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Visuospatial Neglect due to Cingulum Bundle Disconnection in Anterior Cerebral Artery Infarction

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Background

Visuospatial neglect is a neurological condition, in which patient fails to attend or respond to stimuli on one side of space due to a contralateral hemispheric cerebral lesion. The finding is associated with lesions in the middle and posterior cerebral artery territories, with a higher incidence in right hemispheric infarctions. Neglect syndrome in anterior cerebral artery (ACA) infarction is more commonly accompanied by lower extremity weakness or shown as a motor neglect.

Herein, we report a case of pure visuospatial neglect without motor weakness in a patient with right ACA infarction. Furthermore, we quantitatively identified the underlying neuroanatomical mechanism as the disconnection of the cingulum bundle using Diffusion Tensor Image (DTI) tractography.

CASE PRESENTATION

A 62-year-old woman visited our clinic with a 3-day history of cognitive decline. Brain magnetic resonance imaging revealed an acute infarction in the right ACA territory with the parietal lobe spared (Figure 1). Neurological examination revealed intact motor function. However, bedside test coloring tests (Figure 2) and the Seoul Neuropsychological Screening Battery (SNSB), evaluated using the Rey-Osterrieth Complex Figure Test (RFCT) and the letter cancellation test demonstrated severe left-sided visuospatial neglect. while language- related attention and memory, assessed using the digit span test remained preserved.

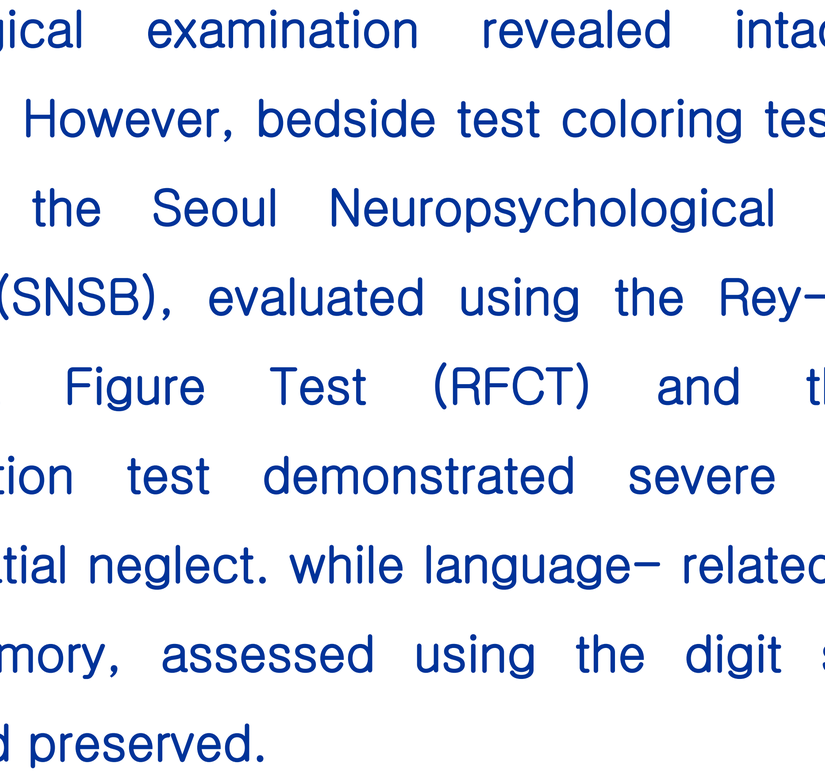

Figure 1. Brain MRI showing an acute infarction in the right medial frontal lobe, DWI sequence

