

G. Iaconetta • M. Esposito • F. Maiuri • P. Cappabianca

## Arachnoid cyst with intracystic haemorrhage and subdural haematoma: case report and literature review

Received: 11 September 2005/Accepted in revised form: 15 December 2005

**Abstract** Arachnoid cysts (AC) are usually asymptomatic. However, very rarely they can become symptomatic due to cyst enlargement or haemorrhage, often after head trauma. In such cases bleeding is often confined to the subdural space, but intracystic haemorrhage has rarely been observed. We report a case of a child who had intracranial hypertension syndrome due to a right middle cranial fossa AC with intracystic bleeding and subdural haematoma.

**Key words** Arachnoid cyst • Intracystic haemorrhage • Subdural haematoma

### Introduction

Arachnoid cysts (AC) are extracerebral, intra-arachnoidal cerebrospinal fluid collections that comprise 1% of all non-traumatic intracranial mass lesions. They are most commonly found in the middle cranial fossa in 50% of cases, with a slight predilection for the left side and the male sex [1]. Their origin is unknown. We report a case of a child with intracranial hypertension syndrome due to a middle cranial fossa AC with intracystic bleeding and associated subdural haematoma. To our knowledge 37 other such cases have been reported (Table 1).

### Case report

A 13-year-old boy was admitted to our Neurosurgical Department in September 2002 with a one-month history of headaches and vomiting. There was no history of a head trauma or of any dis-coagulation syndrome, and the patient had not taken any drug that could have possibly caused haemorrhaging. Since the age of five, the patient had suffered bulging of the temporal right bone, but no clinical or radiological follow-up had been performed. The clinical examination showed bilateral papilloedema. The CT scans revealed a hyperdense mass located in the right middle fossa and Sylvian fissure, with no enhancement after contrast medium. The mass displaced the midline and the lateral ventricles contralaterally (Fig. 1). A hypodense area, suggestive of subdural haematoma, was also located in the right frontal region. There was bulging and thinning of the temporal squama and elevation of the lesser sphenoid wing. An MR examination showed the presence of a cystic lesion in the right middle cranial fossa with high signal intensity on T1-, DP and T2-weighted images, and subdural fluid-blood level in the right frontal and parietal areas (Fig. 1a–c). These radiological features were in favour of an AC complicated by intracystic haemorrhage and subdural haematoma. During surgery the haematoma and

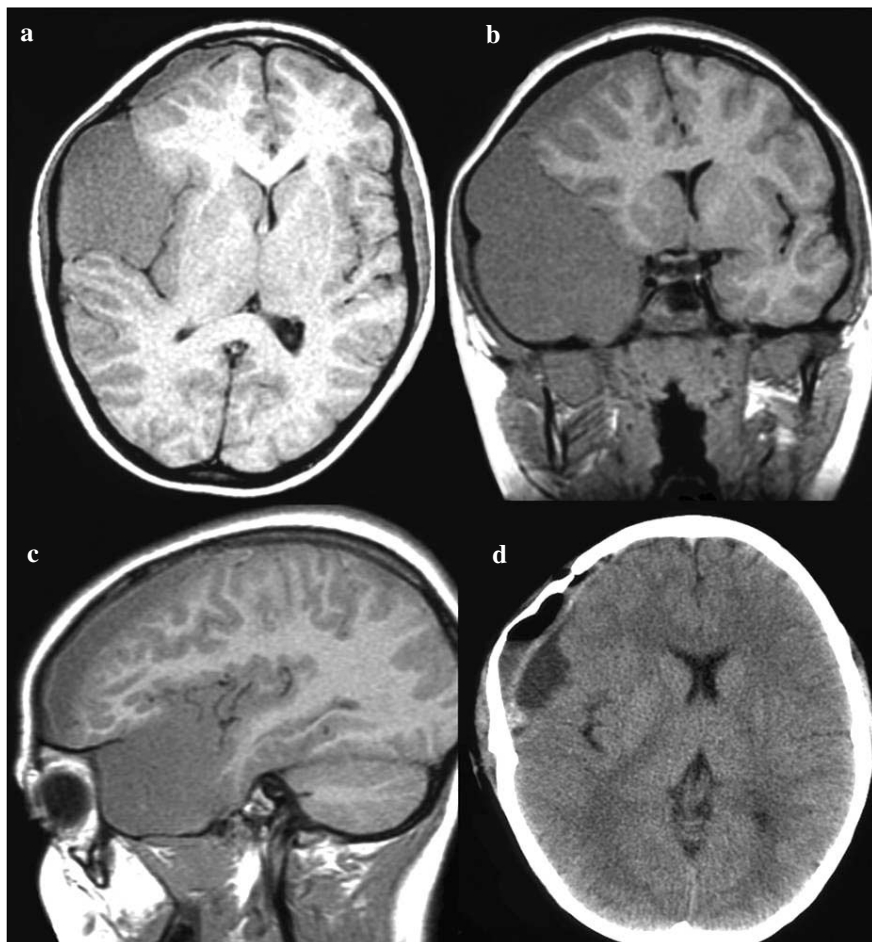
G. Iaconetta (✉) • M. Esposito • F. Maiuri • P. Cappabianca  
Department of Neurological Sciences  
Faculty of Medicine  
“Federico II” University  
Via S. Pansini, I-580131 Naples, Italy  
e-mail: iaconetta@libero.it

