Meningiomas causing spontaneous intracranial hematomas

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Four cases of spontaneous intracranial hematomas caused by unsuspected meningiomas are reported. Nine previous cases were found in the literature and the entire series of 13 cases is reviewed. Because of their unusual clinical presentation, these cases were not diagnosed correctly prior to radiological studies. Hypertension, trauma, and blood dyscrasia played no significant pathogenetic role. The histological features of these hemorrhagic meningiomas are described, and the importance of adequate radiological investigations and early radical surgery is stressed.

KEY WORDS • cerebral hemorrhage • brain tumors • spontaneous intracranial hematoma • meningioma

Spontaneous hemorrhage occurs in approximately 4% of cases of intracranial glioma or metastatic carcinoma7,10,12,14 and occasionally in pituitary adenomas. By contrast, hemorrhage into meningiomas is exceedingly rare;13,18 in fact, no instance of spontaneous hematoma was mentioned in the large meningioma series of Cushing and Eisenhardt2 or in that of Hoessly and Olivecrona.9 Meningioma was not cited as a cause of cerebral hemorrhage in the autopsy series of Mutlu, et al.,11 Zimmerman,17 or Zülch.19

In this communication we will report four cases of intracranial hemorrhage of surgical significance associated with supratentorial meningiomas and summarize the nine cases previously reported.1,4,6,8,15 The diagnostic difficulties encountered by the unusual presentation of these cases, the value of contrast studies, and the results of surgical therapy will be briefly discussed.

Case Reports

Case 1

A 59-year-old normotensive man developed sudden headache and transient loss of consciousness. He was drowsy and dysphasic with right hemiparesis but without papilledema. The cerebrospinal fluid (CSF) was bloody. Skull radiographs demonstrated sclerosis of the left sphenoid wing. A left carotid angiogram showed a sphenoid wing meningioma and enlargement of the left temporal lobe. During preparation for craniotomy the patient suffered cardiac arrest from which he was resuscitated. A burr hole yielded 40 cc of liquid hematoma from the left temporal lobe. A second angiogram confirmed the previous findings. A craniotomy exposed subdural and intracerebral hematomas adjacent to the meningioma. Both were totally removed. Histologically,
the tumor was a meningoendotheliomatous meningioma with foci of unusually rich vascularity immediately adjacent to the hemorrhage (Fig. 1). Two years after surgery the patient remains asymptomatic and neurologically intact.

**Case 2**

Over a period of 10 years this 49-year-old woman had recurrent left-sided headaches followed by right hemiparesis and focal seizures. On each occasion the spinal fluid was bloody. Two prior angiograms were interpreted as normal, the last one was 3 years previous to the present admission, which was again precipitated by severe headache, dysphasia, and right hemiparesis. There was no papilledema, and the spinal fluid was again bloody. A left carotid angiogram showed a parasagittal tumor and an overlying subdural hematoma. Surgery was carried out in two stages because of excessive dural bleeding. The meningioma was surrounded by a thick subdural hematoma with membranes, and an intracerebral hematoma was found extending deep to the tumor in the medial portion of the hemisphere. Microscopically, the tumor was a meningoendotheliomatous meningioma with a diffuse vascular pattern (Fig. 2). The patient has remained dysphasic and hemiplegic.

**Case 3**

A hypertensive 72-year-old woman had had right-sided seizures and personality changes for 6 months. On the day of admission she was found comatose with a right hemiplegia and a dilated right pupil. There was no papilledema. The spinal fluid was hemorrhagic. A $^{99m}$Tc cerebral imaging study showed an area of uptake in the left parasagittal area. A left carotid angiogram disclosed a large meningioma and an overlying subdural hematoma. At surgery a very soft hemorrhagic tumor and an acute subdural hematoma were found. The histological diagnosis was angioblastic meningioma characterized by a profuse network of
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delicate vascular channels (Fig. 3). The patient remained comatose and died 2 months after surgery.

Case 4

One year prior to admission this 69-year-old man exhibited a 6-week period of confusion, dysphasia, and right hemiparesis from which he spontaneously recovered. At that time a cerebral imaging study showed a pattern compatible with a middle cerebral artery occlusion. He was readmitted 1 year later because of the rapid onset of severe headache, dysphasia, and progressive stupor. He had no papilledema and the CSF was clear. A brain scan was again interpreted as compatible with occlusion of the middle cerebral artery. Angiography showed an avascular parietal mass and a subdural hematoma (Fig. 4). A cystic meningioma surrounded by a liquid hematoma was removed at surgery. Microscopically, the meningotheliotomatous pattern of this tumor was associated with a capillary network formation adjacent to the hematoma (Fig. 5). The patient made an excellent recovery.

Summary of Cases

With this report of four patients, a total of 13 cases of meningiomas with intracranial hematomas have been documented in the world literature. The patients' ages ranged from 18 to 78 years; there were five women and eight men. Essential hypertension requiring therapy was present in two patients. Trivial trauma was probably a contributing factor in one case only; this is in agreement with the findings in other tumor series. No case showed clinical or laboratory evidence of a blood dyscrasia. The most common presentation was characterized by sudden severe headaches with depressed sensorium and varying degrees of neurological deficit. Seizures and papilledema were rarely encountered. Understandably, in most cases this clinical picture and the findings of bloody spinal fluid led to a diagnosis of subarachnoid hemorrhage. When the spinal fluid was not bloody, a brain tumor was considered, but the diagnoses of meningioma and hematoma together were never entertained. One of our patients was erroneously presumed to have a cerebral infarct, a diagnosis supported by two consecutive brain scans.

Radiological contrast studies were undertaken in 12 of the 13 patients. The presence of a meningioma and a hematoma together was recognized in five cases. In one case, only the tumor was diagnosed, and in four cases only the hematoma. In two patients neither diagnosis was made. Angiography, however,
remains the procedure of choice in the investigation of patients with apoplectic neurological manifestations. The use of computed axial tomography should provide more precise delineation of these lesions. Histologically, all meningiomas were classified as meningoendotheliomatous tumors except for one that was an angioblastic meningioma. In five cases in which detailed histological studies were undertaken, a constant association of large and small thin-walled endothelial channels with the hemorrhage was noted. The frequency with which this vascularity occurs is not known, but this finding in five cases suggests that its relationship with the hemorrhage is more than coincidental. Although it has not been possible to identify precisely the histological features responsible for the hemorrhage, the vascular changes appear to be related.

In this group of 13 patients the therapeutic results were influenced by the preoperative neurological status and the extent of surgery. The three patients who were not operated on, and one who had only exploratory burr holes died. Two patients who were comatose on admission died in spite of extensive surgery. In three patients, removal of both lesions did not improve their preoperative neurological deficit. The four patients who fully recovered had the benefit of radical surgery.

Discussion

Meningiomas may become clinically manifest by unusual clinical features due to spontaneous bleeding resulting in the formation of intracerebral or subdural hematoma. In the 13 cases analyzed here, the correct diagnoses were never made on clinical grounds alone. Contrast studies are necessary to identify both the benign nature of the meningioma and the location of the associated hematoma. Histologically, these tumors showed an unusual vascularity near the site of the hemorrhage. Radical surgery aimed at evacuation of the hematoma and total excision of the meningioma is essential if satisfactory therapeutic results are to be obtained.

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