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RESEARCH ARTICLE

NEW-ONSET BIPOLAR WITH PSYCHOTIC FEATURES IN ADOLESCENCE YEARS AFTER CHIARI I MALFORMATION SURGERY: A CASE REPORT AND LITERATURE REVIEW

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ABSTRACT

Background: Chiari I malformation (CM-I) is a congenital anomaly involving cerebellar tonsillar herniation that has been reported to be linked with neuropsychiatric symptoms. Long-term psychiatric outcomes post-surgical correction remain poorly understood. ***Case:*** We report a novel case of new-onset bipolar I disorder with psychotic features in an adolescent, occurring over 8 years after surgical decompression for CM-I. The patient had no prior psychiatric history and presented with mania, psychosis, and auditory hallucinations. ***Conclusion:*** This rare presentation points out the possibilities for delayed psychiatric sequelae in patients with CM1 even after early-life neurosurgical interventions, emphasizing the necessity of long-term neuropsychiatric monitoring.

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INTRODUCTION

Chiari malformations (CM) refer to a range of hindbrain anomalies marked by cerebellar herniation through the foramen magnum, leading to compression of the caudal brainstem and upper cervical spinal cord, as well as obstruction of normal cerebrospinal fluid (CSF) flow through the fourth ventricle (1) (Dubow et al). Four classifications of Chiari malformation (CM-I, CM-II, CM-III, and CM-IV) have been described, with CM-I representing the least severe type, often accompanied by syringohydromyelia and hydrocephalus (2).Psychosis is a mental condition marked by loss of contact with reality that can occur in both psychiatric (e.g., schizophrenia, bipolar I, major depression disorder with psychosis) and medical/substance-related conditions (5).

Bipolar I Disorder is a serious mood disorder defined by the presence of at least one manic episode, which may accompany psychotic symptoms (4). A number of case reports indicate the connection between Arnold–Chiari malformation and psychiatric disorders (3), but the association with psychosis in this malformation is rarely reported, and there are no known cases reported after surgical treatment of this condition. Here, we present a case of adolescent-onset bipolar I disorder with psychotic features occurring more than eight years after surgical decompression for Chiari malformation type I (CM-I). To our knowledge, there are only six (3, 9, 11-14) known instances that describe the co-occurrence of Chiari malformation type I (CM-I) and psychotic symptoms, and ours is the first report of psychosis that emerged after CM-I decompression, which raises interest in the long-term

neurodevelopmental effects and consequences of both CM-I and its treatment.

Case Presentation: A fifteen year old girl came to our psychiatric care facility with acute psychotic symptoms. The patient had no prior history of psychiatric illnesses. As per the parents, the patient awoke at 3:30 AM in the morning and was crying, incoherent, and making disorganized statements "mommy please don't take the baby". She was saying, "father gave bluetooth so you give me the baby". The girl was telling the mother that she "took the vacuum cleaner hose and put it on the baby's hand to teach him pain". Today she woke up and told her mother, "do not worry" and was telling mother that she is "becoming perfect". She didn't sleep for several nights. The girl stated that she has been daydreaming almost all day. Recently, she has been shopping and spending a lot of money. Parents mention that she has isolated herself from her friends, and she maintains a closed-off expression.

When she was six years old, she was diagnosed with Arnold Chiari Malformation type 1 and underwent surgical decompression. The surgery was successful, and she did not experience any complications and has never had any prior psychiatric symptoms. Until the eighth grade, her academic performance was excellent. The patient never had difficulty making and keeping friends. She reported that she once went to an overnight summer camp in the eighth grade in the mountains. In the camp, she felt that other girls were talking behind her back, and she felt that "it was the end of the world". She stated that she felt better with support from her family and did not require any psychiatric intervention at that time. Learning was easy until after eighth grade. Patient mentioned that she lost interest in learning in the ninth grade. Her grades started declining, and she had problems with concentration, time management and organization. She started feeling sad and depressed in ninth grade. She cries frequently. She felt hopelessness, helplessness, worthlessness, lack of motivation, lack of drive and lack of energy. The patient verbalized, "I wish I could sleep my whole life". The patient rated her mood as 2 out of 10, 10 being the best mood. She feels that she has special powers. Over the past year, the patient has reported experiencing auditory hallucinations, describing hearing voices inside her head. She endorsed the belief that she can read others' minds and that others can read hers. She feels that other people are always mocking her behind her back and that "people are out to get her". She also demonstrated decreased need for sleep recently, stating a desire to remain awake throughout the night.