**Table 1** Cases of arachnoid cysts associated with intracystic haemorrhage

No.	Author/year	Age/sex	Cyst location	Associated lesions
1	Deruty [16]	3 weeks/F	Left occipito-temporal	No
2	Deruty [16]	12/M	Right parieto-temporal	Ipsilateral subdural haematoma
3	Deruty [16]	27/M	Right fronto-temporal	No
4	LaCour et al. [11]	31/M	Left middle cranial fossa	Ipsilateral subdural haematoma
5	Galassi et al. [14]	?	Middle cranial fossa	No
6	Varma et al. [17]	24/M	Right middle cranial fossa	Subarachnoid haemorrhage
7	Varma et al. [17]	7/M	Right middle cranial fossa	No
8	Lesoin et al. [18]	45/M	Left Sylvian fissure	Ipsilateral subdural haematoma
9	Van der Meche and R. Braakman [13]	15/F	Middle cranial fossa	No
10	Hara et al. [19]	13/M	Right fronto-temporal	Ipsilateral subdural haematoma
11	Jenkins et al. [4]	?	?	Right middle cerebral bifurcation. Subarachnoid haemorrhage
12	Munk et al. [20]	?	Middle cranial fossa	Ipsilateral subdural haematoma
13	Page et al. [10]	11/F	Left middle cranial fossa	Ipsilateral subdural haematoma
14	Page et al. [10]	57/M	Left middle cranial fossa	Bilateral subdural haematoma
15	Page et al. [10]	17/M	Left middle cranial fossa	Ipsilateral subdural haematoma
16	Romero et al. [21]	14/M	Left Sylvian fissure	Ipsilateral subdural haematoma
17	Romero et al. [21]	32/M	Left frontal	Ipsilateral subdural haematoma
18	Olsen et al. [15]	10/M	Left middle cranial fossa	Ipsilateral subdural haematoma
19	Van Burken et al. [12]	39/F	Right front-temporal	Ipsilateral subdural haematoma
20	Eustace et al. [9]	11/F	Left Sylvian fissure	Ipsilateral subdural haematoma
21	Maeda et al. [22]	14/M	Left middle cranial fossa	Ipsilateral subdural haematoma
22	Pasquini et al. [23]	26/M	Left fronto-temporal	No
23	Ildan et al. [24]	?	Sylvian fissure	No
24	Okura et al. [25]	15/M	Right frontal convexity	Ipsilateral subdural haematoma
25	Hirose et al. [5]	45 M	Left middle cranial fossa	Internal carotid artery bifurcation aneurysm
26	Takahashi et al. [26]	23/M	Left middle cranial fossa	No
27	Ide et al. [27]	37/M	Left suprasellar area	No
28	De Recondo and S. Merran [28]	47/F	Left middle cranial fossa	Ipsilateral subdural haematoma
29	Parsch et al. [1]	19 ?	Right middle cranial fossa	Ipsilateral subdural haematoma
30	Parsch et al. [1]	34 ?	Left middle cranial fossa	Ipsilateral subdural haematoma
31	Barker et al. [8]	29/F	Left middle cranial fossa	Left posterior communicating artery aneurysm. Subarachnoid haemorrhage
32	Huang et al. [7]	61/F	Left Sylvian fissure	Left middle cerebral artery aneurysm. Bilateral subdural haematoma
33	Ibarra and P.P. Kesava [29]	11/M	Left middle cranial fossa	Ipsilateral subdural haematoma
34	Ikeda et al. [30]	57/M	Premedullary cistern	No
35	Zanini et al. [6]	35/M	Left Sylvian fissure	Internal carotid artery bifurcation aneurysm. Subarachnoid haemorrhage
36	Ulmer et al. [3]	?	Base of the skull, posterior to the brain-stem, extending over the complete convexity of the left hemisphere	Ipsilateral subdural haematoma
37	De et al. [31]	2/M	Left middle cranial fossa	No

