



A Case Study on Cardiovascular Embolism and Its Impact on Facial Recognition

Hailun Song

Department of Psychology, University of Nevada, Reno, Nevada, USA

DOI: 10.32629/jcmr.v4i4.1464

Abstract: This case study presents an 84-year-old man patient with cardio-genic cerebral embolism in the right middle artery territory, who showed difficulty in recognizing faces and often mistook unfamiliar people for someone he knew. He was fully conscious, with normal visual acuity, and no hemianopia, neglect, and deafness. Results from a neuropsychological examination indicated visual agnosia for prosopagnosia. An MRI showed hyperintense signals from the frontal to temporal lobes on the right side. Initially suspected to be delusional misidentification syndrome, the patient's case differed from Fregoli syndrome as he identified unfamiliar people as persons close to him. This case highlights the importance of careful diagnosis and assessment in patients with visual agnosia for prosopagnosia, which can have significant impact on daily life and functioning.

Keyword: cardiovascular embolism, facial recognition, case study

1. Introduction

Cognitive neuroscience is a rapidly growing field that studies the relationship between brain function and cognitive processes such as perception, attention, memory, emotion, and language. One of the most interesting topics in this field is facial recognition, which refers to the inability to identify an object, people, or place. This paper will discuss a case study about facial recognition on unfamiliar faces caused by cardiovascular embolism.

2. Case description

The patient was an 84-year-old, right-handed man who was diagnosed with cardiovascular embolism in the right middle artery territory, with a medical history that includes atrial fibrillation, myocardial infarction, L4/5 spondylolisthesis, cataracts, and inguinal hernia[1]. He had repeatedly mistaken family members or friends for someone else and was not aware of the mistake. He was admitted to an acute hospital after being discovered lying immobile in the bathtub, and subsequently transferred to another hospital for rehabilitation at day 21 after onset of infraction.

The patient was studied by Yumiko Sugahara, Chiaki Iizuka, Kazuya Doi, Kenichiro Matzuzaki and Masanori Nagaoka, who were from Nagaoka Rehabilitation Hospital in Shizuoka, while Masanori Nagaoka was also affiliated with Nikko-Noguchi Hospital, Tochigi, and the Department of Neurology and Rehabilitation Medicine at Juntendo University in Japan.

The patient was fully consciousness, with standard visual acuity, and showed no sign of hemianopia, neglect, or deafness, but a mild paresis on the left side[1]. The patient had difficulty recognizing faces and frequently confused unfamiliar people for someone he knew. In addition, he misidentified people by their voice and judged their identity based on appearances besides their face, such as their hair style, costume, and posture. Other than false facial recognition, he experienced difficulty in operating electrical equipment that he had used earlier in life and struggled to accomplish his roles in daily life occasionally. He also had difficulty in recognizing faces on photographs during visual perception tests for prosopagnosia done after discharge.

Based on the results of the neuropsychological examination related to visual cognition, the patient had difficulty recognizing faces, especially the faces of familiar celebrities and family members. Nevertheless, the patient's other cognitive-related abilities were not affected, he was able to name colors correctly and identify objects without touching them. He also performed well in tasks that do not require identification of people by their face, such as judging gender and age, and interpreting facial expressions. However, his performance was moderately to severely disabled in tasks that involve recognizing unfamiliar faces, pointing to celebrities by name, and recognizing family members. Overall, despite he had visual agnosia for prosopagnosia, however, as he retained his semantic memory, he was able to remember the occupations and relationships of family members and answered correctly about the jobs and episodes related to some historical persons[1].

3. Neuroimaging

An MRI was conducted on the patient at the acute hospital, and the hyperintense signals on the FLAIR images showed extension from the frontal lobe to temporal lobes, with higher intensity on the lower frontal gyrus, the insula, operculum, and superior temporal gyrus on the right side. These regions are known to be critical for face processing and recognition, especially the right anterior temporal lobe, where lesions lead to multimodal people recognition disorders, and the right superior temporal sulcus, which is an anatomical region responsive to sound[2].

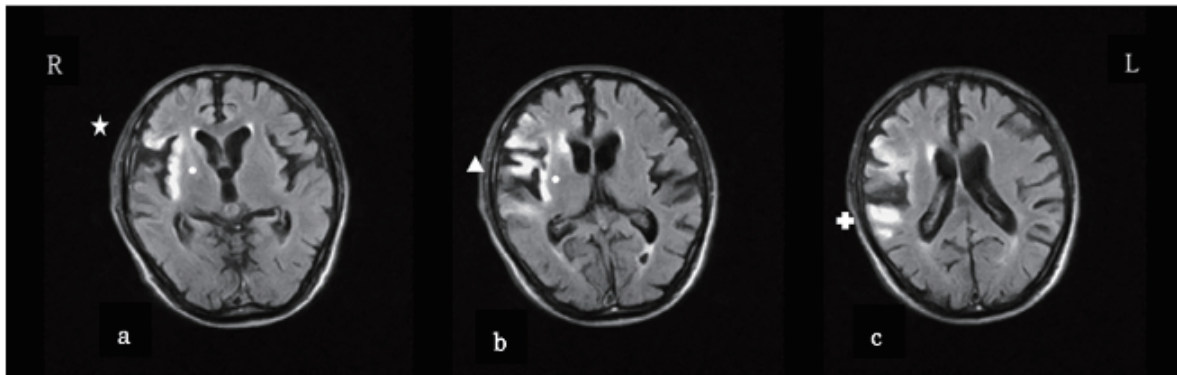


Figure 1. MRI findings of the patient

In this patient, the MRI findings indicated that the misidentification by disrupting the monitoring function may be caused by the damage to the right frontal lobe, particularly the inferior frontal gyrus and uncinate fasciculus.

4. Discussion

Initially, the patient's symptoms were suspected to be delusional misidentification syndrome, particularly Fregoli syndrome due to the overlapping lesion distribution[1]. However, Fregoli syndrome is characterized by the perception that some person (usually a stranger) disguised as a familiar person is present in his environment because this stranger is in love with him or tries to persecute him[3], whereas the patient in this case identified the unfamiliar person as someone close to him.

It was hypothesized that the patient's misidentification may have resulted from habitually judging familiarity based on formations other than face and voice, such as hairstyle and clothing, which is to say that lesions of the frontal lobes and uncinate fasciculus disrupted decision and monitoring functions.[1]

In order to further investigate on the patient's condition, a functional MRI could be conducted while the patient is doing a series of facial process and recognition tasks, to identify the specific brain regions that are activated during facial processing and recognition. Potential findings from the fMRI study may indicate that the activation of the damaged areas is decreased compared to a healthy individual on the same task.

References

- [1] Sugahara, Y., Iizuka, C., Doi, K., Matsuzaki, K., Nagaoka, M. False recognition/misidentification of unfamiliar person after cerebral infarction: A case report. *Cortex*. 2022; 147: 185-193.
- [2] Liu, R. R., Pancaroglu, R., Hills, C. S., Duchaine, B., Barton, J. J. S. (2016). Voice recognition in face-blind patients. *Cerebral Cortex*. 2016; 26(4): 1473-1487.
- [3] Christodoulou, G. N. (1978). Syndrome of subjective doubles. *The American Journal of Psychiatry*. 1978; 135(2): 249-251.