

CASE REPORTS

A patient with persistent prosopagnosia after right posterior cerebral artery territorial infarction

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Abstract

Prosopagnosia is a specific form of visual agnosia that impairs the ability to recognise familiar faces. Prosopagnosia is typically considered for bilateral ventro-occipitotemporal lesions involving the fusiform face area. A 72-year-old right-handed woman presented with persistent inability to recognise familiar faces after cerebral infarction. Brain magnetic resonance imaging demonstrated infarction in the right medial occipital lobe, including the lingual and fusiform gyri. She showed decreased facial recognition abilities in a face recognition test consisting of famous Koreans. This case suggests that there can be individual-specific degrees of hemispheric dominance for face processing, and unilateral right occipitotemporal lesion is sufficient to produce persistent prosopagnosia.

Keywords: prosopagnosia, right occipitotemporal lesion, unilateral

INTRODUCTION

Prosopagnosia is a specific type of visual agnosia. Patients with prosopagnosia have difficulty visually identifying familiar faces.¹ This phenomenon can be observed in patients with semantic dementia or bilateral posterior cerebral artery (PCA) territorial infarction.² Although it is widely accepted that damage to bilateral occipitotemporal areas, including the lingual and fusiform gyri, is a necessary precondition of prosopagnosia, it is unclear whether these lesions are necessarily bilateral. Patients with prosopagnosia of unilateral occipitotemporal lesions have rarely been reported³; however, reports of prosopagnosia following unilateral hemispheric lesions are still regarded as controversial. We report a case of prosopagnosia after chronic cerebral infarction in the right PCA territory.

CASE REPORT

A 72-year-old right-handed Korean woman with a 6-year elementary school education presented to our hospital with visual disturbance and difficulty in identifying people after a stroke. The patient had a history of right PCA territorial infarction 2

years ago. In the early stages of cerebral infarction, she complained of severe visual field defect and poor visual acuity. Her visual acuity gradually recovered after several months. However, the patient showed poor recognition of faces after the stroke when she met previously familiar people on the street.

At the time of the hospital visit, blood pressure was 160/90 mmHg, pulse rate was 81 beats/min, respiratory rate was 20 breaths/min and body temperature was 36.5°C. In physical and neurological examinations her corrected visual acuity of the left and right eyes were 6/38 and 6/19, respectively in the Snellen meter scale. Colour vision was normal. Visual field examination showed left congruent homonymous hemianopsia but no other motor and sensory deficits.

She showed clear consciousness and normal orientation of time and place. Language tests were unremarkable including confrontational naming tests with watch, pencil, key and stamps. She could copy interlocking pentagon and cube without any difficulties. Neglect syndrome tests were also unremarkable including letter cancellation and line bisection test. She scored 24 points on the Korean-version of Mini-Mental Status Examination (K-MMSE).⁴

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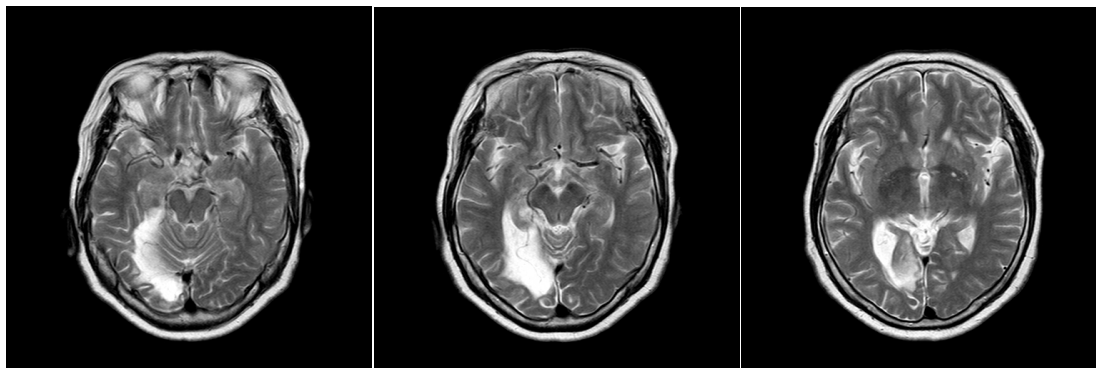


Figure 1. The T2-weighted magnetic resonance imaging of the patient demonstrates a chronic infarction in the territory of the right posterior cerebral artery.

We tried to perform computerized neuro-cognitive function test⁵ including attention, language, memory, frontal executive and visuospatial function after MMSE. However she could not complete above mentioned neuropsychological tests because of her subjective complain of poor visual acuity. She could only perform verbal learning test and digit span forward test. She showed increased verbal learning abilities according to the repetitive hearing of word lists and showed normal delayed recall. We also performed digit span forward test for the evaluation of her working memory and attention. Her digit span forward was also normal.

Brain magnetic resonance imaging (1.5T Philips Gyroscan NT) demonstrated a cerebral infarction in the right occipitotemporal region, including the fusiform face area (FFA) (Figure 1).

To examine the patient’s facial recognition abilities, a naming test was conducted using photographs of well-known Korean celebrities.⁶ This test consisted of photos of 55 well-known Koreans, including famous actors, politicians and athletes. First, the patient was asked to identify the gender (man or woman) of the person in the presented photos. Second, we tried measuring the age discrimination ability of the patient. The age group was divided into three categories: ‘youth’, ‘middle-aged’ and ‘old’. Third, the patient was asked to identify the name of the persons in the photos (Table 1).

