CASE REPORT

Intracranial arachnoid cyst associated with traumatic intracystic hemorrhage and subdural haematoma

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Abstract

Background*:* Brain arachnoid cysts are fluid collections of developmental origin. They are commonly detected incidentally in patients imaged for unrelated symptoms.

Case Description*:* A 15-year-old healthy boy with a recent history of head trauma experienced headache that gradually worsened over the course of 10 days. He underwent CT and MRI brain scans which revealed the presence of subdural haematoma caused by the rupture of a middle cranial fossa arachnoid cyst. This was accompanied by intracystic haemorrhage. The subdural haematoma was removed, while communication of the cyst with the basal cisterns was also performed. The postoperative course of the patient was uneventful.

Conclusions: The annual haemorrhage risk for the patients with middle cranial fossa cysts remains very low. However, when haemorrhage occurs, in most occasions it can be effectively managed only with haematoma evacuation. Hippokratia 2008; 12 (1): 53-55

Keywords: intracranial arachnoid cyst, subdural haematoma, intracystic bleeding, treatment

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Arachnoid cysts (AC) are the most frequent congenital cystic intracranial abnormality. They represent extra cerebral, intra-arachnoidal cerebrospinal fluid collections comprising 1% of intracranial space-occupying lesions[1,2]. Their pathogenesis and natural course remain to be clarified and they are commonly discovered incidentally or post-mortem during autopsy[3].

Usually these cysts overlie the sylvian fissure in the middle cranial fossa[1,2]. Subdural haematomas, hygromas and intracystic haemorrhage are infrequently encountered complications of AC[4]. We describe a case of a boy with a middle cranial fossa AC associated with intracystic haemorrhage and subdural haematoma as a result of a preceding head trauma.

Case description

A 15-year-old developmentally normal, healthy boy presented with a 10-day history of gradually worsening headache accompanied by constant nausea and intermittent vomiting. His recent history was remarkable for head injury occurred during an athletic event. Initially, he experienced mild headache that became more severe and resistant to mild analgesia and bed rest. His level of consciousness was normal without any visual disturbances although funduscopic examination revealed bilateral papilledema. Of note, the patient has not received any drug that could have implicated with hemorrhagic phenomena.

The CT scan of the brain demonstrated subacute subdural haematoma in the right frontotemporal region with intracerebral edema and midline shift. No other space-occupying lesions were identified (Figure 1).

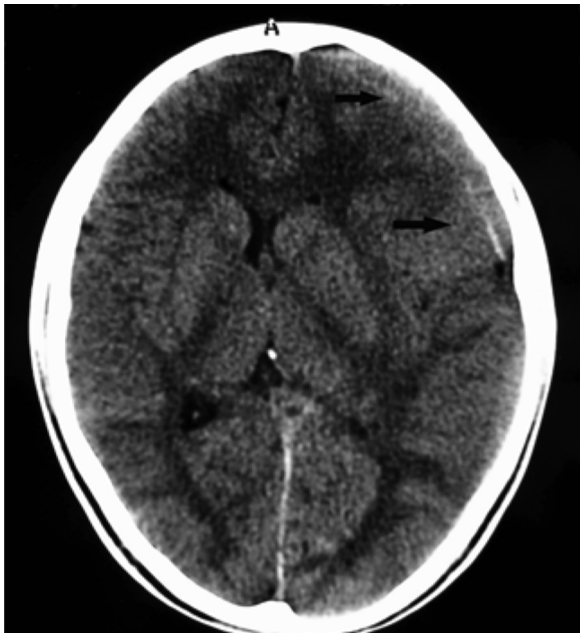

Figure 1. Computed Tomography (CT) scan showing the presence of subdural haematoma in the right frontotemporal region (arrows)

The aforementioned findings were inconsistent with a mild head trauma. Therefore, a MRI examination was ordered which showed the presence of a cystic lesion in the right middle fossa on T1 and T2 weighted sequences with a hyper intense signal inside the cystic cavity on T1 sequence. Additionally, the presence of the subdural collection was confirmed (Figure 2).

ing or subdural haematoma was described in 1938[8]. The coexistence of an intracranial cyst with intracystic bleeding and subdural haematoma is quite rare. To our knowledge, less than such 40 cases have been confirmed[1].

