CASE REPORT OPEN ACCESS

Alice in Wonderland Syndrome: An Uncommon Presentation of Pyogenic Cerebral Abscess

Ayesha Abdul Samad[1], Saba Zaidi[1], Muhammad Luqman[1]
[1]*Neurology Department, Liaquat National Hospital, Karachi, Pakistan.*

ABSTRACT

Alice in Wonderland syndrome (AIWS) is a rare perceptual disorder causing distorted body image and spatial awareness. This is the case of a middle-aged man, known case of diabetes, hypertension, and chronic kidney disease who presented with a week-long history of fever, drowsiness, and visual hallucinations of unfamiliar people appearing unusually tall or short. He exhibited unusual behavior, frequently touching his nose and eyes as if they were unfamiliar or altered in some way. MRI revealed a ring-enhancing lesion in the left parieto-occipital region, indicating a brain abscess. He was treated with broad-spectrum antibiotics, steroids, and antifungal therapy due to his compromised immune state. On improvement of neurological symptoms, we discharged him with follow up in clinic. Our case addresses an uncommon exhibition of pyogenic cerebral abscess as AIWS. This highlights the importance of understanding of pathophysiology and contributes to the better understanding of such symptoms for similar cases in future.

Keywords: Alice in Wonderland, Middle-Aged, Perceptual Disorder, Occipital lobe, Brain Abscess

Corresponding Author:
Dr. Ayesha Abdul Samad
Liaquat National Hospital, Karachi
Email: ayeshasamad1216@gmail.com
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INTRODUCTION

Alice in Wonderland Syndrome (AIWS), or Todd's syndrome, is a perceptual disorder involving altered visual perception, body image, and time cognition. Named after Lewis Carroll's novel, AIWS causes patients to perceive their body parts as larger (macrosomatognosia) or smaller (microsomatognosia) than usual, as well as distortions in the size of objects (macropsia, micropsia) and their distance (telopsia, pelopsia). Patients may also experience altered time perception, depersonalization, and derealization. AIWS is linked to various conditions, including migraines, infections, epilepsy, and brain diseases. We report the first known case of AIWS associated with a pyogenic cerebral abscess, a rare and life-threatening infection within the brain.

CASE PRESENTATION

A 62-year-old male patient, with a known history of diabetes, hypertension, and chronic kidney disease, presented to the emergency department with complaints of fever, drowsiness, and formed visual hallucinations for one week. His fever, documented at 102°F, was intermittent, accompanied by rigors, chills, and increasing lethargy. He denied any recent travel or new medications. Upon further inquiry about the visual hallucinations, he described seeing unfamiliar people who appeared either unusually tall or short, though none seemed recognizable. His family reported that he had become irritable and exhibited unusual behavior in front of the mirror, frequently touching his nose and eyes as if they were unfamiliar or altered in some way. There

were no accompanying auditory or tactile hallucinations.

He denied any other images like animals or snakes, geometric figures or colors. He had no significant history of cognitive decline or psychiatric illness in the past. Although his mood was low for the past few months for which selective serotonin reuptake inhibitor was started.

On examination, a sick-looking, middle-aged gentleman, vital were noted as, blood pressure 180/70 mm Hg, pulse 110 beats/min, and temperature 1000F. He was intubated in an emergency department due to declining Glasgow Coma Scale (GCS) and metabolic acidosis. Given the history of hallucinations, fever, and altered mental status, a working differential diagnosis includes metabolic encephalopathy (potentially uremic or hyperglycemic), an infectious etiology such as sepsis, or possibly a neurological event like a stroke or delirium due to underlying systemic conditions. An initial blood workup was done which showed increased inflammatory markers and leukocytosis (C-reactive protein = 16.97 mg/dl, Total Leucocyte Count = 13.10).

MRI brain showed a ring-enhancing lesion in the left parieto-occipital region and adjacent splenium associated with surrounding oedema compressing in the left ventricle suggestive of a brain abscess (Figure 1).

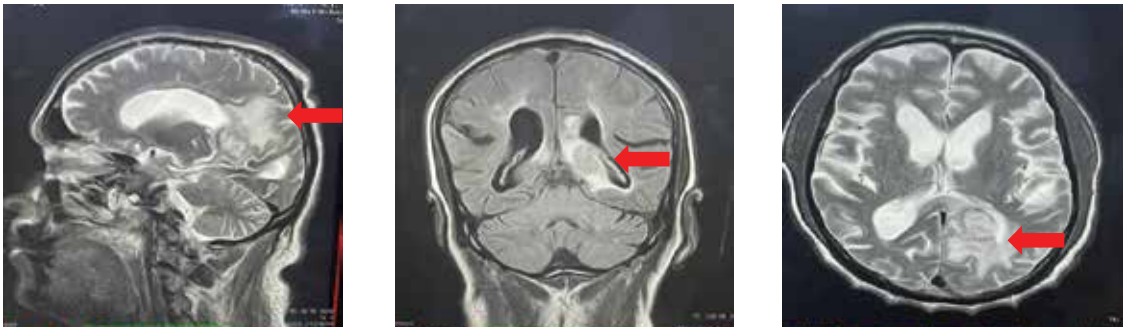

Figure 1: MRI brain showing abscess in left parieto-occipital region with surrounding edema.

