Case study

From the Pages of a Book to Real Life: The Mental Health Syndrome known as Alice in Wonderland - A Case Report

ABSTRACT

The Alice in Wonderland Syndrome (AIWS) is a rare neurological and psychiatric condition, represented as the appearance of disorienting perceptual disorder with occasional episodes of bizarre visual illusions and spatial distortions. It was first introduced by John Todd in 1955, based on the literary chronicles of the strange encounters described by Lewis Carroll in Alice in Wonderland books. A 30-year-old healthy male presented to the doctor's office with left-sided headaches lasting 24 hours and preceded by an aura. During these auras, the patient was experiencing erratic behaviors consistent with the phenomena experienced by Alice, the main character in the world-famous story. During his episodes, he reported objects around him being larger and further away than they really were (macropsia and micropsia). He described his fingers on his right hand to be much smaller when compared to his fingers on his left hand (micropsia). Additionally, objects around him were deformed and distorted (metamorphopsia). His symptoms lasted anywhere from 30 to 45 minutes. All his clinical and diagnostic workups and physician evaluations were unremarkable, and the patient was placed on valproic acid at 500 mg/day. Three months later during his follow-up, he mentioned his symptoms had subsided but were still present. His dose was once again increased to 1000 mg/day which eventually stopped all further symptoms from surfacing. He has not had another episode in three months. AIWS has been found to be related to migraines with preceding auras. Other conditions have also been linked to AIWS. It is both common in pediatrics as well as in adults. Although the symptoms are quite common in childhood and adolescence, they may occur at any age. I present an AIWS case co-existent with aura migraines.

Keywords: Alice In Wonderland Syndrome, metamorphopsias, Todd's Syndrome, lilliputian hallucinations, macropsia, micropsia, teleopsia, pelopsia, aschematia, dysmetropsia, migraines, aura.

INTRODUCTION

Alice in Wonderland Syndrome (AIWS) is a unique and unusual perceptual phenomenon that leads to transitory occurrences of distorted perception and disorientation (metamorphopsias). People who experience this rare condition may undergo brief sensations of feeling larger or smaller than they really are or that the room they are in is much larger or smaller than what it really is. The furniture around these individuals may be presumed to be distorted and feel closer or farther away than they really are. This condition, also known as Todd's Syndrome or

Lilliputian hallucinations, is a condition that affects all the senses and perception. Vision, touch, and hearing are all equally affected, and these senses are not the result of issues with the eyes or ears or hallucinations but rather alterations on how the brain perceives the environment you're in as well as how the individual's body looks. John Todd, in 1955 applied the term "The Alice-in-Wonderland Syndrome" (AIWS) to altered, bizarre perceptions of the size and shapes of patients' bodies and illusions of changes in forms, dimensions, and motions of objects that patients with migraine headaches or epilepsy experienced (figures 1 & 2). He suggested these paramnesias and hallucinations coincide with the body alterations the character Alice displayed in Lewis Carroll's earliest Alice's Adventures in Wonderland [1]. These distortions experienced by these patients include metamorphopsia (visual disturbances), macropsia (visualizing objects and body parts larger than normal), micropsia (visualizing objects and body parts smaller than normal), teleopsia (visualizing objects or people to be further than they really are), and pelopsia (visualizing objects or people to be closer than really are). These incidents are perceived as a group of cognitive impairments referred to as aschematia and dysmetropsia. Mastria et al. (2016) states that this syndrome has many different etiologies; however, EBV infection is the most common cause in children, while migraine affects more commonly adults. Many data support a strict relationship between migraine and AIWS, which could be considered in many patients as an aura or a migraine equivalent, particularly in children [2]. To date, no ICD-10 or DSM-5 criteria have been confirmed and identified for AIWS, therefore diagnosis is made on presenting signs and symptoms in addition to ruling out any other diagnosis such as primary psychiatric disorders, viral infections, and central nervous lesions. While it has historically been assumed that this syndrome is rare, epidemiologic studies in patients with migraine have reported an Alice in Wonderland syndrome prevalence rate of up to 15% among this population. Previously published etiologies implicated in Alice in Wonderland syndrome include viral infections (particularly Epstein-Barr virus [EBV]), migraine, epilepsy, central nervous system lesions, and hallucinogenic substances. One pediatric study of Alice in Wonderland syndrome found a family history of migraine or Alice in Wonderland syndrome in nearly 50% of patients, suggesting a possible genetic predisposition to this fascinating syndrome [3].

A 30-year-old male presented to the doctor's office with longstanding episodes of pulsating headaches on the left side of the head, visual disturbances, and a complaint of some of his fingers being smaller than the rest of the fingers on his other hand.

