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CASE REPORT

CHRONIC SUBDURAL HEMATOMA CAUSED BY ARACHNOID CYST IN A 12-YEAR-OLD CHILD: A CASE REPORT

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ABSTRACT

This case report details the management of a chronic subdural hematoma associated with an arachnoid cyst in a 12-year-old patient. Following a fall from a tractor, the patient presented with a chronic subdural hematoma and a left temporal arachnoid cyst. The condition was successfully treated using the burr hole drainage technique, with no postoperative complications. This case report highlights the importance for physicians to be aware of the risk of chronic subdural hematoma in patients with arachnoid cysts, especially in high-risk groups. The presence of a cerebral arachnoid cyst facilitated the occurrence of chronic subdural hematoma in young people or children. It also underscores the need for further research to minimize complications and reduce the risk of recurrence.

Keywords: Arachnoid cysts, chronic subdural hematoma, closed head trauma

INTRODUCTION

Chronic subdural hematoma (CSDH) represents a meningeal pathology characterized by an enduring accumulation of blood and its degenerative products on the surface of the brain (1). CSDH is predominantly observed in elderly patients, and the primary etiology is attributed to head trauma. Apart from trauma, non-traumatic causes can also contribute to the development of CSDH (2). The presenting symptoms of CSDH can vary and the most common symptoms are headache, gait disturbance, hemiparesis, and cognitive problems. The prognosis of patients with CSDH is worse when it is accompanied with seizures or low Glasgow Coma scale scores (3). When it comes to determining the internal structures and the size of CSDH, magnetic resonance imaging (MRI) is more sensitive than computed tomography (CT) and can also be helpful with the diagnosis of bilateral isodense CSDH, which is difficult to detect by CT (4).

Prior studies have posited that arachnoid cysts (ACs) could potentially serve as a risk factor for CSDH, particularly among children and young adults (5). It is stated that the presentation of CSDH together with subdural hemorrhage is rare (6). However, the mechanistic pathway underlying AC-associated CSDH remains unclear, with a few hypotheses proposed thus far (7). Concurrently, the surgical treatment strategies for CSDH vary, leading to different outcomes and postoperative complications (8). This case report discusses the experience of a 12-year-old CSDH patient with a left temporal AC, managed with a single burr hole craniotomy. We aim to augment the limited body of literature on pediatric CSDH cases associated with AC following head trauma and present the post-treatment prognosis of our patient.

CASE REPORT

A 12-year-old male patient presented to Trakya University Hospital Neurosurgery Department following a fall from a tractor approximately two months prior, experiencing persistent headaches. His physical and neurological examinations revealed no deficits or pathological findings. However, an MRI scan at the

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referring medical center demonstrated a left temporal AC, an ipsilateral subdural hematoma, and a midline shift (Figure 1).

The laboratory results of the patient revealed no abnormalities. After completing routine preoperative preparations, a left parietal burr hole was drilled. Upon incision of the dura, a high-pressure "motor oil-like" fluid, consistent with CSDH, was extruded (Figure 2). The subdural space was thoroughly irrigated with saline, and a subdural drain was placed. No intervention was carried out on the AC.

The patient experienced an uncomplicated postoperative period. His neurological examinations were consistently unremarkable. The postoperative CT and MRI scans exhibited complete evacuation of the hematoma and rectification of the midline shift (Figures 3, 4). The post-surgery follow-up laboratory results for the patient were within the normal range. The patient was discharged on the fourth postoperative day in a stable condition. Postoperatively, a regimen of 500 mg levetiracetam twice daily was administered for antiepileptic prophylaxis. An eight-month follow-up revealed no complaints or complications. Following a normal electroencephalogram, the antiepileptics were ceased.

DISCUSSION

Several methods are commonly employed for the diagnosis and further investigation of CSDH, as well as different aspects of MRI and CT findings and advantages (4). In patients where ACs are identified through radiological imaging, it is recommended that they undergo regular examinations and periodic radiological imaging (7). CSDH is predominantly diagnosed via CT scans. Although most lesions appear hypodense, isodense or mixed-density lesions may also be present. Calcified CSDHs, rarely observed, can mimic calvarial masses, making contrast-enhanced imaging the preferred choice for differential diagnosis (4).

Magnetic resonance imaging offers more sensitivity than CT in assessing the size and internal structures of CSDHs. It can also detect fresh bleeding and changes in hemolysis and hemoglobin. Specifically, contrast MRI is adept at identifying neomembranes and clots, while diffusion MRI proves more beneficial in detecting infected subdural hematomas (4).