Cerebrospinal fluid (CSF) was sent for D/R which showed increased protein and glucose with a negative gram stain (Table 1).

Table 1: CSF D/R with Gram Stain

CSF D/R		Normal values
Glucose	129 mg/dl	40-70 mg/dl
Protein	221 mg/dl	20-50 mg/dl
WBC	380 /cu mm	<5/cu mm
RBC	40	0
Neutrophils	90 %	0 %
Lymphocytes	10 %	60-70 %
Gram stain	No organism seen	
Wet mount	Negative	

He was promptly initiated on a combination of broad-spectrum antibiotics, namely Imipenem 2gm, 8 hourly and Vancomycin 750 mg, 6 hourly along with the administration of steroids (Dexamethasone 10 mg, 6 hourly) due to the radiological impression of a pyogenic brain abscess. He spent one week in the ICU, after which he was transferred to our ward as his symptoms showed signs of improvement. The infectious disease department was consulted, and they advised sending blood cultures. In light of the patient's compromised immune system, they also recommended initiating antifungal treatment. The patient received an Amphotericin injection based on his creatinine clearance. Over time, his clinical condition steadily improved. When he was cognitively capable, we conducted a comprehensive assessment of his higher mental functions and administered a mini-mental state examination which is shown below. The antibiotics were continued for total of 8 weeks with simultaneous creatinine monitoring. His blood culture showed the growth of Streptococcus pneumoniae. On improvement of neurological symptoms, we discharged him with follow up in clinic.

Higher Mental Function:

Appearance and mood: Agitated
Conscious: Alert
Orientation: To person only
Attention: tap A test- not able to perform
Apraxia: hammer the nail in the wall – intact
Agnosia: show me your index finger – intact
Cortical sensory (Graphesthesia/stereognosis/two-point discrimination): not able to identify on the right hand
Memory:
Immediate -forward digit span (4579) - intact
Working: backward digit span (9754) - impaired
Short term (recent) (what you had in breakfast) - intact
Long-term (remote) (when was Pakistan born, when was your birthday/ wedding anniversary) - impaired
Comprehension: complex commands - intact
Touch your nose from your index finger
Point to your right hand lift your left hand
Repetition: (repeat after me) - able to perform
Naming: (show them watch or a pen) - identify
Reading: (anything written: close your eyes) - intact
Writing: write something for me - unable to perform

Mini-Mental State Examination (MMSE)

Patient's Name: Arif Ahmed Date: _____

***Instructions:* Ask the questions in the order listed. Score one point for each correct response within each question or activity.**

Maximum Score	Patient's Score	Questions
5	0	"What is the year? Season? Date? Day of the week? Month?"
5	2	"Where are we now: State? County? Town/city? Hospital? Floor?"
3	3	The examiner names three unrelated objects clearly and slowly, then asks the patient to name all three of them. The patient's response is used for scoring. The examiner repeats them until patient learns all of them, if possible. Number of trials: _____
5	0	"I would like you to count backward from 100 by sevens." (93, 86, 79, 72, 65, ...) Stop after five answers. Alternative: "Spell WORLD backwards." (D-L-R-O-W)
3	0	"Earlier I told you the names of three things. Can you tell me what those were?"
2	2	Show the patient two simple objects, such as a wristwatch and a pencil, and ask the patient to name them.
1	1	"Repeat the phrase: 'No ifs, ands, or buts.'"
3	2	"Take the paper in your right hand, fold it in half, and put it on the floor." (The examiner gives the patient a piece of blank paper.)
1	0	"Please read this and do what it says." (Written instruction is "Close your eyes.")
1	0	"Make up and write a sentence about anything." (This sentence must contain a noun and a verb.)
1	0	"Please copy this picture." (The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and two must intersect.) 
30	10	TOTAL

DISCUSSION

Alice in Wonderland syndrome (AIWS) is marked by perceptual distortions rather than hallucinations or illusions, and as such, it must be differentiated from schizophrenia spectrum disorders and other psychotic conditions.