Figure 1.

Alice experiences total-body macrosomatognosia. Illustration by John Tenniel (1865)

Figure 2.

(A) Alice experiences partial macrosomatognosia, and (B) Alice experiences total-body microsomatognosia. Illustrations by John Tenniel (1890).

Note: Alice in Alice in Wonderland. Adapted from "Alice in Wonderland Syndrome," by Blom, J. 2016, *The Journal of NIH Research*, V6(3): 259-270. Copyright 2016 Adapted with permission.

CASE PRESENTATION

A 30-year-old male, neurodevelopmentally normal presented to his doctor's office with a chief complaint of pulsating headaches on the left side of his head lasting 24 hours and re-occurring every week for a period of few months. Preceding the headaches, he experienced nausea, photophobia, and phonophobia. During his episodic headaches, he reported objects around him being larger and further away than they really were (macropsia and micropsia). He described his fingers on his right hand to be much smaller when compared to his fingers on his left hand. Additionally, objects around him were deformed and distorted (metamorphopsia). He stated that his headaches started 30 minutes after he began experiencing the auras and the symptoms described. The auras did not precede the headaches or symptoms on every occasion. He mentioned that these visual disturbances had been occurring for over 1 year and that they were becoming more prevalent in the last few months. The distortions and other symptoms would last for approximately 30-45 minutes and then subside. Past medical history was unremarkable other than his mother and sister suffering from migraine headaches. His physical exam was unremarkable, and his psychiatric exam yielded no apparent findings. According to the psychiatric examination, she was conscious, and well oriented to time, place, person, and situation. Neurological exams were unremarkable, and no pathologies were noted on brain magnetic resonance imaging (MRI) and electroencephalography (EEG). A complete blood test panel was performed, and all results were within normal limits. The Structured Clinical Interview for DSM-IV Axis 1 Disorders was administered. Beck Anxiety Inventory score was 13 and the Hamilton Depression Rating Scale (HDRS) score was 17. He was treated with 500mg/day of valproic acid, and his complaints improved but were still occurring. During follow-up, his daily dose of valproic acid was increased to 1000mg/day, and the complaints were completely eliminated [4].

DISCUSSION

The above case illustrates a unique case of a 30-year-old normal male displaying clinical features consistent with Alice in Wonderland Syndrome. Since 1955, about 170 cases of AIWS have been reported in literature, with most subjects being less than 18 years old. Only a part of them fit Todd's description. Additionally, it was found in a study carried out in Japanese population with 3224 subjects between 13 to 18 years old that the occurrence of micropsia and macropsia was 6.5% and 7.3% in males and females, respectively, suggesting that visual illusions in AIWS are not as infrequent as usually believed [5]. However, most psychiatrists and neurologists conceive that there is a multitude of other AIWS cases out there that have not been given an adequate diagnosis due to a lack of classification and definition. Most professionals speculate that the actual prevalence of the syndrome is much more popular than previously stated. Factors

such as lack of reliable epidemiological data and inconsistent international parameters account for the nominal number of cases.