LITERATURE REVIEW

Chiari Malformation Type I (CM-I) is a congenital defect characterized by the inferior displacement of the cerebellar tonsils via the foramen magnum into the upper cervical canal. While traditionally viewed through a neurosurgical perspective due to its association with headaches, syringomyelia, and motor coordination deficits, there is a growing number of literature implicating the association of CM-I and psychiatric conditions. A review of the literature reveals only six published cases in English describing a co-occurrence of CM-I and psychotic symptoms. Three of them involved bipolar I disorder, two with schizophrenia and one with major depressive disorder with psychotic features. Importantly, in all these CM-I cases, psychosis was present before or without surgical decompression, with ours being the only case that occurred after surgical intervention with a long silent symptom-free period of more than 8 years. Additionally, what interested us is that bipolar I disorder, while not all patients experience psychosis, and it's not a criterion for diagnosis according to DSM-5, all four bipolar cases, including ours, presented with psychotic features. These cases suggest a possible neuropsychiatric connection or pathway of CM-I with psychosis, but the literature remains limited and lacks long-term follow-up studies.

A summary of key cases is shown in the table below:

Year	Psychosis onset Age	Psych Diagnosis	CM-I and surgery Timing	Authors
2006	~ 27	Schizophrenia	Pre-surgery	Ilankovic et al.[9]
2014	~36	Schizophrenia	Pre-surgery	Genova et al.[13]
2021	41	Major depressive disorder with psychotic feature	Pre-surgery	Badrfam et al.[14]
2022	35	Bipolar I + Panic disorder	Pre-surgery	Pagni et al.[11]
2022	39	BipolarI +panic disorder+MDD	Pre-surgery	Yalçın et al.[12]
2024	16	Bipolar I	Pre-surgery	Raj et al.[3]
2025	15	Bipolar I	Post-surgery	Current case

DISCUSSION

This case adds to the limited but growing field of literature suggesting a potential link between Chiari malformation type I (CM-I) and psychiatric outcomes, particularly bipolar I disorder with psychotic features. What makes this case especially unique is the delayed onset of symptoms, emerging over eight years after surgical decompression in an adolescent with no prior psychiatric history. To our knowledge, this is the first reported case of psychosis developing long after CM-I surgery, highlighting a previously underrecognized long-term psychiatric vulnerability in this patient population. There are several existing studies that correlate cerebellar pathology with psychosis (15-17), Torgeir et al also illuminates the role of cerebellum in predictive sensorimotor control and higher level cognitive function (10). This hints at the correlation of organic etiology with psychosis. While traditionally regarded as a structural anomaly affecting motor coordination and CSF dynamics, emerging studies increasingly implicate the cerebellum in emotion regulation, cognition, and psychiatric pathophysiology. Neuroanatomically, the cerebellum forms extensive bidirectional connections with the limbic system, thalamus, prefrontal cortex, and brainstem monoaminergic nuclei, regions implicated in mood and psychotic disorders (6, 8). Functional imaging studies of patients with bipolar disorder have revealed reduced cerebellar gray matter volume and disrupted cerebellar-cortical connectivity, suggesting a possible pathophysiologic role for the cerebellum in mood dysregulation (7). It's interesting to notice the presence of psychotic features in all the reported bipolar cases with CM-I. According to DSM-5, although psychosis is not required for a bipolar I diagnosis, all known current CM-I–associated bipolar cases, including ours, exhibited psychotic symptoms, which may suggest a possible Chiari malformation structural correlation with psychosis that needs further exploration.

Our case and others raise the question: Could congenital cerebellar anomalies like CM-I create a latent vulnerability for psychiatric disorders that manifest later in development? Moreover, considering the delayed onset, years after surgical correction, does neurosurgical intervention, while effective for structural decompression, fully address these

neurodevelopmental risks, or could it, in some cases, predispose or be relevant to later psychiatric vulnerability?

A case we encountered in our literature review involved a patient with long-standing treatment-resistant psychosis, ultimately found to have CM-I (9). This case reinforces the need for clinicians to maintain a high suspicion for these organic etiologies, particularly in treatment-resistant psychosis or when symptoms arise in the absence of psychosocial stressors or family psychiatric history, as seen in our patient.

Finally, it's important to point out the clinical importance of long-term neuropsychiatric monitoring in patients with CM-I, even after successful early-life surgical decompression. Routine psychiatric screening and increased awareness among pediatricians, neurosurgeons, and mental health professionals could help in early identification and intervention. From a research perspective, the growing association of chiari malformation with psychiatric disorders invites translational studies, including animal models, to explore how cerebellar maldevelopment and anomalies, or other unknown mechanisms or pathways can predispose to affective or psychotic syndromes.

CONCLUSION

This is the first case of bipolar I disorder with psychotic features emerging years after Chiari I malformation decompression. To our knowledge, this case represents the first reported instance of bipolar I disorder with psychotic features developing years after surgical decompression for Chiari I malformation (CM-I). Our case adds to the limited but growing literature field where CM-I is linked with psychiatric disorders beyond its neurological presentation, emphasizing the significance of integrating psychiatric monitoring into the long-term follow-up of patients with a history of CM-I, including those deemed neurologically stable after surgery. Finally, the case underscores the need for further multidisciplinary and longitudinal research studies to investigate the underlying neurodevelopmental and pathophysiological mechanisms linking cerebellar abnormalities to psychotic disorders.

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List of abbreviations: Chiari Malformation Type I (CM-I), Major depression disorder (MDD)

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