intracystic blood clots were removed. The cyst wall was widely fenestrated in order to obtain communication with the subarachnoid space. The postoperative outcome was

uneventful. A postoperative CT scan showed the absence of subdural haematoma. There was a residual cyst but with no intracystic bleeding and mass effect (Fig. 1d).



**Fig. 1a-d** Axial (a), coronal (b) and sagittal (c) magnetic resonance imaging T1-weighted images show the cystic lesion in the right middle cranial fossa with high signal intensity, contralaterally displacing the midline and the lateral ventricles. Furthermore, subdural fluid-blood levels in the right frontal and parietal areas are observed. Postoperative computerized tomography (d) shows the absence of subdural haematoma and the residual cyst with no intracystic bleeding and mass effect

## Discussion

To our knowledge the first description of an AC with intracystic bleeding or subdural haematoma was reported by Davidoff and Dyke in 1938 [2]. Although most ACs remain stable with advancing age, they can sometimes become symptomatic due to cyst enlargement or haemorrhage. The combination of intracystic bleeding with subdural or extradural haematoma, contralateral or bilateral, although very rare, has been reported [3]. To our knowledge only 37 such cases have been documented to date in the pertinent literature (Table 1). Nineteen of these cases were located in the middle cranial fossa (52.7%). There was predilection for the left side (68.7%) and the male sex (73.3%). The average age was 25.6 (range: 3 weeks–61 years). Fourteen patients had a history of a previous head injury (56%). In 21 cases, as in ours, there was also ipsilateral subdural haematoma (56.7%) and bilateral haematoma in 2 cases. In 5 cases there was a rupture of an aneurysm into an AC (13.5%) [4–8]. Intracystic haemorrhage may be spontaneous, but can also be caused by a minor trauma with rupturing of the intracystic or bridging vessels [9]. The reason could be the unsupported blood vessels that can be found surrounding an AC, which are most likely veins, and the fragile surrounding sup-

