ORIGINAL ARTICLE

Eastern Journal of Medicine

East J Med 28(2): 320-324, 2023
DOI: 10.5505/ejm.2023.01112

Clinical and Radiological Evaluation of Childhood Arachnoid Cyst Cases

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ABSTRACT

Intracranial arachnoid cysts are benign, non-genetic cavities that contain cerebrospinal fluid-like sterile secretions surrounded by an arachnoid membrane.

In this study, 190 patients younger than 18 years of age who applied to the pediatric neurology clinic, underwent neuroimaging for different indications and were found to have arachnoid cysts were retrospectively analyzed. It was planned to examine various clinical evaluations such as demographic characteristics of the patients, complaints at presentation, physical examination findings, additional anomalies or diseases accompanying the arachnoid cyst, the location of the arachnoid cyst and/or cysts in the cranium, imaging data including the location of the cysts, and the treatments applied.

132 (69.4%) of the patients were male and the mean age at presentation was 8 (4±11.2). The complaints of the patients were seizure (23.6%), headache (23.1%), neuromotor growth retardation (18.4%) and various reasons (34.2%), respectively. In the neurological examination, findings such as neurocutaneous skin finding, localised neurologic deficit, ataxia, altered consciousness, hypotonia, and macro/microcephaly were found in 40 (21%) patients, respectively. Arachnoid cysts were located in the middle fossa in 93 (48.9%) patients, in the posterior fossa in 83 (43.6%) patients, in the anterior fossa in 24 (12.6%) patients, and in the spinal region in 1 (0.5%) patient. Arachnoid cysts were found in the right hemisphere in 94 (49.4%) patients, in the left hemisphere in 82 (43.1%) patients, and bilateral in 14 (7.3%) patients. There was no change in cyst size and localization in 39 of the patients who underwent control brain MRI, and a decrease of 0.5 cm (0.2±0.8 cm) in cyst size was detected in 13 patients. Surgical treatment was applied to two of the patients with arachnoid cysts.

In conclusion, there are no widely accepted treatment principles for arachnoid cysts. Fundamentally, due to the benign nature of these lesions, the lack of a common consensus on the approach to arachnoid cysts complicates the current situation. It was determined that most of the cases did not require treatment. Knowing the clinical features of cysts is important to prevent unnecessary tests and treatments. However, it should not be forgotten that close follow-up of possible risky cases is necessary. In addition, radiological follow-up of cyst sizes of AC patients, as well as neuropsychiatric evaluations, are recommended to be considered in future studies.

Keywords: Arachnoid cyst, Childhood, Clinical finding, Radiology

Introduction

Intracranial arachnoid cysts are benign cavities surrounded by an arachnoid membrane and containing sterile secretion similar to cerebrospinal fluid (1). Arachnoid cysts, which are mostly detected in childhood, are detected in neuroimaging for the evaluation of conditions such as developmental delay, headache, head trauma and epileptic seizures (2). The majority of arachnoid cysts are detected by the evaluation of neuroradiological examinations in childhood, and its frequency has been found to be 2.6%. Since this rate varies between 1.1-2.3% in adults, it is thought that some of the cysts regress over time (3). While arachnoid cysts are frequently found in the middle fossa, they are found in the posterior fossa, suprasellar, frontal, cerebral convexity, interhemispheric fissure, and quadrigeminal

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Received: 07.02.2023, **Accepted:** 16.03.2023

cistern, respectively (4). The clinical findings of arachnoid cysts are often nonspecific and variable, mostly asymptomatic. Findings are related to the size of the cyst, its anatomical location, and its effect on cerebrospinal fluid (CSF) flow. The most common symptoms are; complaints such as headache, seizures, dizziness, gait disturbance, nausea-vomiting, tinnitus, double vision, growth retardation, and swelling in the calvarium are caused by increased intracranial pressure and compression of neuronal tissues (5, 6).