Arachnoid cysts show a slight predilection for the male sex[4]. They can develop anywhere within the subarachnoid space, intimately related to the cisterns. In the

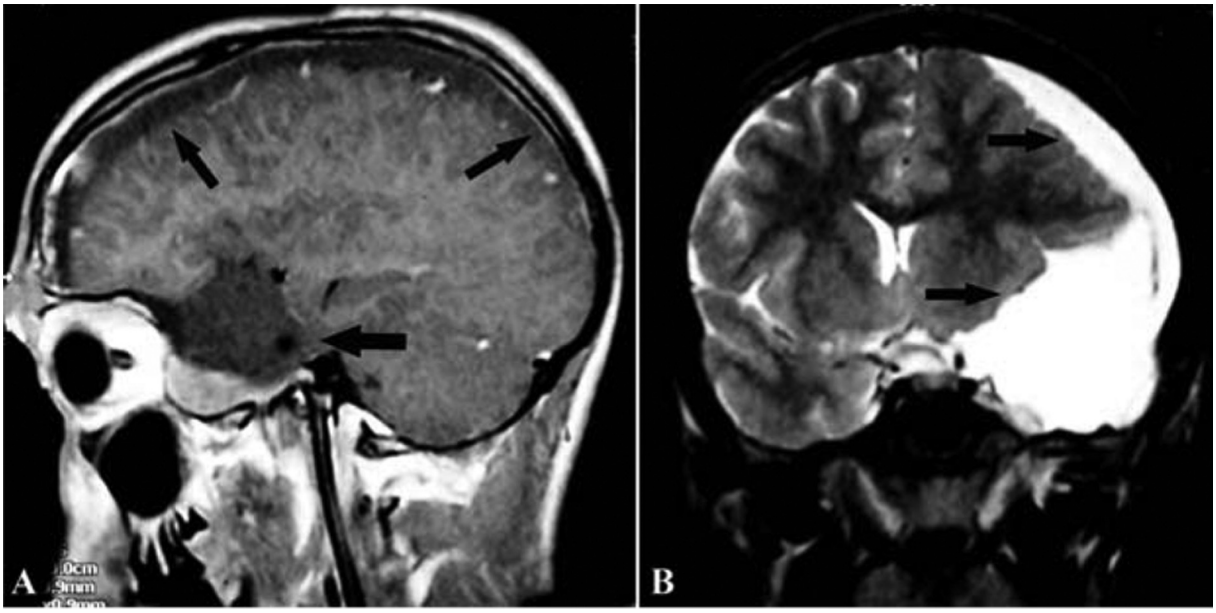

Figure 2. Sagittal T1 post contrast Magnetic Resonance Imaging (MRI) scan (a) and T2 sequence MRI scan clearly demonstrating arachnoid cyst, subdural haematoma and intracystic hemorrhage (arrows)

During surgery the subdural haematoma was evacuated and the intracystic blood clots were removed. A wide communication of the cyst with the subarachnoid space was obtained via marsupialisation.

Postoperatively, the clinical symptoms totally resolved. At one year follow-up CT examination there was no evidence of subdural haematoma. Although the size of the cyst had remained unchanged, no mass effect was identified. Hemorrhagic signs were not present inside the cystic cavity. (Figure 3)

Discussion

Arachnoid cysts are congenital fluid-filled compartments within cerebrospinal fluid (CSF) cisterns and major cerebral fissures, intimately bordered by the arachnoid membrane. The cysts are filled with clear, colourless fluid nearly identical to CSF [5]. They have been originally described on autopsy reports from the early 19th century[6].

True arachnoid cysts are congenital. They may develop when alterations of CSF flow during the early phase of subarachnoid space formation lead to rupture of the developing webbed arachnoid. An alternative theory involves splitting of the arachnoid membrane during delamination from the overlying dura. However, the exact mechanism remains speculative[7].