porting stroma, or lack of it. The AC may enlarge over time as a result of production of fluid from the cyst walls. The ensuing increased pressure may rupture into the subdural, extradural or intracystic space and manifest as a haematoma if there is also an accompanying vascular disruption [7]. Microscopically the cyst wall is lined with mesothelial cells and not ependyma. The membrane is vascular, and bridging veins are often observed traversing the cyst cavity. This could in part explain the liability of intracystic bleeding. At radiological examinations intracystic haemorrhage may mask the presence of an AC [10, 11]. In some cases it is difficult to distinguish an AC from a subacute or chronic intracystic or subdural haematoma by CT, because blood may be isodense. MR is the radiological investigation of choice. Early subacute haematomas usually contain methaemoglobin, which shows bright on T1-weighted images. Methaemoglobin is initially intracellular and shows a low signal on T2-weighted images. In late subacute and chronic haematomas the cell membrane of the red blood cell is disrupted; methaemoglobin becomes extracellular and has a high signal on T2- and T1-weighted images. The definitive diagnosis of an arachnoid origin of the cysts rests with the pathologist. There is great controversy concerning the surgical procedure of choice to be performed for ACs with

intracystic and/or subdural haematoma [12]. The annual risk for haemorrhage in patients with a middle cranial fossa cyst probably remains below 0.1%. According to some research the most successful and comprehensive treatment for a patient with an AC and intracystic and/or subdural haematoma is to undergo surgery. Membranectomy and cyst communication to the basal cisterns has to be performed [10, 13, 14]. Postoperatively, a residual cyst can be expected [13]. The postoperative prognosis is good. Following radical treatment, recurrence of the cyst is unusual [15].

---

**Sommario** *Le cisti aracnoidee sono generalmente asintomatiche. Tuttavia, molto raramente possono diventare sintomatiche a causa di un ingrossamento della cisti o di un'emorragia, spesso postraumatica. In tali casi il sanguinamento è spesso confinato allo spazio subdurale, ma anche un'emorragia intracistica può essere osservata. Noi riportiamo il caso clinico di un bambino che aveva un'ipertensione endocranica dovuta ad una cisti aracnoidea della fossa cranica media di destra, associata ad emorragia intracistica ed ematoma subdurale.*

