ISOLATED RIGHT ANTERIOR INSULAR CORTEX LESION IN CATATONIC SCHIZOPHRENIA: A CASE REPORT

Çağrı Öğüt

Uşak Training and Research Hospital, Department of Psychiatry, Uşak, Turkey

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INTRODUCTION

The etiology of schizophrenia is resulting from a combination of physical, genetic, psychological, and environmental factors. A number of structural neuro-anatomical abnormalities have provided insight into the underlying pathology. The role of the anterior insular cortex (AIC) in the pathophysiology of schizophrenia has started to draw attention recently due to its relation with processing emotional component of interoception, self-awareness, social cognition, and high-level cognition (Wylie & Tregellas 2010, Uddin 2015). In this case, the possible relationship of catatonic schizophrenia symptoms with isolated right AIC lesion was discussed.

CASE REPORT

A 49-year-old male was brought to the emergency clinic with retarded catatonic symptoms by her relatives. He had negativism, immobility, stupor and mutism.

It was learned from the patient's relatives that his illness started about 9 years ago, and he was followed up with schizophrenia. His main symptoms were persecutory delusions, auditory hallucinations, catatonic behaviors, and negative symptoms. He was unable to work and had difficulties in establishing relationships with people during this period.

There was no history of physical illness and neurologic evaluation revealed no focal findings. Routine laboratory studies were within normal limits, except for an elevated d-dimer level. Pulmonary thromboembolism was diagnosed, which may be related to long-term immobilization, and anticoagulant treatment was initiated.

A cyst about 11 mm in size was found in the right AIC on his cranial magnetic resonance imaging (MRI) (Figure 1). It was interpreted as cystic encephalomalacia secondary to ischemia/infarction by the radiology department.

He was admitted to the psychiatric ward with the diagnose of schizophrenia and catatonia according to the DSM-V criteria. After approximately 2 weeks of treatment with lorazepam and paliperidone, his catatonic symptoms partially alleviated and he accepted to talk about his auditory hallucinations and persecutory delusions of being poisoned. The episode was resolved in 4 weeks by lorazepam 2–4 mg and paliperidone palmitate long-acting injection.

DISCUSSION

Although a single brain region can not be held responsible for the pathophysiology of schizophrenia, the role of the AIC has started to draw attention recently. The AIC is suggested to be a key structure of a salience network that has a central role in switching between default-mode and central-executive networks and coordinating brain network dynamics (Uddin 2015). It has extensive structural connections with the orbitofrontal cortex, amygdala, anterior cingulate cortex, superior temporal sulcus, and olfactory cortex (Uddin 2015).

Functionally, the AIC is specialized for processing the emotional component of interoception (Wylie & Tregellas 2010, Uddin 2015). Interoception is detecting signals from inside the body and includes visceral perception (such as heartbeat, respiration, satiety) and proprioception (such as signals from skin, joints, tendons, and muscles) (Barrett et al. 2004). These sensations from inside the body are suggested to play a critical role in the formulation and execution of a conscious action (Badgaiyan 2002). If interoceptive information is unavailable, the execution of a voluntary movement may be distorted, as in catatonia (Badgaiyan 2002, Price & Hooven 2010). It is suggested that catatonia may be caused by a malfunction of the salience network, in which the AIC is a key structure (Fricchione & Beach 2019).

The AIC is also thought to have an important role in self-awareness (Wylie & Tregellas 2010, Uddin 2015). Self-awareness is a basic human ability to "recognize one's own existence and experience and the existence and experience of others" (Oyebode 2018). Self-awareness arises from the processing of exteroceptive and interoceptive signals" (Gibson 2019). The AIC has an important role in discriminating self from non-self signals. Misperception of the self as a distinct entity from the external world may be associated not only as a possible mechanism of hallucinations as discussed earlier by Wylie and Tregellas (2010) but also with many of the first rank symptoms related to loss of ego boundaries (Wylie & Tregellas 2010, Oyebode 2018).