In this study, patients who applied to our clinic, had neuroimaging for different indications and were found to have arachnoid cysts were retrospectively analyzed. Demographic features of patients, complaints at presentation, physical examination findings, additional anomalies or diseases accompanying arachnoid cyst, location of arachnoid cyst and/or cysts in the cranium (anterior fossa, middle fossa, posterior fossa, other localizations), direction of location (right hemisphere, left various clinical data, such as imaging data, including hemisphere, bilateral) and treatments applied, were examined.

Material and Methods

Patients: 190 patients younger than 18 years of age, who applied to the pediatric neurology clinic of SBU Dr Sami Ulus Gynecology, Child Health and Diseases Training and Research Hospital between January 2015 and December 2020, who underwent neuroimaging for different indications and were found to have arachnoid cysts, were retrospectively analyzed. Demographic characteristics of all patients, complaints at presentation, physical examination findings, additional anomalies or diseases accompanying arachnoid cyst, location of arachnoid cyst and/or cysts in the cranium (anterior fossa, middle fossa, posterior fossa, other localizations), direction of location (right hemisphere), left hemisphere, bilateral) imaging data and treatments applied were reviewed. It is planned to examine various clinical evaluations such as changes in cyst size and clinic, and treatments applied in patients with more than one neuroimaging in their clinical follow-up.

Results

190 patients younger than 18 years of age, who applied to our clinic with different clinical complaints between January 2015 and December 2020 at SBU Dr Sami Ulus Gynecology, Obstetrics and Gynecology Training-Research Hospital, who requested brain MRI examination and were found to have arachnoid cysts in their brain MRI, were included in the study. 132 (69.4%) of the patients were male. The mean age at presentation was 8 (4±11.2). When the complaints of the patients were examined, seizures in 45 (23.6%) patients, headache in 44 (23.1%) patients, neuromotor developmental delay in 36 (18.4%) patients, and various causes (trauma, dizziness, central nervous system infection in 65 (34.2%) patients, acute changes in consciousness and gait disturbance) were detected (Table-1).

When the neurological examinations of the patients were evaluated, 40 (21%) patients had pathological neurological examination findings such as neurocutaneous skin finding, side neurologic deficit, ataxia, altered consciousness, hypotonia, and macro/microcephaly, respectively.

Arachnoid cysts were located in the middle fossa in 93 (48.9%) patients, in the posterior fossa in 83 (43.6%) patients, in the anterior fossa in 24 (12.6%) patients, and in the spinal region in 1 (0.5%) patient. Arachnoid cysts were found in the right hemisphere in 94 (49.4%) patients, in the left hemisphere in 82 (43.1%) patients, and bilateral in 14 (7.3%) patients (Table-2). Figure 1 (A,B,C) shows a case example of a patient with an arachnoid cyst.

Control brain MRI was performed in 52 of the patients for an average of 1.8 years (1±4 years), and no change in cyst size and localization was observed in 39 patients, and a decrease of 0.5 cm (0.2±0.8 cm) in cyst size was detected in 13 patients.

Considering the clinical follow-ups of patients with arachnoid cysts, surgical treatment was applied to a patient with a cyst size of 10 cm who had symptomatic seizures due to compression on the temporal region, and a patient who presented with a complaint of gait disturbance and was found to have an arachnoid cyst in the thoracic region of the medulla spinalis.

Discussion

Arachnoid cysts have been defined as the most common congenital cystic lesions of the brain that are benign (7, 8). The incidence of arachnoid cysts has increased as a result of the increasing use of brain neuroimaging, especially brain MRI. However, the frequency of arachnoid cysts is not known exactly. In our study, 69.4% of the patients were male and the result was found to be compatible with the literature (5, 9)