The first description of an AC with intracystic bleed-

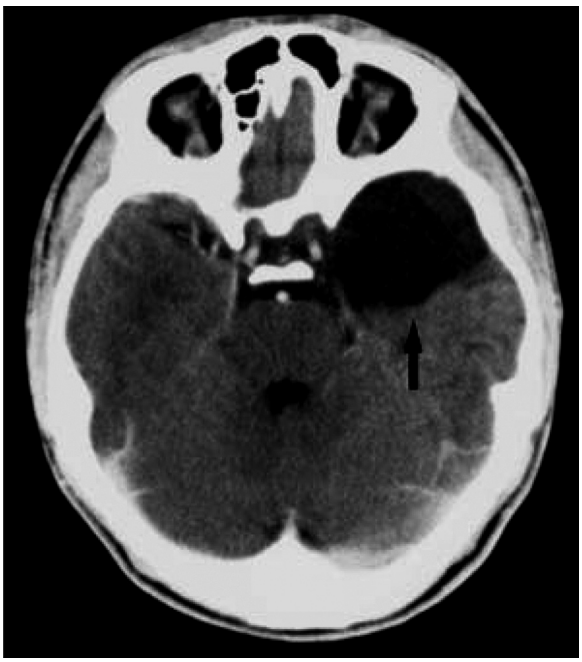

Figure 3. Postoperative axial CT scan with contrast enhancement at 1-year. The arachnoid cyst in the right temporal lobe is present with no evidence of intracranial hemorrhage and mass effect (arrow)

general population, nearly half of cysts occur within the sylvian fissure. It is also known that the supratentorial cysts far outnumber the infratentorial ones[9]. Less common sites of appearance are the suprasellar region, the cerebellopontine angle, the cerebral convexity and the quadrigeminal plate[10].

A majority of the arachnoid cysts are recognized during the first two decades of life. Their natural history and course are poorly understood. Most of them constitute dormant fluid compartments that remain silent for many years. In distinct cases they enlarge producing mass effect on brain structures[5]. Signs related to arachnoid cysts include cranial enlargement, seizures, hydrocephalus and mental retardation[11]. In middle cranial fossa cysts, headache is the most frequent presenting symptom[12]. In rare occasions they can resolve spontaneously[13].

On Computed Tomography (CT) scan arachnoid cysts appear normally as extra-parenchymal hypo intense without any contrast-medium enhancement. In post traumatic cases however, the borders of isointense AC are not clearly demonstrated. In these patients, cyst location and relationship to adjacent structures is best visualized by T1 weighted sequences. Cyst fluid has normally low attenuation on T1 images and a high signal on T2 sequences which is nearly identical to CSF. However, previous intracystic haemorrhage may change the attenuation values in all image sequences[14].

Intracystic haemorrhage and/or subdural haematoma as a complication of AC may occur spontaneously or after a minor head trauma. They may result from rupture of the intracystic or bridging vessels[15]. This could be presumably explained by the presence of unsupported veins that surround the cyst walls. Moreover, the fragile supporting stroma also predisposes to rupture even after a minor injury[15]. In some occasions, subsequent re-bleed or osmotic influx of fluid could explain the gradual increase in the subdural or intracystic fluid collection[3].

Management decisions balance the imaging findings and the clinical symptoms. Many collections are asymptomatic and are managed conservatively with observation. However, symptomatic patients are candidates for surgery[2]. Sizeable subdural collections with mass effect should be evacuated with application of usual neurosurgical techniques. The optimal cyst manipulation is still under debate. The two most commonly used surgical procedures are cyst peritoneal shunting and cyst fenestration[16]. Endoscopic membrane excision has also been used with good outcomes[17]. Whatever the choice of the surgical procedure, membranectomy and cyst communication to the basal cisterns must be accomplished[19].