---

## References

- Parsch CS, Krauss J, Hofmann E et al (1997) Arachnoid cysts associated with subdural hematomas and hygromas: analysis of 16 cases, long-term follow-up, and review of the literature. *Neurosurgery* 40:483–90.
- Davidoff LM, Dyke CG (1938) Relapsing juvenile chronic subdural hematoma: a clinical and roentgenographic study. *Bull Neurol Inst NY* 7:95–111
- Ulmer S, Engelland K, Stiller U et al (2002) Chronic subdural hemorrhage into a giant arachnoid cyst (Galassi classification type III). *J Comput Assist Tomogr* 26:647–653
- Jenkins JR, Siqueira EB, Holoubi A (1987) Ruptured middle cerebral aneurysm with accumulation of subarachnoid blood within convexity arachnoid cyst. *Comput Radio* 11:185–187
- Hirose S, Shimada S, Yamaguchi N et al (1995) Ruptured aneurysm associated with arachnoid cyst: intracystic hematoma without subarachnoid hemorrhage. *Surg Neurol* 43:353–356
- Zanini MA, Gabarra RC, de Souza Faleiros AT et al (2000) Cerebral aneurysm and arachnoid cyst: about a case with intracystic hemorrhage. *Arq Neuropsiquiatr* 58:330–335
- Huang D, Abe T, Kojima K et al (1999) Intracystic hemorrhage of the middle fossa arachnoid cyst and subdural hematoma caused by ruptured middle cerebral artery aneurysm. *Am J Neuroradiol* 20:1284–1286
- Barker RA, Phillips RR, Moseley IF et al (1998) Posterior communicating artery aneurysm presenting with hemorrhage into an arachnoid cyst. *J Neurol Neurosurg Psychiatry* 64:558–560
- Eustace S, Toland J, Stack J (1992) CT and MRI of arachnoid cyst with complicating intracystic and subdural haemorrhage. *J Comput Assist Tomogr* 16:995–997
- Page AC, Mohan D, Paxton RM (1988) Arachnoid cysts of the middle fossa predispose to subdural haematoma formation fact or fiction? *Acta Neurochir Suppl (Wien)* 42:210–215
- LaCour F, Trevor R, Carey M (1978) Arachnoid cyst and associated subdural hematoma. Observations on conventional roentgenographic and computerized tomographic diagnosis. *Arch Neurol* 35:84–89
- Van Burken MMG, Sarioglu AC, O'Donnell HD (1992) Supratentorial arachnoid cyst with intracystic and subdural haematoma. *Neurochirurgia (Stuttg)* 35:199–203
- Van der Meche FG, Braakman R (1983) Arachnoid cysts in the middle cranial fossa: cause and treatment of progressive and non-progressive symptoms. *J Neurol Neurosurg Psychiatry* 46:1102–1107
- Galassi E, Piazza G, Gaist G, Frank F (1980) Arachnoid cyst of the middle cranial fossa: a clinical and radiological study of 25 cases treated surgically. *Surg Neurol* 14:211–219
- Olsen NK, Madsen HHT (1990) Arachnoid cyst with complicating intracystic and subdural haemorrhage. *Röntgenblätter* 43:166–168
- Deruty R (1970) Les kyste bénins du cerveau (à propos de 25 observations). Thèse. Lyon
- Varma TRK, Sedzimir CB, Miles JB (1981) Post-traumatic complications of arachnoid cyst and temporal lobe agenesis. *J Neurol Neurosurg Psychiatry* 44:29–34
- Lesoin F, Dhellemmes P, Rousseaux M, Jomin M (1983) Arachnoid cyst and head injury. *Acta Neurochirurgica* 69:43–51
- Hara H, Inoue T, Matsuo K et al (1984) Unusual computed tomographic findings in a case of arachnoid cyst in the middle cranial fossa. *Surg Neurol* 22:79–82
- Munk PL, Robertson WD, Durity FA (1988) Middle fossa arachnoid cyst and subdural hematoma: CT studies. *J Comput Assist Tomogr* 12:1073–1075
- Romero FJ, Rovira M Jr, Ibarra B et al (1989) Arachnoid cysts with intracystic and subdural haematoma. *Eur J Radiol* 9:119–120
- Maeda M, Kawamura Y, Handa Y et al (1993) Value of MR imaging in middle fossa arachnoid cyst with intracystic and subdural hematoma. *Eur J Radiol* 17:145–147
- Pasquini U, Bevilacqua F, Salvolini U et al (1993) An intracranial arachnoid cyst with a repeated intracystic hemorrhagic complication. *Radiol Med* 86:145–148
- Ildan F, Cetinalp E, Bagdatoglu et al (1994) Arachnoid cyst with traumatic intracystic hemorrhage unassociated with subdural hematoma. *Neurosurg Rev* 17:229–232
- Okura A, Noguchi S, Yuge T et al (1994) A case of convexity arachnoid cyst associated with chronic subdural hematoma and intracystic hemorrhage. *No Shinkei Geka* 22:273–277
- Takahashi M, Sengoku Y, Nishioka H et al (1995) Arachnoid cyst with hematoma in the cyst wall. *No Shinkei Geka* 23:445–449
- Ide C, De Coene B, Gilliard C et al (1997) Hemorrhagic arachnoid cyst with third nerve paresis: CT and MR findings. *Am J Neuroradiol* 18:1407–1410
- De Recondo A, Merran S (1996) Arachnoid cyst of the middle cranial fossa, disclosed by bleeding. *J Neurol Neurosurg Psychiatry* 61:444

29. Ibarra R, Kesava PP (2000) Role of MR imaging in the diagnosis of complicated arachnoid cyst. *Pediatr Radiol* 30:329–331
30. Ikeda H, Deinsberger W, Boker DK (2000) Retroclival arachnoid cyst presenting with spontaneous intracystic haemorrhage— case presentation. *Acta Neurochir (Wien)* 142:1317–1318
31. De K, Berry K, Denniston S (2002) Haemorrhage into an arachnoid cyst: a serious complication of minor head trauma. *Emerg Med J* 19:365–366