Despite CT scans being the initial test typically administered, MRI holds superiority in distinguishing bleeding within the arachnoid cyst from a subdural hematoma. Furthermore, MRI is highly recommended for detecting small AC in pediatric patients diagnosed with CSDH (9).

Existing literature provides various surgical interventions for managing CSDH associated with AC (2, 5, 7, 9-13). Among these, the burr hole drainage technique we employed in our case has been recommended as a viable first-line treatment option, requiring no intervention on the AC membrane (5, 9-11). Some studies have also reported success with the fenestration

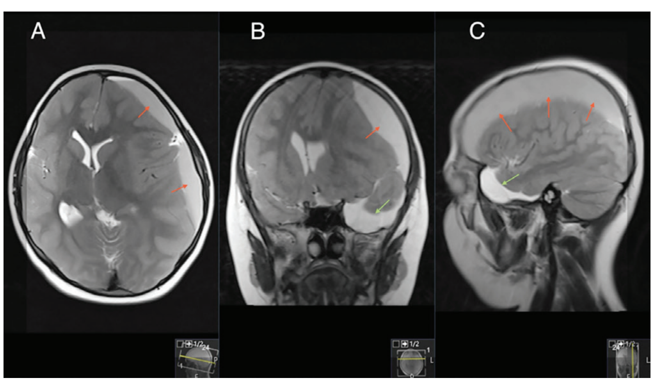

Figure 1: Preoperative magnetic resonance imaging in the axial (A), coronal (B), and sagittal (C) planes.
Red arrows: The subdural hematoma, Green arrows: The arachnoid cyst

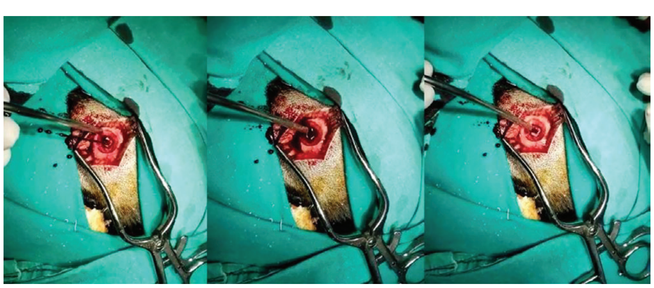

Figure 2: The evacuation of the chronic subdural hematoma through a burr hole.

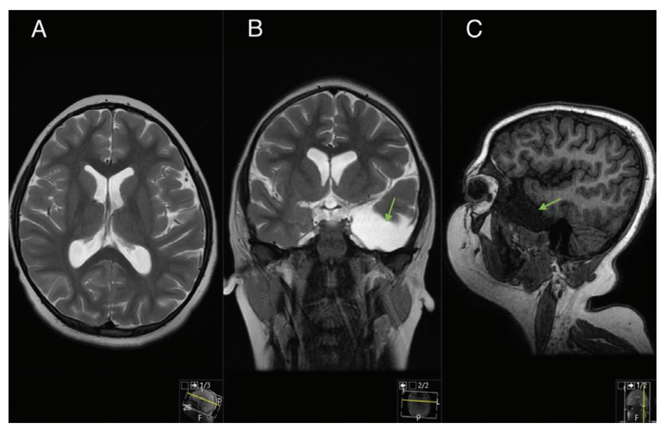

Figure 3: Postoperative magnetic resonance imaging in the axial (A), coronal (B), and sagittal (C) planes.
Green arrows: The arachnoid cyst

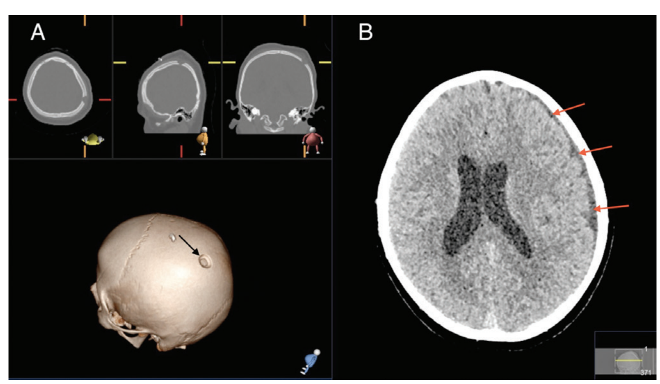

Figure 4: Postoperative computerized tomography, (A) 3D reconstruction, (B) axial section.
Black arrow: The burr hole, Red arrows: The subdural space

of the cyst membrane (7, 11). Our patient experienced favorable results from the burr hole drainage technique, aligning with findings from similar cases in the literature (5).

