Diagnosis and treatment of middle fossa arachnoid cysts and subdural hematomas

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Nine cases with temporal fossa arachnoid cysts were diagnosed by computerized tomography (CT). Five patients also had subdural hematomas, three of them following head trauma. When the hematoma was chronic and of equal hypodensity with the cyst, a clear-cut differentiation was not possible from the CT scan. The presence of a subdural hematoma could only be suggested by thickened arachnoid structures crossing the hypodense area, indicating the wall between cyst and hematoma. The cyst could often be diagnosed by bulging of the skull bone and a temporal lobe defect. Differences in density between cyst and hematoma, such as in subacute subdural hematoma, delineated both entities. Typical examples are demonstrated. Treatment consisted of evacuation of the hematoma and excision of the cyst in all cases.

KEY WORDS • middle fossa • arachnoid cyst • subdural hematoma

Arachnoid cysts were first described in 1831 by R. Bright.8 Their specific etiology has generally been reported as unclear, although several authors have mentioned meningitis and fetal meningoopathies as possible causes.3,18 Accordingly, these cysts have been called “primary arachnoid cysts,” “primary congenital arachnoid cysts,”5,10,11,16 or “intra-arachnoid cysts.”12,7,8 Some of them have a small communication with the subarachnoid space.4,5,14,18 Main sites are the cisterna magna and the spinal canal. Size varies from small lesions, occasionally found in association with subdural hematoma, to big lesions that fill large portions of the supratentorial compartment.13 They occur in up to 0.4% of cases with intracranial tumors.15,17

This report will deal exclusively with cysts of the middle fossa in the temporal region.4,17 They are of major neurosurgical interest due to their frequent association with subdural hematoma, a combination that is rarely seen with cysts in other regions. Computerized tomography (CT) has made diagnosis relatively easy, although some subdural hematomas associated with middle fossa arachnoid cysts have only been detected by angiography.6 The present paper adds nine cases to the literature, and discusses the surgical diagnosis and results.

Summary of Cases

Nine cases of temporal fossa arachnoid cyst were found among the clinical material from the University Hospital in Graz in the last 25 years. All were diagnosed within the last 3 years. Seven of the patients were males and two females. Their ages ranged from 7 to 63 years (mean 31 years). In five patients, an associated subdural hematoma led to the diagnosis of the cyst. A head injury was the cause of the hematoma in three cases, and the other two patients had no history of trauma. In four cases, hemiparesis was found on admission; three of these patients had an associated subdural hematoma. One patient with a subdural hematoma had temporal lobe seizures and two patients without a hematoma suffered from generalized epilepsy.

Electroencephalography revealed focal abnormalities in four of the nine patients, with hypersynchronous activity in two. Plain skull films showed localized bulging of the temporal bone in two patients, one of whom had an associated subdural hematoma. Carotid angiography was performed in three patients and the cyst was not demonstrated in any of them. None of these patients had a concomitant hematoma. Final diagnosis of the cyst was made by
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CT in all patients. Subdural hematomas were either suspected or clearly diagnosed on the basis of the CT scan in four cases (Figs. 1 and 2) depending on the homogeneity or heterogeneity of densities in the cyst and hematoma. In patients where the cyst and hematoma were isodense, thickened arachnoid structures indicated the probable existence of the cyst underlying a subdural hematoma. In one case, a chronic hematoma was totally missed on CT, but found at operation (Fig. 3). The approximate size of the cystic lesions

Fig. 1. Computerized tomography scans of a large right temporal arachnoid cyst. The temporal pole is absent. Left: The relatively thick membrane underneath the hematoma membrane, extending between the rudimentary temporal lobe and the frontal and parietal lobes (found at operation), can only be suspected from this scan (arrow). Center: The hypodense right frontoparietal lesions can be seen. Right: Two years after operation the hematoma is absent. There is, however, still a clearly visible defect in the right temporal lobe.

Fig. 2. Computerized tomography scans of a left temporal arachnoid cyst not clearly separable from a chronic subdural hematoma found on operation. The cyst was diagnosed due to the defective temporal lobe (arrows, left). The hematoma, however, can only be suspected from membranous structures (arrows, right), later verified at operation.

Fig. 3. Computerized tomography (CT) scan showing a large right temporal arachnoid cyst with bulging of the temporal bone and a temporal lobe defect. Compression of the right lateral ventricle and midline shift to the left are also demonstrated. The border between the cyst and a chronic subdural hematoma that was found at operation could not be visualized by CT.
was 1 cm in one case, 3 cm in two, 4 cm in three cases, 5 cm in one, and 6 cm in two cases.

At operation in patients with a combination of a cyst and hematoma, fairly uniform anatomicopathological findings were demonstrated. The subdural hematoma was encountered on opening the dura. It contained either amber-colored fluid (as is typical for chronic hematomas (Figs. 1–3) or coagulated blood and liquid blood of more recent origin (Fig. 4 left pair). Chronic hematomas were surrounded by the usual hematomatous membrane. Underneath the hematoma, arachnoid-like membranes formed a cystic structure containing fluid with the appearance of cerebrospinal fluid (CSF). In all these cases, the cyst expanded into an enlarged Sylvian fissure and to the margin of the partially or totally absent temporal pole. Inside the opened cyst, the middle cerebral artery was clearly visible. The capsule of the cyst was thin in all but one case (Fig. 1 left), where a thicker whitish membrane connected the margins of the rudimentary temporal lobe with the frontal and parietal lobes.

The postoperative course was uneventful in all but one patient, in whom pneumonia developed following surgery. This patient had required an emergency operation due to the rapid development of increased intracranial pressure following status epilepticus, and his general condition was poor. The three patients who had experienced seizures before surgery remained on antiepileptic drugs and were free of further seizures postoperatively. The hemiparesis regressed in all four patients. In follow-up examinations, neither the clinical findings nor the CT scans showed signs of recurrent cysts. At the last follow-up examination 3 years after intervention, all patients were free of symptoms.

Discussion

Ectopic neuroglia, as mentioned by Shuangshoti, could not be found on histological investigation of the cyst wall in the patients reported here, nor was calcification observed.

Evidence of persistent temporal defects in control CT scans support the hypothesis of temporal lobe agenesis being the primary event, the cyst being formed ex vacuo and remaining asymptomatic for a lifetime. However, secondary development of a space-occupying lesion, with increased intracranial pressure or focal neurological signs, can occur. This may be due to an arachnoid valve mechanism permitting CSF to enter and expand the cyst or a head injury causing subdural bleeding adjacent to the cyst. Direct surgical approach is necessary in many cases due to the considerable space-occupying effect with midline shift to the contralateral side. Conservative management, as proposed by Robinson, can only be suggested for cases lacking signs of increased intracranial pressure and focal neurological signs. Excision of the cyst rather than a shunting procedure seems to be the treatment of choice, since all the patients improved and no recurrence of cysts occurred in this series.

The importance of the CT scan for the diagnosis of the cyst is emphasized, since the marked difference in density between cyst and brain tissue allows the detection of even small lesions. Associated subdural hematomas could unequivocally be detected by CT only when the density of the hematoma was different from...
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that of the cyst. Thickened arachnoid membranous structures in the CT may only vaguely suggest the possible presence of an isodense hematoma superimposed on the cyst. In doubtful cases, angiography may be needed to establish the diagnosis.*

References


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