Conclusions

The broad use of CT and MRI has increased the frequency of diagnosed arachnoid cysts as well as the detection of their possible complications. The outcome is generally excellent. The indications for surgical intervention are not clearly defined. Further improvements in neuroendoscopic and surgical techniques are expected to perform a major role in the future.

References

1. Iaconetta G, Esposito M, Maiuri F, Cappabianca P. Arachnoid cyst with intracystic haemorrhage and subdural haematoma: case report and literature review. Neurol Sci 2006; 26:451-455
2. Gosalakkal JA. Intracranial arachnoid cysts in children: a review of pathogenesis, clinical features and management. Pediatr Neurol 2002;26:93-98
3. Hopkin J, Mamourian A, Lollis S, Duhaime T. The next extreme sport? Subdural haematoma in a patient with arachnoid cyst after head shaking competition. Br J Neurosurg 2006; 20:111-113
4. Parsch CS, Krauss J, Hofmann E, Meixensberger J, Roosen K. Arachnoid cysts associated with subdural hematomas and hygromas: analysis of 16 cases, long-term follow-up and review of the literature. Neurosurgery 1997; 40:483-490
5. Kanev PM. Arachnoid cyst in Youmans JR, (ed): Neurological. Surgery, ed 3, vol 3, Chapter208, Philadelphia, Saunders, 2004, 3289-3299
6. Bright R. Serous cysts in the arachnoid. In: Rees Orme, et al. (eds). Reports of medical cases selected with a view of illustrating the symptoms and cure of diseases by a reference to morbid anatomy, vol. II: Diseases of the brain and nervous system, part I. Highley, London, 1831, 437-439
7. Lemire RJ, Loeser JD, Leech RW, et al. Normal and abnormal development of the human nervous system. New York, Harper & Row, 1-421
8. Davidoff LM, Dyke CG. Relapsing juveline chronic subdural haematoma: a clinical and roengenographic study. Bull Neurol Inst NY 1938; 7:95-111
9. Rengachary S., Watanabe I. Ultrastructure and pathogenesis of intracranial arachnoid cysts. J Neuropathol Exp Neurol 1981; 40:61-83
10. Di Rocco C, Caldarelli M, Ceddia A. Incidence, anatomical distribution and classification of arachnoidal cysts. In Raimondi A, Choux M, Di Rocco C (eds): intracranial cyst lesions. New York, Springer-Verlag, 1993, 101-111
11. Wang PJ, Lin HC, Liu HM, Tseng CL, Shen YZ. Intracranial arachnoid cysts in children: related signs and associated anomalies. Pediatr Neurol 1998; 19:100-104
12. Wester K. Peculiarities of intracranial arachnoid cysts: location, sidedness, and sex distribution in 126 consecutive patients. Neurosurgery 1999; 45:775-779
13. Yamanouchi Y, Someda K, Oka N. Spontaneous disappearance of middle fossa arachnoid cyst after head injury. Childs Nerv Syst 1986; 2:40-43
14. Heier LA, Zimmerman RD, Amster JL, Gandy SE, Deck MDF. Magnetic resonance imaging of arachnoid cysts. Clin Imaging 1989; 13:281-291
15. Eustace S, Toland J, Stack J. CT and MRI of arachnoid cyst with complicating intracystic and subdural haemorrhage. J Comput Assist Tomogr 1992; 16:995-997
16. Ciricillo SF, Cogen PH, Harsh GR, Edwards MS. Intracranial arachnoid cysts in children: a comparison of the effects of fenestration and shunting. J Neurosurgery 1991; 74:230-235
17. Hopf NJ, Perneczky A. Endoscopic neurosurgery and endoscope-assisted microneurosurgery for the treatment of intracranial cysts. Neurosurgery 1998;43:1330-1336
18. Schroeder HW, Gaab MR, Niendorf WR. Neuroendoscopic approach to arachnoid cysts. J Neurosurg 1996; 85:293-298

Page AC, Mohan D, Paxton RM. Arachnoid cysts of the middle cranial fossa predispose to subdural haematoma formation fact or fiction? Acta Neurochir Suppl (Wien) 1988; 42:210-215