The symptoms of Alice in Wonderland syndrome (AIWS) are thought to arise from both functional and structural changes within the brain's perception system. While abnormalities in the brain (central pathology) are the most common cause, certain visual distortions, such as dysmorphopsia, can also occur due to eye issues like retinal damage[6]. Similarly, plagiopsia, where vision appears tilted, can result from inner ear disorders. However, the majority of AIWS symptoms are linked to specific neuron clusters in the brain that process sensory information, particularly in the visual cortex (regions V1–V5). For example, the V4 area is responsible for color perception, and its dysfunction can lead to color blindness (achromatopsia), while the V5 area is crucial for detecting motion, and damage here can cause difficulty perceiving movement. The inability to see vertical lines correctly is thought to be caused by damage to orientation-specific neuron columns within the visual cortex[7,8]. Different forms of visual distortion, such as metamorphopsia, are associated with specific neuronal groups, although some remain under investigation. In some cases, these symptoms result from discrepancies between larger regions of the brain's visual network, which can vary between individuals. For instance, in prosopometamorphopsia, people may see human faces as animal faces, and in micropsia, where objects appear smaller than they are, brain imaging has shown distinctive patterns of brain activation involving occipital and parietal regions[8,9].

AIWS is still relatively unfamiliar and likely subject to misdiagnosis. The precise occurrence rate of AIWS remains uncertain due to several factors. Firstly, there is a lack of extensive epidemiological studies conducted on this condition. Secondly, the absence of universally agreed-upon diagnostic criteria for AIWS introduces uncertainty into reported data, necessitating cautious interpretation[10].

Consequently, in clinical practice, the diagnosis of AIWS hinges on accurate history-taking, a comprehensive physical examination (including neurological, and often otologic and ophthalmic assessments), and a solid understanding of the diverse symptoms associated with AIWS and their potential underlying causes. In cases where a central origin is suspected, additional investigations such as blood tests, EEG, and brain MRI should be conducted[11].

Patients with somesthetic perceptual symptoms were classified as type A (approximately 9% of all cases) based on defined diagnostic criteria[11]. Patients with only visual illusions were classified as type B (which, ironically, Todd did not describe but which is the most common type, accounting for up to 75%), and patients with coexisting somesthetic and visual symptoms were classified as type C (approximately 16% of cases). Our patient falls in category B[11].

A cross-sectional study of 1,480 adolescents revealed that the lifetime prevalence of visual distortions like micropsia (objects appearing smaller) and macropsia (objects appearing larger) was 5.6% in males and 6.2% in females, indicating a slightly higher occurrence in females across their lifetime[5].

Among the 166 reported cases of AIWS, the leading cause was migraine (27.1%), proceded by infections (22.9%), primarily Epstein-Barr virus (EBV) (15.7%). In descending order, other contributing factors include brain lesions (7.8%), medications (6%), drug use (6%), psychiatric disorders (3.6%), epilepsy (3%), peripheral nervous system diseases (1.2%), and miscellaneous factors (3%). Approximately 20% of patients had no identified cause for their AIWS, while 65% of cases occurred in individuals under the age of 18[4].

In our instance, AIWS was linked to a pyogenic cerebral abscess situated in the dominant parieto-occipital area. When a lesion affects two separate brain regions, the range of symptoms seems to be more complex and wide ranging. For example, when a lesion is located in the occipital areas, we typically see very minor visual abnormalities. However, as was the situation with our patient, when the lesion is closer to the parietal and temporal areas, it causes somatosensory and cognitive difficulties in addition to visual problems, resulting in more complicated symptoms that resemble an integration anomaly. A generic term used to describe all sorts of visual complaints, other than blindness, is 'visual hallucination[5].

Our case underscores the importance of conducting a thorough assessment and history-taking to understand the symptoms clearly and use appropriate terminology. In our case, we observed that the images were well-formed but distorted, with some appearing taller (macropsia) and others shorter (micropsia), along with persistent difficulties in recognizing colors (dyschromatopsia). The patient in our care experienced the development of a pyogenic brain abscess, likely attributable to his compromised immune system. Initially, his clinical progress was concerning, but subsequently, he positively responded to the treatment, and the alterations in visual perception were resolved as well, as indicated by both clinical observations and cytological analysis of cerebrospinal fluid (CSF D/R).

This improvement highlights the importance of early intervention and appropriate management of underlying conditions. Moreover, the resolution of the visual symptoms reinforces the connection between central nervous system pathology and perceptual disturbances. Continued follow-up will be essential to monitor for any potential recurrence of symptoms or complications, ensuring that the patient maintains optimal visual function and overall health. Our findings contribute to a deeper understanding of how systemic issues can manifest as perceptual disorders, emphasizing the need for a multidisciplinary approach in such complex cases.

CONCLUSION

AIWS is a self-limiting condition often managed by the treatment of underlying cause and reassurance only. To understand the pathophysiology behind such change in perception of body image and time requires thorough research and a multidisciplinary approach. Relatively limited literature has been published on AIWS and its association with pyogenic cerebral abscess has never been documented before, therefore our case provides valuable insight in the diagnosis and clinical presentation of AIWS.

DECLARATION

None

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None

PATIENTS' CONSENT

An informed consent was obtained from the patient

CONFLICT OF INTEREST

None

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