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# Spontaneous Rupture of the Middle Fossa Arachnoid Cyst into the Subdural Space: Case Report

**Authors' Contribution:** 

A Study Design

B Data Collection

C Statistical Analysis

**D** Data Interpretation

**E** Manuscript Preparation

F Literature Search

**G** Funds Collection

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## Summary

Background:

Arachnoid cysts are congenital, benign and intra-arachnoidal lesions. A great majority of arachnoid cysts are congenital. However, to a lesser extent, they are known to develop after head trauma and brain inflammatory diseases. Arachnoid cysts are mostly asymptomatic and they can develop anywhere in the brain along the arachnoid membrane.

**Case Report:** 

Arachnoid cysts form 1% of the non-traumatic lesions which occupy a place and it is thought to be a congenital lesion developed as a result of meningeal development abnormalities or a lesion acquired after trauma and infection. There is a male dominance at a rate of 3/1 in arachnoid cysts which locate mostly in the middle fossa. Our patient was a 2-years-old boy.

**Conclusions:** 

As a conclusion, spontaneous subdural hygroma is a rare complication of the arachnoid cysts. Surgical intervention could be required in acute cases.

MeSH Keywords:

Arachnoid Cysts • Magnetic Resonance Imaging • Subdural Effusion • Tomography Scanners, X-Ray Computed

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#### **Background**

An arachnoid cyst is an intra-arachnoid cyst which contains cerebrospinal fluid without any connection with the ventricular system, and is usually unaccompanied by anomalous development of the brain structure. Arachnoid cysts form 1% of intracranial masses [1]. Arachnoid cysts are most frequently seen in the middle cranial fossa, at a rate of 50-65%. They are also seen in the supracellular and quadrigeminal systems, the posterior fossa, cerebral convexity and interhemispheric fissure. The cysts that are located in the middle cranial fossa develop most commonly in males and on the left side [1]. Most patients are asymptomatic [4-6]. In symptomatic patients with arachnoid cysts, asymmetric macrocrania, acute and chronic intracranial hypertension, headaches, seizures, neurological deficits and psychomotor retardation are frequently encountered. Subdural hygroma and hematoma can occur in the wake of a minor head trauma and are the recognized complications of middle cranial fossa arachnoid cysts. Spontaneous rupture of an arachnoid cyst is observed infrequently [4,7,8].

In this study, a spontaneous rupture of an arachnoid cyst associated with subdural hygroma was detected in the follow-up images of a boy who had been previously diagnosed with an arachnoid cyst in the middle cranial fossa. The results obtained are presented together with the studies in the literature.

#### **Case Report**

A two-year-old boy was admitted to the neurosurgery clinic with complaints of a growth in the head and vomiting in July 2014. An anarachnoid cyst (4.5 cm in diameter, 2.5 cm in thickness), which was isodense with CSF, was determined in the left temporal region on CT imaging. It was exhibiting a pressure effect on the adjacent brain parenchyma (Figure 1). The patient did not undergo surgical intervention and surveillance of the patient was carried out, with a decline in symptoms. In October 2014, cranial Magnetic Resonance Imaging (MRI) with 1.5-Tesla was performed in the patient in a fair general clinical condition, for the purposes of examination. Subdural effusion was determined in



**Figure 1.** Axial CT image. There is an arachnoid cyst in the left temporal region visible.

the left cerebral region; it was 6 mm thick at its thickest part causing compression on the left lateral ventricle and a midline shift of 5 mm from left to right. It was isointense with the cortex on T1-weighted MRI images, hyperintense

on T2-weighted and FLAIR images, hypointense on diffusion-weighted imaging (DWI), and hyperintense on the Apparent Diffusion Coefficient (ADC) images (Figure 2). Moreover, a decrease in the size of the arachnoid cyst as a result of rupture into the subdural space was noted (Figure 2D–2F). An MRI scan of the unoperated but monitored patient was performed in February 2015; a minimal reduction in effusion thickness was observed, with no significant differences observed on the MRI images (Figure 3).

### **Discussion**

Arachnoid cysts form 1% of the non-traumatic brain lesions and are thought to be congenital lesions developed as a result of meningeal development abnormalities, or lesions acquired subsequent to a trauma or infection [2,9,10]. There is male dominance at a rate of 3/1 in arachnoid cysts, which are mostly located in the middle fossa [2,11]. Our patient was a two-year-old boy.

