

# Chronic Subdural Hematoma Associated with an Arachnoid Cyst in a Juvenile Taekwondo Athlete: A Case Report and Review of the Literature

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## Key Words

Chronic subdural hematoma · Arachnoid cyst · Taekwondo · Sports-related injury · Children

## Abstract

Both chronic subdural hematoma and arachnoid cysts are common lesions in neurosurgical practice. Arachnoid cysts are a well-known predisposing factor for chronic subdural hematoma. Here, we present a 12-year-old taekwondo athlete with chronic subdural hematoma associated with arachnoid cysts. The chronic subdural hematoma was evacuated through 2 burr holes and the patient was discharged in good condition. To our knowledge, this is the first case of chronic subdural hematoma with associated arachnoid cysts in a taekwondo athlete. We also review the literature on sports-related chronic subdural hematomas associated with arachnoid cysts in children.

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## Introduction

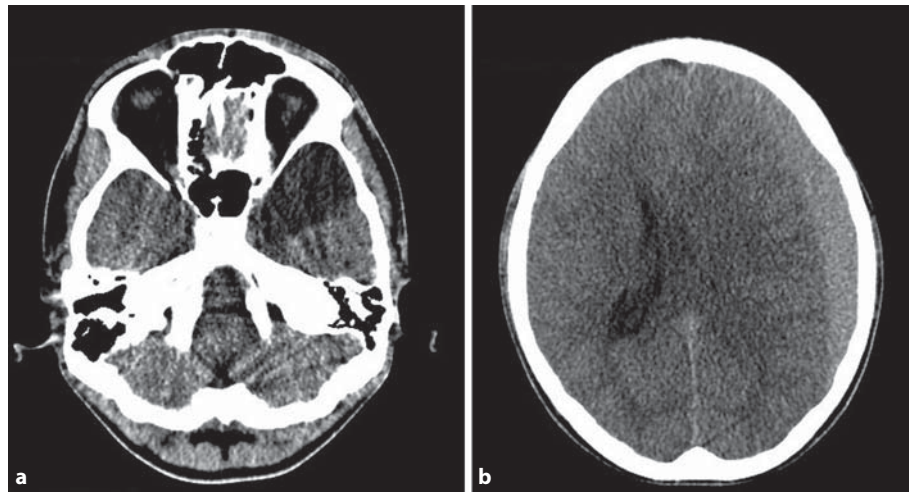
Taekwondo is a more than 1,000-year-old Korean martial art which has gained worldwide popularity since the early 1980s. It earned Olympic sport status when it was included in the 2000 Sydney Olympic Games for the first time. Taekwondo is a full-contact free-sparring sport

which awards points for head contacts. As expected, increased injury rates have been reported, especially in relation to head injuries [1, 2]. However, most of the head injuries and cerebral concussions are mild; serious head injuries are considered rare events under the modern protective rules of taekwondo [1, 3]. The frequency of head injuries has declined since the introduction of a rule requiring participants to wear protective helmets during fights [1].

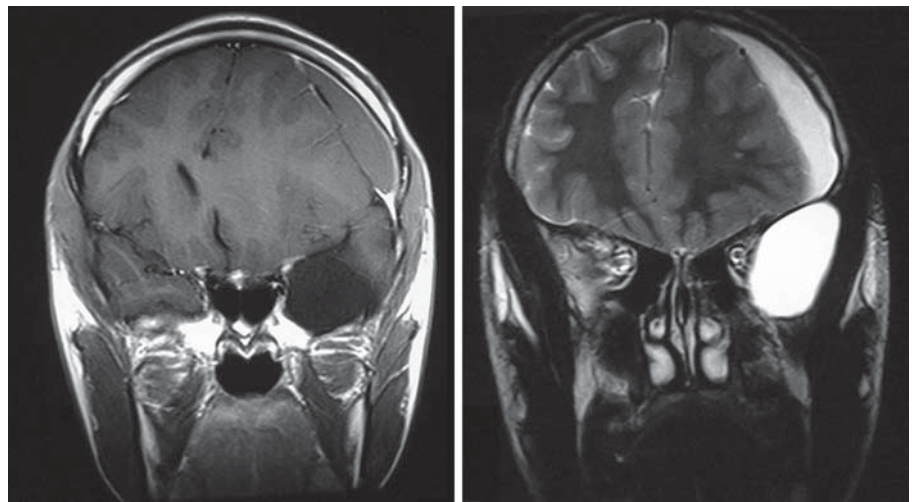
Both chronic subdural hematoma (CSDH) and arachnoid cysts (ACs) are common lesions in neurosurgical practice. ACs are now recognized as one of the causes of CSDH after head injury, especially in young people [4]. Here we present the first case of CSDH associated with ACs in a taekwondo athlete. We also review the literature on CSDHs associated with ACs in sports-related injuries in children and juveniles.

## Case Report

A 12-year-old boy was admitted to our neurosurgical department with the complaint of progressive headache for about 2 weeks. He was a taekwondo athlete in a professional sports school. He reported having repetitive mild head injuries due to taekwondo trainings. Computed tomography (CT) of the head revealed a left temporal AC and an ipsilateral frontoparietal isodense subdural hematoma and a midline shift (fig. 1). The same pathologies were confirmed by subsequent magnetic resonance imaging (MRI) (fig. 2). Upon admission, he had a relatively normal status with no neurological deficits. The patient underwent surgery on



**Fig. 1.** Preoperative CT scan revealing an AC at the left temporal lobe (a) and left frontoparietal CSDH and midline shift (b).