Finally, the AIC is also important for social cognition (Wylie & Tregellas 2010, Uddin 2015). The AIC has unique spindle-shaped von Economo neurons (VENs) which are being thought to have a potentially major role in social cognition in humans (Evrard et al. 2012). VEN has also been shown in mammals with complex social
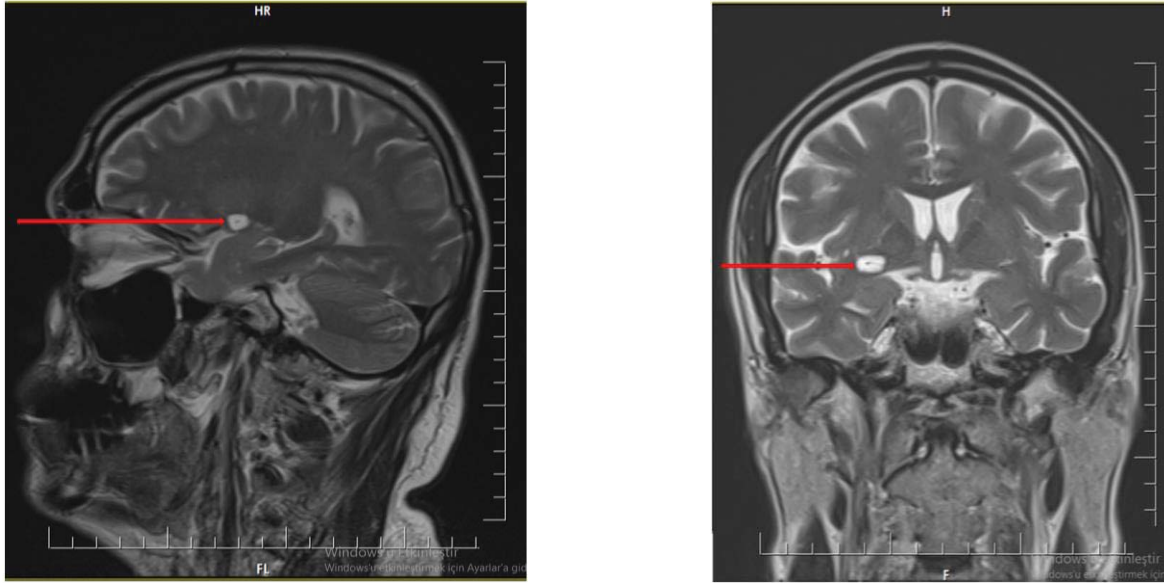
Figure 1. Brain MRI findings in the present case (A) T2-weighted sagittal image showing the right insular lesion (red arrow); (B) T2-weighted coronal image showing the right insular lesion (red arrow)

organization, such as great apes, cetaceans, and elephants (Evrard et al. 2012). The right hemisphere of the brain consists of 30% more VENs than the left hemisphere (Uddin 2015). It has been shown that VENs are affected in diseases such as FTD and schizophrenia, where social cognition is also affected (Uddin 2015, Brüne et al. 2010).

As discussed above, the isolated AIC lesion in the patient may be associated with a retarded catatonic syndrome. It is also reasonable to hypothesize the auditory hallucinations and the associated persecution delusions may be related to his lesion. The right-sided localization of the lesion may have caused more severe social cognition symptoms due to the density of VENs is more on the right side.

CONCLUSION

In conclusion, it was presented a case of late-onset catatonic schizophrenia associated with isolated right AIC lesion which is one of the least understood brain regions due to its deep location and low prevalence of isolated lesions. Because it is specialized for processing the emotional component of interoception, self-awareness, social cognition, and high-level cognition, it may be concluded that insular malfunction may lead to symptoms observed in catatonic schizophrenia. More studies are needed to demonstrate the accurate role of AIC and its functional networks for the underlying pathology of schizophrenia.

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Correspondence:
Çağrı Öğüt, MD
Uşak Training and Research Hospital, Department of Psychiatry
Uşak, 64200, Turkey
E-mail: cagri_ogut@hotmail.com