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Arachnoid Cyst and Autism Spectrum Disorder: A Case Report

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Abstract **Case Report**

Arachnoid cysts (ACs) are cerebrospinal fluid accumulations in the central nervous system, surrounded by thin membranes contiguous with the surrounding normal arachnoid. Although most patients are asymptomatic, some present with various symptoms that sometimes require surgical intervention. The association between arachnoid cysts and autism has been reported in some studies. We present here the case of a 16-year-old female patient, monitored and hospitalized in the day hospital of the child psychiatry department for autism spectrum disorder, who was found to have an arachnoid cyst on brain CT imaging.

Keywords: Autism Spectrum Disorder, Arachnoid Cyst, Brain CT scan, Epilepsy, Neurosurgical Intervention, Intellectual Disability.

INTRODUCTION

Arachnoid cysts (ACs) are cerebrospinal fluid accumulations in the central nervous system, surrounded by thin membranes contiguous with the surrounding normal arachnoid. They are characterized by hyperplastic arachnoid cells, increased collagen, and the absence of normal spiderweb-like trabeculations [1, 2].

While most patients are asymptomatic, 5% to 12% are not, with 4% to 7% requiring neurosurgical intervention [3, 4]. Symptomatic patients most often present with headaches (31%), nausea/vomiting (21.7%), cranial nerve dysfunctions (21.7%), and macrocephaly (15%) [4]. Recent studies have suggested that many arachnoid cysts can lead to clinically significant symptoms, such as cognitive impairments and psychiatric disorders, which may be alleviated by neurosurgical intervention [5-7].

Symptomatic arachnoid cysts have been broadly defined by the presence of clinical symptoms triggered by the cyst, necessitating clear and actionable neurosurgical interventions, such as obstructive hydrocephalus, increased intracranial pressure, or focal neurological deficits [8, 9]. However, various neurodevelopmental phenotypes, such as autism spectrum disorder (ASD) [10], developmental delay [11, 12], seizures [13], and psychiatric disorders [14-16], are also frequently observed in patients with ACs.

The association between arachnoid cysts and autism has been very rarely reported [17, 18].

Here, we present the case of a 16-year-old female patient, monitored and hospitalized in the day hospital of the child psychiatry department for autism spectrum disorder, who was found to have an arachnoid cyst on brain CT imaging.

PATIENT AND OBSERVATION

Youssra, the eldest of two siblings, was born to non-consanguineous parents. She was delivered at term via vaginal delivery (39 weeks of gestation) with a birth weight of 3.50 kg. No medical complications were reported during the pregnancy, delivery, or postpartum period.

At the age of 7 months, she began experiencing crying episodes accompanied by cyanosis, prompting multiple pediatric consultations. An EEG and brain CT scan were performed. The EEG results suggested temporal lobe epilepsy, and the brain CT revealed an arachnoid cyst. Youssra was prescribed valproic acid, which improved her epileptic seizures. No surgical intervention was recommended for the arachnoid cyst.

Her early motor developmental milestones were within normal limits, including walking at 12 months and achieving toilet training on time. However, her language development was delayed, with her first words emerging

around the age of 5. This led to multiple consultations in child psychiatry, where a diagnosis of autism spectrum disorder (ASD) was made based on DSM-5 criteria.

She underwent numerous speech therapy and psychomotor rehabilitation sessions, resulting in slight improvement in both verbal and non-verbal communication as well as motor skills.

For her epilepsy, Youssra continued sodium valproate until the age of 7, after which it was discontinued. She is currently seizure-free.

At present, clinical examination reveals that Youssra avoids direct eye contact, frequently averts her gaze, continues to exhibit motor stereotypies, and has very limited social interactions. Her language skills have improved. Both somatic and neurological examinations are unremarkable.

DISCUSSION

Our case represents one of the rare instances of autism spectrum disorder (ASD) associated with an arachnoid cyst (AC) and epilepsy reported in the literature.

Another study [18], described a similar case of an 8-year-old child with a history of epileptic seizures controlled by sodium valproate, left-sided spastic hemiparesis causing gait disturbances, and autistic symptoms. Brain CT scan revealed an arachnoid cyst in the left sphenoidal region. The same study also presented a case of a 4-year and 9-month-old child with intellectual developmental disorder, motor developmental delays, and gait disturbances due to mild spasticity in the lower limbs. This child also experienced epileptic seizures controlled by sodium valproate, and brain CT showed a large, well-defined arachnoid cyst in the left temporal fossa, causing temporal lobe atrophy.

A 2006 study [10], on children with ASD and developmental delays reported that 49% had abnormalities on brain MRI, 8% of which were attributed to arachnoid cysts. While this study did not explore the precise nature of the relationship, it suggested that ACs are associated with severe neurodevelopmental disorders.

Several other studies have established a link between arachnoid cysts located in the temporal regions and the Sylvian fissure and cognitive impairments [21-7]. A radiological study [22], conducted on children with severe intellectual developmental disorders found ACs in 3.1% of participants. Additionally, several case reports have documented cognitive impairments and intellectual developmental disorders in patients with ACs, often accompanied by other clinical symptoms and comorbidities [21-7].

Although arachnoid cysts are relatively common in the general population, their pathogenesis remains poorly understood. While some intracranial ACs have been considered secondary to ischemic, traumatic, or infectious injuries during gestation [9], most are thought to be primary or sporadic in origin.

Current treatment options for intracranial ACs include endoscopic or open fenestration of the cyst, shunt placement, cyst wall resection, and medical treatment with acetazolamide [24, 25]. Kershenovich and Toms [29], proposed that symptoms related to ACs might result from increased pressure of the fluid within the cyst on surrounding structures. They suggested that reducing the amount of fluid in the cyst or surrounding cerebrospinal fluid, using acetazolamide (a carbonic anhydrase inhibitor that reduces cerebrospinal fluid production), could mimic the effects of surgical decompression.

For symptomatic spinal ACs, complete cyst resection is currently the preferred treatment [26]. However, many patients continue to experience refractory symptoms after cyst removal [8], suggesting that not all symptomatic ACs necessarily require surgical intervention.

Several studies have demonstrated improvements in cognitive functions, measured by various neuropsychological tests, in symptomatic patients who underwent surgery for ACs due to other classic symptoms [27-6]. These patients often had additional surgical indications, such as mass effect or increased intracranial pressure, which may also have contributed to the observed cognitive dysfunctions.

Vaivre-Douret *et al*., [30], described a 6-year-old boy with pervasive developmental disorder not otherwise specified, whose brain MRI revealed a large left temporopolar arachnoid cyst with significant mass effect on the left temporal lobe. Neurosurgical intervention was associated with symptom improvement.

In our case, no surgical treatment was recommended for the arachnoid cyst.

CONCLUSION

The association between arachnoid cysts and autism spectrum disorder (ASD) has been reported in the literature, albeit rarely. These observations support the hypothesis of a potential link between arachnoid cysts and significant cognitive dysfunctions, warranting further research to better understand this relationship.

It is crucial for clinicians to be aware of this association when managing patients with neurodevelopmental disorders, including ASD and intellectual developmental disorder. Clinicians should not hesitate to request radiological assessments and refer patients to specialists when necessary.

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