**Fig. 2.** Preoperative MRI showing a left temporal AC and left frontoparietal CSDH.

the day of admission. ‘Motor-oil-like’ fluid, which is typical for CSDH, was evacuated and irrigated with normal saline through 2 burr holes and closed-system subdural drainage was applied for 2 days after the operation. His postoperative course was uneventful and the patient was discharged on the sixth postoperative day in good condition. A control MRI was obtained 6 months after the surgery and reported normal except for an AC (fig. 3).

## Discussion

ACs are among the most common clinical entities in daily neurosurgical practice. ACs are generally considered to be congenital, tend to occur in children, and are most frequently located in the middle fossa [5]. On the other hand, CSDHs usually occur in elderly patients with a history of mild trauma, whereas CSDHs are very rare in children.



**Fig. 3.** The postoperative MRI was normal except for a left temporal AC.

**Table 1.** Reported cases of sports-related CSDHs in association with ACs in children

First author, year	Age, sex	Presenting symptoms	CSDH location	AC location	Related sport	Surgery	Outcome
Kawanishi, 1999 [14]	14, M	H/A, nausea	left frontotemporal	left MF	soccer	burr hole, no cyst treatment	perfect
	11, M	H/A, vomiting	intracystic	left MF	soccer	burr hole, no cyst treatment	perfect
Prabhu, 2002 [15]	16, F	H/A	left frontotemporal	left sylvian	soccer	craniotomy and cyst fenestration	perfect
Domenicucci, 2009 [16]	7, M	hemiparesis	left frontotemporal	left temporal	soccer	burr hole, no cyst treatment	good
Zeng, 2011 [17]	14, M	progressive H/A	intracystic	left sylvian	jumping athlete	craniectomy and cyst fenestration	perfect
	16, M	H/A, vomiting	left frontotemporal	left MF	football	burr hole, no cyst treatment	perfect
Işık, 2011 [18]	13, M	H/A, vomiting	left frontotemporal	left MF	football	burr hole, no cyst treatment	perfect
Present case	12, M	progressive H/A	left frontoparietal	left temporal	taekwondo	burr hole, no cyst treatment	perfect

Ages are presented in years. H/A = Headache; MF = middle fossa.

ACs are a well-known predisposing factor for CSDH after mild head trauma, and the cases of CSDH in patients with ACs of the middle fossa have increased since the first report by Robinson [4]. Tamburrini et al. [6] reported that the risk of subdural hematoma in association with ACs was 2.27%. In a series of a 541 patients, Mori et al. [7] reported the rate as 1.5%, and they also reported that 62.5% of the pediatric cases of CSDH had associated ACs. Parsch et al. [8] also reported that 16 cases (2.4%) of associated ACs were found among 658 cases of CSDH. Conversely, 8–17% of cases of ACs were complicated by CSDH after head trauma [9–11]. These observations clearly show that ACs are a well-documented risk factor for CSDH, especially in children.

There are many hypotheses explaining the underlying mechanisms of the occurrence of CSDH in association with ACs. The two most widely accepted hypotheses are presented here. First, in response to mild trauma, flow changes within the cerebrospinal fluid (CSF) could be magnified by the AC leading to rupture of the bridging veins or vessels in the cyst wall [12]. It is recognized that pressure is transferred more readily and is magnified through the cyst fluid in compression with the normal subarachnoid CSF space [4, 12]. In the second theory, it is hypothesized that ACs are less compliant than normal brain, resulting in reduced intracalvarial cushioning following minor trauma. Thus, hemorrhage may occur from bridging veins resulting in subdural hematomas [12].

For diagnosis, CT is the first test to be performed. MRI is superior when it is hard to distinguish the hemorrhage within the AC from a subdural hematoma. On the other hand, even a small AC in the middle fossa, and also in the convexity, may be a predisposing factor for CSDH [13]. MRI is recommended to detect small ACs in children with CSDH.

Burr hole irrigation of CSDHs without cyst removal or fenestration is recommended by various authors. If the AC is symptomatic or the preoperative symptoms persist, additional surgery to treat the AC should be considered [6, 8, 9].

Injuries related to sports are among the most common forms of injury in Western societies, with martial arts often cited on the list of high-risk sports [1, 3]. Taekwondo is one of the most popular martial arts, and mild head injuries are common in this sport. As mentioned above, there is a well-known risk of developing CSDH in children with ACs. There were only 7 previously reported cases of sports-related CSDHs in association with ACs in children (table 1). The most common sport was soccer as in this patient group direct contact of the head with the ball is very plausible. Interestingly, in all of the cases, as in ours, the left side was affected. The most common presenting symptom was headache, as in our case. We present the first case, to our knowledge, of CSDH with associated ACs in a taekwondo athlete.

In conclusion, in sports such as football, soccer, and martial arts, where contact or collision is likely, ACs may be a relative contraindication for participation. In such patients, especially in children who practice these sports, headache is enough to alert physicians to order neuro-radiological imaging. However, it is the consensus that patients with ACs and their families should be informed to avoid sports where contact or collisions are most likely to occur. Also, we suggest further investigations about the cost-effectiveness of radiological evaluation of the athletes for ACs.

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