The patient could accurately identify the genders of all 55 persons and estimate the age categories without any difficulty. However, the patient recognised only 6 names of total 55 people. Among the 49 persons who could not be recognised correctly, the patient identified one person with the wrong name and three others with only their given names. Although the patient was talking about the professions of the persons in the photos, she could recognise only 2 of 49 correctly. The patient found familiar but could not recognise 20 of the 49 faces; she saw 28 of them for the first time. Instead of showing the pictures to the patient, we tried repeating the test by talking about the previous work of and awards received by the person and asked her to identify their name, but the patient did not want to undertake any more tests.

DISCUSSION

The patient could tell the gender and age categories of persons based on their photos without any difficulty, so there was no abnormality in visual perception. However, when she was showed a picture of a celebrity, she could not say their name correctly. She said she had never seen the face before or she had seen it somewhere before, but she was not sure. Therefore, the patient’s cognitive impairment is probably prosopagnosia. The patient complained of continuous visual difficulties

Table 1: Results of the photo recognition test of 55 famous Koreans

	Gender discrimination	Naming	Job naming
Correctly matched number	55	6	7
Incorrectly matched numbers	0	1	2
Partially matched numbers	0	3	0
No response or do not know	0	45	46

during the test, but corrected visual acuity was preserved. Prosopagnosia caused by unilateral PCA infarction or traumatic temporo-occipital lesion has rarely been reported, and in some cases, prosopagnosia can persist for extended periods of time.³ Most patients with prosopagnosia caused by unilateral lesions have right-side lesions; left lesions are rare.⁷

According to the cognitive model for face recognition, after seeing a human face, one undergoes a holistic perceptual process and transfers the information of the whole face is referred to face recognition units (FRU).⁸ After that, one can access the face distinction unit (FDU) to recognise the face correctly among the previously known faces.⁹ Therefore, patients with prosopagnosia are more likely to have abnormal connections in FRU in the FFA and FDU in the anterior temporal pole (Figure 2).^{10,11} Therefore, a wide range of fusiform gyrus lesions from the occipital to the temporal pole show difficulty in distinguishing between an intimate and unfamiliar face (apperceptive prosopagnosia). The lesion that

is located in the anterior temporal pole makes it possible to distinguish between a familiar and unfamiliar face but does not allow the patient to identify the name associated with the familiar face (associated prosopagnosia).⁷⁻¹¹

The mechanism of face recognition caused by unilateral lesions remains unclear. Generally, both hemispheres are involved in the facial recognition process; a right or left hemisphere-dominant facial recognition system exists in selected individuals (right or left hemisphere-dominated face recognition).^{2,3,12}

A previous study has suggested that long-lasting prosopagnosia is mainly caused by bilateral lesions. However, chronic prosopagnosia caused by unilateral brain lesion has also been reported.¹²

There are some limitations in this case. First, further examination was not performed to assess the ability of the patient to recognise the name of the persons when she heard of their previous work. Second, additional prosopagnosia tests using photographs of the patient's family members were not conducted. However, according to the patient's

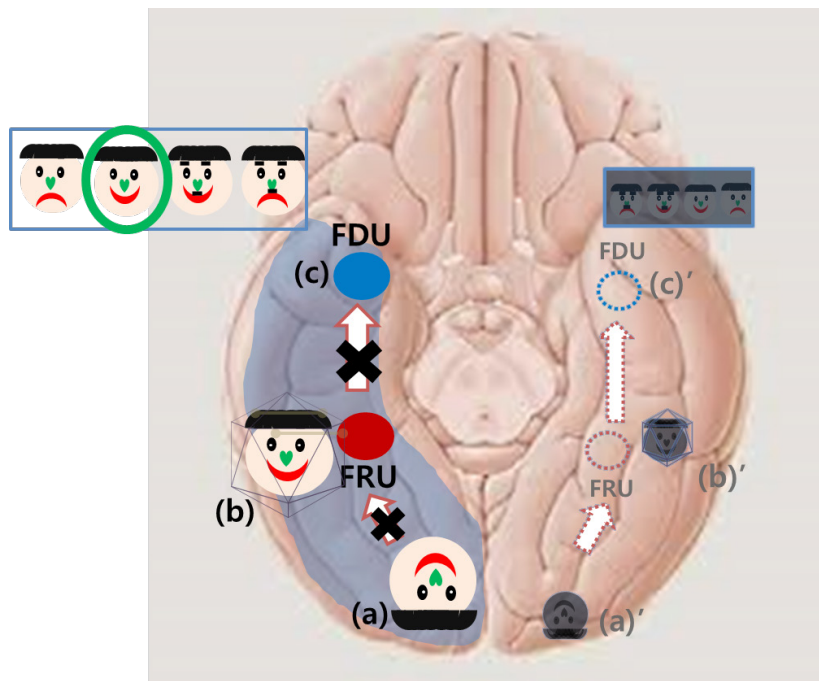


Figure 2. Ventral view of the human brain is depicted. Light blue area represents infarction in the territory of the right posterior cerebral artery. Red circle represents face recognition unit (FRU), and blue circle represents face discrimination unit (FDU). Anatomical locations are only an approximation. When a face is captured in the both occipital pole (a), (a)', FRU recognises the face holistically (b), (b)', and then the information is transferred to FDU (c), (c)', where the previous familiar facial information is stored, based on which one can select an appropriate face (green circle). The X marks represent the interruption of facial perception in the right side of brain. Small, blurred and dot-like left side visual processing represents non-dominant facial processing of the patient.

history, she experienced several prosopagnostic cases with her family members. Third, we could not compare her face recognizing abilities with age and education matched control group.

In conclusion, this case report suggests that unilateral brain lesion, particularly on the right side, could lead to persistent prosopagnosia and there are individual-specific degrees of hemispheric dominance for face recognition and discrimination processes.

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DISCLOSURE

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