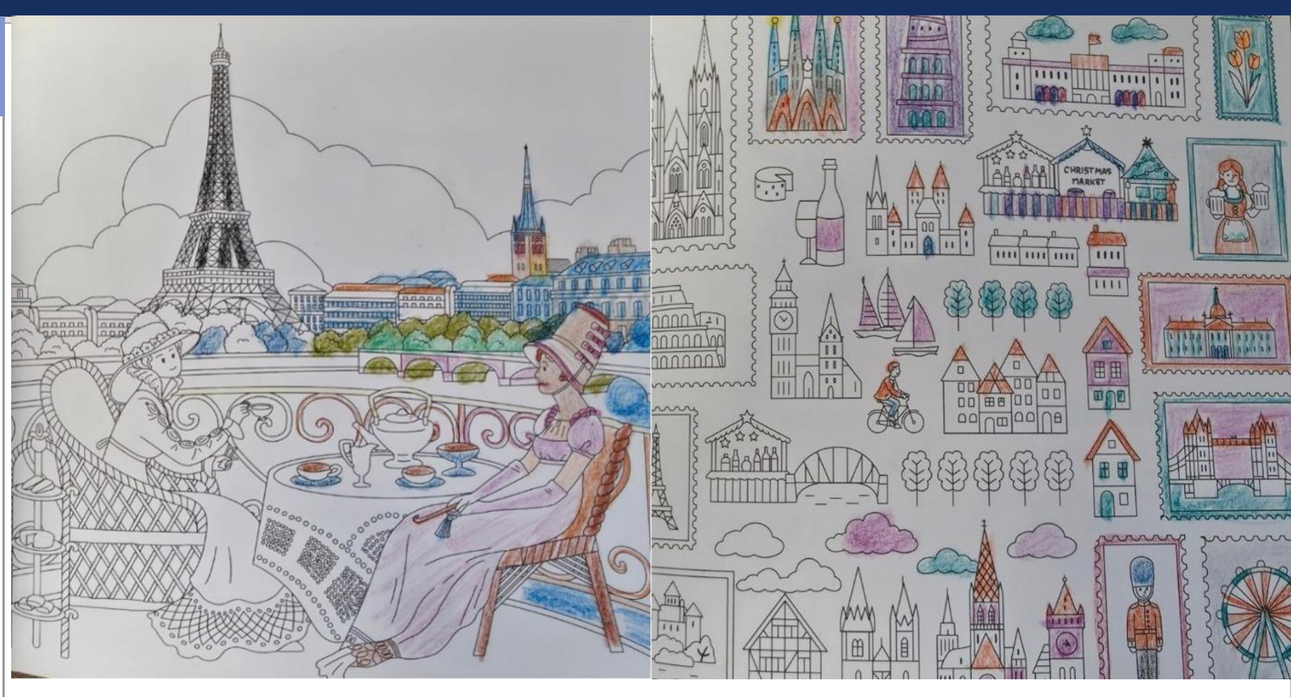

Figure 2. Bedside drawings showing left-sided visual neglect

To further evaluate white matter integrity, follow-up brain MRI with DTI was performed. Visual inspection revealed a severe disruption of the right cingulum bundle. Quantitative analysis demonstrated a marked reduction in the right cingulum compared to the left, with significantly decreased tract count (3,354 vs. 14,919; asymmetry ratio 0.22) and total volume (2,169 mm^3 vs. 5,410 mm^3; asymmetry ratio 0.40) (Figure 3). Other major projection fibers passing the parietal lobes were relatively spared.

Following the diagnosis of visuospatial neglect, computer-assisted cognitive rehabilitation (CACR) including visual-motor coordination, visual field training was initiated. Follow-up neuropsychological assessment after 1 month demonstrated marked improvement on the RFCT

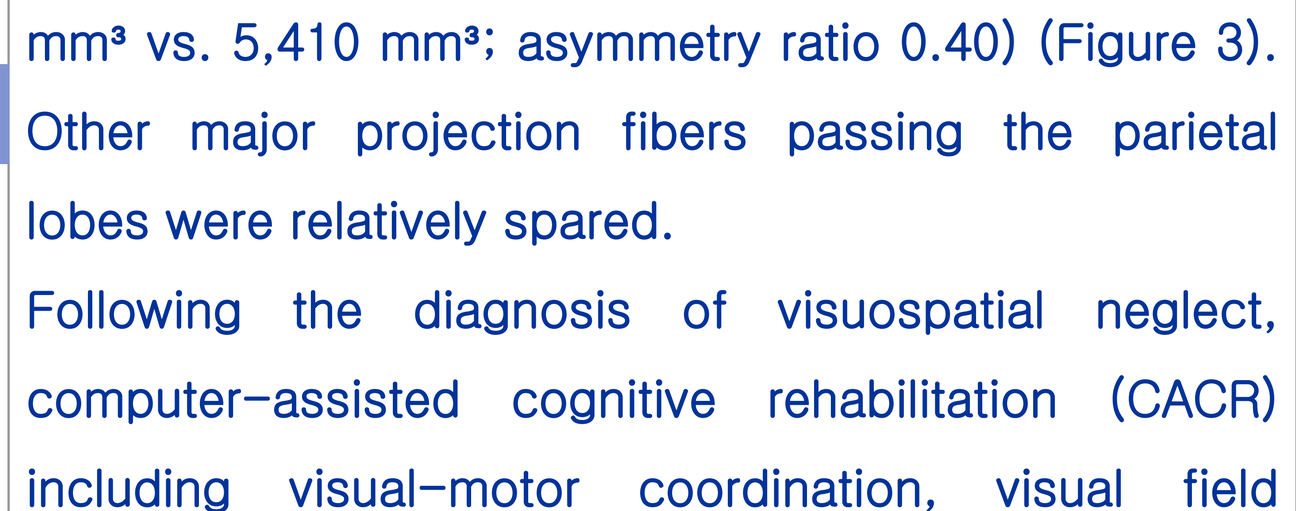

Figure 3. DTI tractography reconstructed by deterministic fiber tracking using DSI Studio software(http://dsi-studio.labsolver.org). Sagittal view, Top: Left; Bottom: Right
Note a significant disruption of the right cingulum bundle with the tract count reduced by approximately 78%

CONCLUSION

We report a case of pure visuospatial neglect in right ACA infarction. Quantitative DTI analysis confirmed the disconnection of the cingulum bundle as the underlying mechanism. This case underscores that motor-sparing ACA infarction can cause severe visuospatial neglect, warranting careful evaluation and active rehabilitation.