Recent research has indicated that using drainage can decrease the recurrence of CSDH. The choice of drain type appears to matter. Both the subperiosteal and subdural drains are highly effective. Even though the mortality rate and postoperative complications are lower in subperiostal drainage, there is a higher rate of recurrence in subperiostal drainage when compared to subdural drainage (4). Additionally, some evidence suggests that employing the double burr hole technique is linked with a reduction in postoperative recurrence rate and a shorter duration of hospital stay (10).

The literature has some debate regarding optimal postoperative head positioning. The incidence of postoperative complications, such as atelectasis, pneumonia and deep vein thrombosis are the same in both the 30°-40° sitting position and supine position but in the upright head position there is a higher rate of recurrence (4).

Risk factors for CSDH have been identified as direct or indirect head traumas, chronic alcohol consumption, and anticoagulants and antiplatelet drugs (14). However, the impact of anticoagulant use on CSDH recurrence is disputed (15, 16). Other identified risk factors include coagulopathies, cerebrospinal shunting, hypertension, male gender, and advanced age (14). Head trauma is the most substantial risk factor for both young and elderly patients (9, 12). Meanwhile, CSDH without head trauma has been reported to carry a higher mortality rate, particularly in elderly patients (17). That, however, remains a topic of debate.

Arachnoid cysts are typically congenital in their presentation (9). Various sources also suggest that they originate from the meninges during embryological development (11).

In considering the relationship between AC and CSDH and the mechanism that underlies this relationship, two hypotheses are primarily accepted. The first posits that a change in cerebrospinal fluid flow triggered by mild trauma can increase the arachnoid cyst. That can then cause the rupture of bridging vessels or vessels in the cyst walls. Evidence indicates that pressure is transmitted more rapidly in cyst fluid than in normal subarachnoid cerebrospinal fluid. The second theory suggests ACs have less compliance than normal brain tissue, which results in post-traumatic hemorrhage. This hemorrhage, in turn, forms subdural hematomas in bridging vessels (9).

Our patient, a 12-year-old male, had a history of trauma due to a fall from a tractor. The presence of an AC, another risk factor, could have increased the risk of hemorrhage following trauma, potentially contributing to hematoma formation (9, 12, 18). AC can either present asymptomatically or cause symptoms due to enlargement of the AC and can exert mass effect on surrounding neural structures (19). In terms of symptoms and signs, CSDHs can range from being asymptomatic to presenting with a variety of symptoms such as headaches, seizures, memory lapses, confusion, difficulties in swallowing and walking, as well as weakness or numbness in the legs, face, and arms (4). On the contrary, ACs are typically asymptomatic, with skull asymmetries serving as potential indicators of their presence (7, 11).

As such, physicians need to be aware of the risk of CSDH in patients with a known history of AC. This risk is particularly relevant to athletes and individuals involved in martial arts, such as taekwondo, as these activities pose a high risk of head injuries (9). Physicians should consider CSDH associated with AC in young athletes, especially the ones present with concussion like symptoms. Even though these two pathologies tend to occur in different age groups, there is a risk for them to present together after a mild head trauma (6). Discussing potential protective measures implemented during these activities may prove beneficial.

From an epidemiological perspective, CSDHs are estimated to occur in 1.7 to 20.6 per 100,000 individuals annually (7). While CSDHs are generally observed in the elderly, they can also be present in younger individuals. Literature reveals that they are seldom seen in infants. However, bilateral CSDHs in infants should raise suspicion of intentional trauma such as physical abuse. CSDHs typically occur on the most curved region of the frontal or occipital convexity of the brain. Despite their usual occurrence in the convex areas of the brain, they can also be interhemispheric (4). ACs, on the other hand, are reported to occur in 0.7-1.7% of the population (7). They are commonly observed in children and are often localized in the middle fossa (9).

There may be significant contributions to the literature by exploring the potential benefits of arachnoid cyst removal and the impact of a cyst-related intervention on the treatment prognosis of subdural hematoma. Moreover, the pathophysiology of CSDHs may involve rupture of the bridging veins and volume expansion of the existing hematoma due to the addition of cerebrospinal fluid (9, 12). In AC-related CSDHs, hypotheses center on the rupture of the vessels in the AC's outer membrane and the subdural space if the cyst fluid in the AC transmits the trauma (9, 12, 18). Further understanding of the mechanism of AC-related CSDH may greatly aid in developing treatment plans to eliminate the source and prevent potential treatment complications. There is also an ongoing debate about optimal postoperative head positioning, and further research is needed to identify a position that minimizes complications without increasing the risk of recurrence (4).

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