Table 1. Characteristics of Patients

Age (year)	
Median (interquartile range)	8 (4±11.2)
Sex, n (%)	
Male	132 (69.4%)
Female	58 (30.6%)
Presenting Symptom, n (%)	
Afebrile seizure	56 (29.5%)
Headache	47 (24.7%)
Dizziness	5 (2.6%)
Acute ataxia	3 (1.6%)
Trauma	7 (3.7%)
Acute altered consciousness	5 (2.66%)
Tremor	3 (1.6%)
Vomiting	3 (1.6%)
Physical examination findings, n (%)	
Normal	150 (78.9%)
Abnormal	36 (21.1%)

Table 2. Distribution of locations of arachnoid cysts

Location	% (n)
Right hemisphere	49.4% (94)
Left hemisphere	43.1% (82)
Bilateral	7.3% (14)
Middle fossa	48.9% (93)
Posterior fossa	43.6% (83)
Anterior fossa	12.6% (24)
Spinal region	0.5% (1)

When neuroimaging indications are examined in cases with arachnoid cysts; Causes such as headache, epileptic seizure, macrocephaly, torticollis, trauma, acute neurological or mental status change have been reported at different rates in various studies (6, 7). In our study, the most common indication for neuroimaging was seizures in 45 (23.6%) patients, headache in 44 (23.1%) patients, and neuromotor developmental delay in 36 (18.4%) patients, and similar results were obtained in previous studies (5, 6).

In our study, when the neurological examinations of the patients were evaluated, pathological neurological examination findings such as neurocutaneous skin finding, localised neurologic deficit, ataxia, altered consciousness, hypotonia, and macro/microcephaly were found in 40 (21%) patients, respectively. There was no significant relationship between cyst sizes in patients with and without neurological findings on physical examination. When the results in the literature were compared with the results obtained in our study, no correlation was found between cyst size and physical examination findings (6). These findings are thought to be due to individual differences in patients.

Depending on the size and localization of arachnoid cysts, they may cause nonspecific complaints. Arachnoid cysts can be seen frequently in the cranial region (2).

It is thought that knowing the localization of arachnoid cysts well and knowing the symptoms of the patients in this localization will help the physician in the differential diagnosis of the cases. Similarly, in our study, it was most common in the middle fossa in 93 (48.9%) patients, respectively; It was localized in the posterior fossa in 83 (43.6%) patients, in the anterior fossa in 24 (12.6%) patients, and in the spinal region in 1 (0.5%) patient. Determining the complaints according to the location of the arachnoid cysts

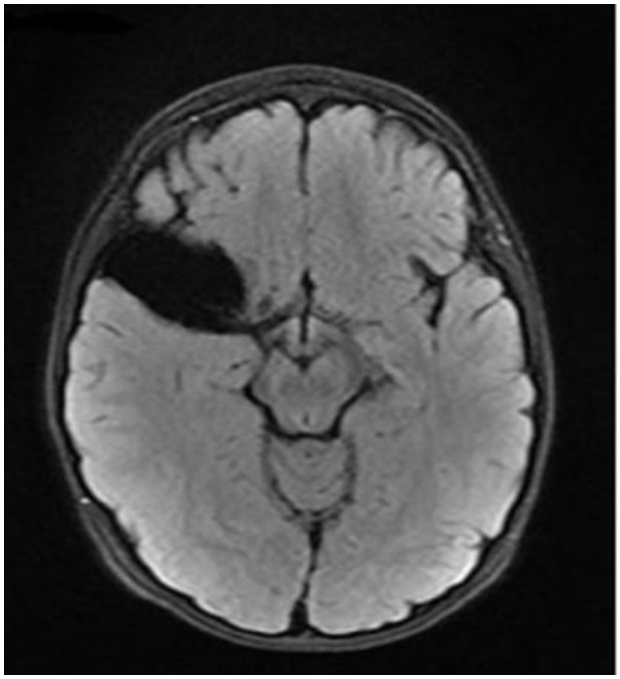

Fig. 1A. Ax Flair image; A hypodense extraxial cystic mass lesion with a signal similar to CSF is observed in the right frontotemporal area

Fig. 1B. Ax T1 image; A hypodense cystic mass lesion in the right temporal anteromedial extraaxial area that creates an indentation to the temporal lobe

may help in locating the cysts in patients with similar symptoms.