Some cases have been reported in which the arachnoid cysts grew over time or disappeared spontaneously, or disappeared subsequent to a head trauma [4,12]. Secondarily, subdural hematoma, subdural hygroma, intracystic bleeding, formation of an intradiploic mass lesion, and epidural hematomas may emerge in patients [2,13]. Chronic subdural hematomas and hygromas occur in 16% of arachnoid cysts in the middle cranial fossa, especially in young

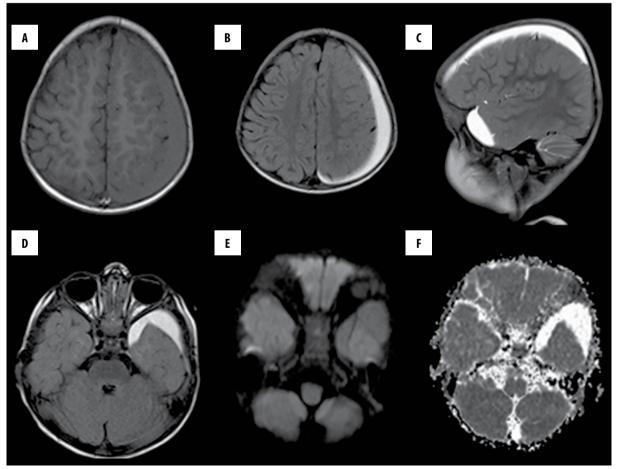


Figure 2. MRI images obtained in January 2014. (A) Axial T1, (B) axial T2, (C) sagittal T2, (D) axial FLAIR, (E) axial DWI, (F) axial ADC.

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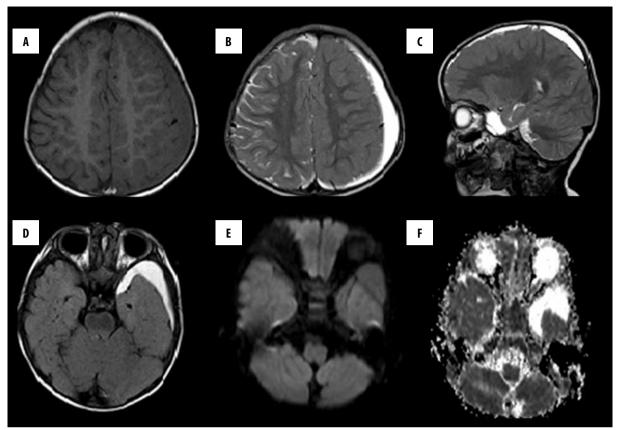


Figure 3. MRI images obtained in February 2014. (A) Axial T1, (B) axial T2, (C) sagittal T2, (D) axial FLAIR, (E) axial DWI, (F) axial ADC.

patients [2,14]. In most patients with subdural hematoma or hygroma, a history of head trauma is present. There was no significant head trauma in our patient. Subdural hematoma and hygroma which develop after head trauma are rarely encountered complications of arachnoid cysts, while spontaneous development is even rarer.

Subdural bleeding may be caused by a head trauma or by spontaneous laceration of weak leptomeningeal and bridge veins inside the cyst, or in the cyst wall. Membraneous adhesions and reduced compliance are predisposing factors [2,12]. Subdural hygroma which occurs as a result of rupture of the arachnoid cyst into the subdural space can emerge following minor head trauma, prolonged valsalva maneuver, or it can emerge spontaneously without any head trauma [4]. As a consequence of contact between the cyst wall, the sphenoid wing, and the tentorial incisure, the cyst wall ruptures and the cystic fluid may pass into the subdural space or into both the subdural and subarachnoid spaces. The fluid cannot return into the cyst due to the flap-valve mechanism and fluid accumulation takes place in the subdural space [2,15]. Another opinion argues that after a head trauma, CSF passes into the anarachnoid cyst from the subarachnoid space; it tears the cyst wall by increasing the intra-cystic pressure so that the intra-cystic fluid then passes into the subdural space [16].

In Magnetic Resonance Imaging, the imaging findings in different sequences show variations that depend on the duration of a particular subdural hematoma. This is because hemoglobin exhibits variability in its biochemical structure. According to that, hyperacute subdural hematoma T1: isointense with gray matter, T2: isointense or hyperintense, FLAIR: hyperintense acute subdural hematoma, T1: hyperintense depending on transformation of hemoglobin to methemoglobin, T2: hyperintense, FLAIR: monitored as hyperintense [17].

In the follow-up MR examination (during the sub-acute phase) of our case, the hyperintense signal that may indicate methemoglobin was not observed in the T1 sequence, and there was not any signal variance that might have indicated blood in other sequences either; therefore, that aspect was evaluated in support of subdural hygroma. The rupture of an arachnoid cyst can cause instantaneous and life-threatening symptoms. For this reason, the risk of cyst rupture should always be kept in mind, particularly if changes in the size of the cyst are detected [18].

#### **Conclusions**

In conclusion, spontaneous subdural hygroma is a rare complication of arachnoid cysts. Surgical intervention can be required in acute cases.

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