Migraine is one of the most common headache disorders affecting approximately 12% of the general population. A timely diagnosis is essential to avoid debilitating consequences. Migraine auras are the sensory symptoms (neurologic, gastrointestinal, and autonomic) that can occur before or during a migraine episode. These symptoms can include flashes of light, blind spots, or tingling in the hands or face [6]. Although most people who suffer from migraines report a preceding aura, not every migraine display those findings. About 10% of all migraine sufferers do not experience auras. Migraine shares common genetic variant risks with depression. Specific clinical features of common migraine seem to be determined by genetic factors. A stronger family history of migraine is associated with lower age-at-onset, higher frequency, the number of medication days, and the migraine with aura subtype [7]. The type of migraine that results with auras usually co-exist with sensitivity to movement, visual, sensory, auditory, motor, and speech disorder. Most attacks are trailed by either hours or a full day of feeling unwell called a postdrome [8]. The 30-year-old patient with metamorphopsia, macropsia, micropsia, teleopsia, and pelopsia preceded the migraine and auras. These symptoms lasted approximately 30-45 minutes with the aura lasting around 30 minutes and the pain associated with the migraines lasting a full day. What resonates with the doctors who treated the patient was how the symptoms described by the patient (specifically the macropsia, micropsia, and metamorphopsia) are consistent with a diagnosis of AIWS. AIWS symptoms have both diagnostic and therapeutic consequences that differ substantially from those in schizophrenia spectrum disorders and other hallucinatory syndromes [9]. Epilepsy, intoxication-induced migraines and EBV infections causing hallucinogenic effects are typically medication-induced. As per the patient, no substances (prescription medication, EtOH, or recreational drugs) were found in his lab work. No history of psychiatric disorders was noted, and no pathologies in the MRI or EEG were found. A migraine aura is a transient neurological symptom that most commonly involves the visual fields and occurs before the headache phase. Aura symptoms include the perception of flashing lights that begin in the center of vision and expand in jagged patterns out into the periphery. Symptoms may be somatosensory, such as numbness and tingling in the lips or fingers. They may also involve a profound alteration of the perception of space and time (AIWS). AIWS can be seen in tempero-occipital or temporo-partial-occipital lesions. [10]. A peculiar study on migraines found that verapamil was reported to be 55% effective for the treatment of migraines, while valproic acid was determined to be 18% effective [11]. The patient received an initial dose of 500 mg/day of valproic acid, raising the dose to 1000 mg/day during the follow-up visit considering the patient was still experiencing metamorphopsia. Studies have found that valproic acid is favorable in the case of migraine-induced AIWS [11]. The three-month follow-up showed no signs of re-occurrence in the patient. Studies have shown that valproic acid is a less effective treatment regimen for migraines, however in the case of this patient, valproic acid showed promising results. Valproic acid has been proven to help with migraines with auras so it should be considered in patients presenting with AIWS. Definitive diagnostic exams (MRI, EEG, and Blood tests) aid practitioners in AIWS from remaining underdiagnosed. The fleeting nature of the episodes evidently makes it difficult for doctors to study this syndrome, but future research should help better understand its effects. The diagnosis of AIWS is made by complete history taking, physical examination (involving neurologic, otologic, and ophthalmic), and being aware of various symptoms typical to AIWS. The single-

photon emission computed tomography brain scans of patients with metamorphopsia demonstrate diminished blood flow in the temporal lobes, occipital lobes, and adjacent areas of the perisylvian fissure. Throughout the episode of micropsia, the patient's functional MRI indicated hypoactivation of the primary and extrastriate regions of visual cortical areas in comparison to a control subject. The functional MRI of metamorphopsia patients interestingly reveals activation of the visual cortex and posterior cerebral regions involving the primary visual cortex and occipital fusiform gyrus [12]. To date, migraines in adults, and infection in children remain the main culprit of AIWS.

PROGNOSIS

It is imperative that physicians and practitioners are educated in the relevance of this condition, which although rare, does occur in children and adults. A misdiagnosis can easily be interpreted due to its similarity to other psychiatric and neurologic conditions. The pathophysiology of AIWS is a definite illustration of the range of manifestations that transcends from pathologies of the nervous system and the surreal sensory-perceptive experiences of people afflicted by this syndrome. Overall, central pathology is considered the most prevalent cause; however, dysmorphopsia, for example, is also experienced in the context of retinal ablation and some other types of eye disease, and plagiopsia (visual tilt) is also experienced in the context of labyrinthine disease. Similarly, various neuron populations have been identified as being responsible for mediating different types of metamorphopsia, and for other metamorphopsias educated guesses have been made. Sometimes this involves higher-order mismatches between larger components of the visual network, which can vary interindividually. An example of the latter situation can be found in complex types of prosopometamorphopsia, in which human faces may be perceived consistently as animal faces, and even in an apparently straightforward symptom such as micropsia, which was found to be associated with a consistent pattern of occipital hypoactivation and parietal hyperactivation in an fMRI study [13].

CONCLUSION AND FUTURE RECOMMENDATIONS

The unknowns of AIWS are still puzzling to many practitioners, physicians, and scholars around the world. AIWS is perhaps missed on many hospital admissions and misdiagnosis is made due to the absence of definitive universally accepted diagnostic criteria. Although there is a diagnosis for migraine-related AIWS, much research and understanding of the syndrome are still needed. The exact pathways of the syndrome depend on the underlying disorder each individual AIWS case is associated with. There is no definitive medication regimen for AIWS. Based on the individual's particular case, physicians may prescribe migraine preventive medication, antibiotics, or antivirals based on the presenting symptoms. Most recently, within the last five years, AIWS has begun to receive scientific attention once more. This is vastly due to the heightened interest in exploring the brain network and neuroimaging diagnostic advances in the field of neuroscience, psychiatry, and neurology. Although AIWS remains a mystery to some, it gives practitioners the ability to research and comprehend the sensory perception in visual and sensory processes of the central nervous system. The hope for the future is that more light is shed on this syndrome and it gets a proper classification in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).

CONSENT

It is not applicable

ETHICAL APPROVAL

It is not applicable

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