The natural course of arachnoid cysts is variable. The size of the cyst may increase, not change, or the cyst may shrink (5). In our study, control brain MRI was performed in 52 of the patients for an average of 1.8 years (1±4 years), and cyst size and localization did not change in 39 patients, and a decrease of 0.5 cm (0.2±0.8 cm) in cyst size was detected in 13 patients. Looking at the literature, Al-Holou et al (2013) examined MRI of 11738 children and found 309 arachnoid cysts. 111 of these patients were followed for a mean period of 3.5 years. The arachnoid cysts increased in size in 10% of the cases, decreased in size in 12%, and the rest of the cases remained stable. In recent studies, besides the change in the size of the cyst,

Fig. 1C. Cor FES-IR image; A hyperintense extraxial cystic mass surrounding the MCA M1 segment in the right frontotemporal area forms an indentation to the temporal lobe

it was also investigated whether it had an effect on neurocognition (10).

Studies have shown that mild neurocognitive retardation can be seen in long-term follow-ups, albeit in a small group. Neurocognitive evaluation of patients is thought to be as important as the evaluation of whether the AC can increase in size with radiological imaging. Therefore, further investigation of the possible neuropsychological consequences of arachnoid cysts is needed (11). Since this study is a retrospective study, a neurocognitive evaluation could not be made.

The treatment of arachnoid cysts is controversial (5). Many studies have been reported showing that arachnoid cysts in different localizations go to spontaneous resolution or regression with a conservative approach. A conservative approach is generally recommended in asymptomatic patients. Generally recommended; If an arachnoid cyst is detected incidentally or is followed conservatively, it should be followed up with computerized tomography and/or MRI (every six months for the first two years). If the cyst is stable at the end, follow-up should be continued at intervals of one year (12).

In our study, surgical treatment was applied to 2 patients with arachnoid cysts in the thoracic region, who applied with the complaint of symptomatic seizure and gait disturbance due to the effect of pressure on the temporal region. Surgical treatment of arachnoid cysts is controversial. There is no Class I evidence (3) therefore surgical treatment is indicated in symptomatic cases (eg headache). In asymptomatic

patients, surgical treatment should be individualized according to the possible risk of rupture.

Reported approaches include craniotomy, cyst shunting, and endoscopic fenestration (1). Spontaneous rupture is a very rare complication of arachnoid cyst. Rupture of arachnoid cyst causes subdural hygroma formation and increased intracranial pressure, necessitating surgical intervention. The use of cross-sectional imaging is vital for rapid diagnosis of this potentially life-threatening condition. (13). None of our patients required emergency surgery.

After successful endoscopic fenestration as a surgical treatment, a significant reduction of 30-40% in arachnoid cyst volume is observed (11).

The location of an AC has an impact on clinical presentation, treatment, and outcome. The type and number of complications also depend on the location of the cyst. Young age at the time of surgery is the most important risk factor for higher complication rate and worse outcome. Recurrence and revision rates are significantly higher in young infants (9, 10).

In conclusion, there are no widely accepted treatment principles for arachnoid cysts. Fundamentally, due to the benign nature of these lesions, the lack of a common consensus on the approach to arachnoid cysts complicates the current situation. It was determined that most of the cases did not require treatment. Knowing the clinical features of cysts is important to prevent unnecessary tests and treatments. However, it should not be forgotten that close follow-up of possible risky cases is necessary. In addition, it is recommended that neuropsychiatric evaluations be made in addition to radiological follow-up of cyst sizes of AC patients and should be considered in future studies.

Conflict of Interest: None of the authors has any conflict of interest to disclose.

Financial Disclosure: All authors do not have any financial or personal relationships with other persons or organizations that may inappropriately influence (bias) their work.

Ethics Approval: The study was first approved by the University of Health Sciences, Dr. Sami Ulus Maternity and Children Training and Research Hospital (EC number: E-21/03-133).

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