (n)			
Left	22	13	9
Right	5	2	3
Bilateral	4	3	1
Location (n)			
Cerebral cortex	11	5	6
Basal ganglia and thalamus	15	12	3
Cerebellum	1	0	1
Brain stem	4	1	3
Onset to initial evaluation (day)	44.5±84.1	33.1±41.4	60.2±121.6
K-MMSE (n, scores)	20.30±5.3	21.0±5.5	19.4±5.2
Line bissection test grade (n)			
Initial evaluation			
Grade 0 (normal)	0	0	0
Grade 1 (mild)	20	13	7
Grade 2 (severe)	11	5	6
After 4 weeks evaluation			
Grade 0 (normal)	13	13	0
Grade 1 (mild)	12	5	7
Grade 2 (severe)	6	0	6

*; Improved group is a group with LBT score change, and non-improved group is a group with no score change

Abbreviations; K-MMSE, Korean-version of Mini-Mental State Examination

Values are presented as mean± standard deviation (SD).

Table 2. Comparison of LBT and K-MMSE results between two groups

Variables	Improved group (n=18)	Non-improved group (n=13)	*p*- value
Line bisection test			
Initial LBT time (sec)	72.68±32.26	109.17±54.50	0.03*
LBT time change (sec)	16.54±27.56	37.19±63.82	0.23
K-MMSE score change			
Total	5.94±4.54	4.08±1.93	0.13
Orientation for time	1.28±1.02	1.08±1.66	0.70
Orientation for place	0.78±0.73	0.85±0.80	0.81
Registration	0.17±0.71	-0.08±0.28	0.20
Attention & calculation	1.00±1.46	0.77±1.24	0.64
Recall	1.22±1.22	0.85±1.07	0.37
Language	1.17±1.98	0.54±0.88	0.24
Visual construction	0.33±0.49	0.08±0.28	0.07

Abbreviations; K-MMSE, Korean-version of Mini-Mental State Examination; LBT, Line bisection test

Values are presented as mean± standard deviation (SD)

*$p < 0.05$

Table 3. Comparision of MVPT-3 results between two groups

Variables	Improved group (n=18)	Non-improved group (n=13)	*p*- value
MVPT-3 initial score	38.75±6.35	34.40±8.60	0.15
MVPT-3 score change	9.75±5.43	4.80±4.10	0.02*

Abbreviations; K-MMSE, Korean-version of Mini-Mental State Examination; LBT, Line bisection test

Values are presented as mean± standard deviation (SD)

*$p < 0.05$