

Aneurysm Inside Meningioma

Case Report

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Summary

The first case in the literature of a large meningioma of the Sylvian fissure incorporating an aneurysm of the middle cerebral artery in a 7-year-old girl is described. The tumour with the aneurysm inside was totally removed. Despite resection of the middle cerebral artery there was complete disappearance of a severe pre-operative neurological deficit. The patient is practically healthy six years after surgery.

Keywords: Meningioma; arterial aneurysm; middle cerebral artery.

We present the unusual case of an aneurysm of the middle cerebral artery inside a large meningioma.

Case Report

A 7-year-old girl was admitted to our clinic in July 1977. When the child was 2 years old the first short syncope-like petit mal seizure took place and then recurred once or twice a year. There were no other complaints, no neurological symptoms or signs.

One week before admission, motor unrest and after that a deep right-sided hemiparesis and semicomatous state suddenly and quickly developed. A lumbar puncture at a local hospital revealed grossly bloody CSF. The following day hemiplegia and total aphasia with severe meningeal signs were noted.

When admitted the girl was in a grave condition. She was confused and inactive. There were no movements in her right arm and minimal movements in the right leg with pathological reflexes, severe aphasia, hemihypaesthesia, initial signs of optic disc oedema. The M-echo showed a 5 mm shift to the right.

Carotid angiography disclosed a typical arterial aneurysm of the left middle cerebral artery (size 7×6 mm). The artery was displaced medially and the anterior cerebral artery to the right (Figs. 1 a and b).

CT-scans showed a large (6×6 cm) lesion of high density with irregular but distinct contours in the left fronto-temporal region surrounded by a narrow oedematous zone. Inside the lesion, an area of accumulated contrast medium was noted (Fig. 2).

According to the above-mentioned data, the clinical suggestion of a massive parenchymatous haematoma after aneurysm rupture was expressed.

Operation. A typical left fronto-temporal craniotomy was performed under general anaesthesia. A mild oedema was noted. In the Sylvian fissure 1 cm under the cortex a very large ball-shaped tumour-like mass was found, which replaced the anterior half of the temporal and the posterior part of the frontal lobe. This encapsulated mass was carefully separated from the normal brain tissue. The proximal part of the middle cerebral artery (M_1) deep in the Sylvian fissure entered into the inferior pole of the mass, while the distal part of the artery left its superior pole.

It was suggested that it was a giant arterial aneurysm partly thrombosed and filled with a clot, which may explain the small size of the aneurysm on the angiograms. Because of the impossibility of separating the mass and the middle cerebral artery inside it, both ends of the artery were ligated and cut. The diastase between the two ends was about 5 cm. After that, the mass was totally removed en bloc; it was about 6 cm in diameter. The inferior pole of the mass contacted the bottom of the middle cranial fossa, where a relatively small haematoma (about 15 ml) was found and removed.

During the early *post-operative course* an uncommonly rapid recovery was noted. The movements in the paralyzed extremities and spontaneous speech re-appeared on the 3rd day and improved rapidly. On the 12th day the girl began to walk. Three weeks after the operation she was discharged with only light hemiparesis and mild amnesic aphasia. 6 years after the operation the girl is practically healthy and has no complaints (Fig. 3). There are no neurological signs except light asymmetry of reflexes in the legs.

Anatomical findings: *Macroscopically*, the cross-section of the removed ball-shaped mass of elastic consistency consisted of a thick peripheral part of grey-rose tissue and the centre replaced by a haematoma. Inside the haematoma an arterial aneurysm about 6 mm in diameter surrounded by coagulated blood and parts of the middle cerebral artery were disclosed (Fig. 4). *Microscopically*, the peripheral tissue has the structure of a typical fibroblastic meningioma (Fig. 5) with the compact linings of cells, containing oval nuclei filled with chromatin. The cell linings present concentric structures (Fig. 6).

The artery in the central part of the tumour was 1.5 mm in diameter and had a typical three-layered wall. The wall of the

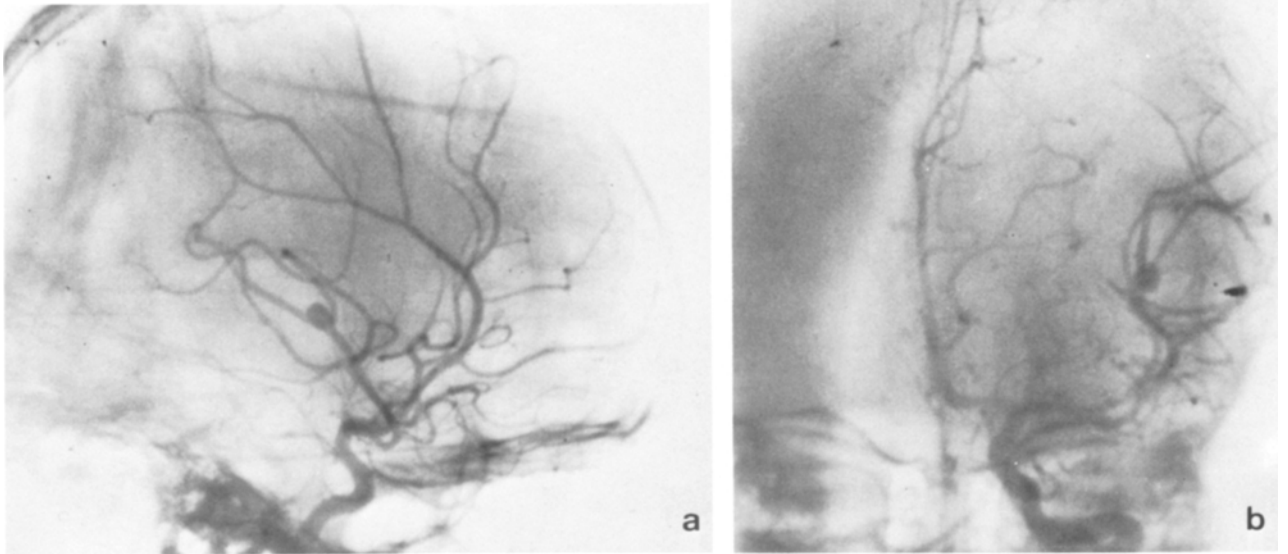


Fig. 1. Pre-operative carotid angiography. a) lateral, b) A-P angiograms. Note the aneurysm of the left middle cerebral artery. The anterior cerebral artery is displaced to the right

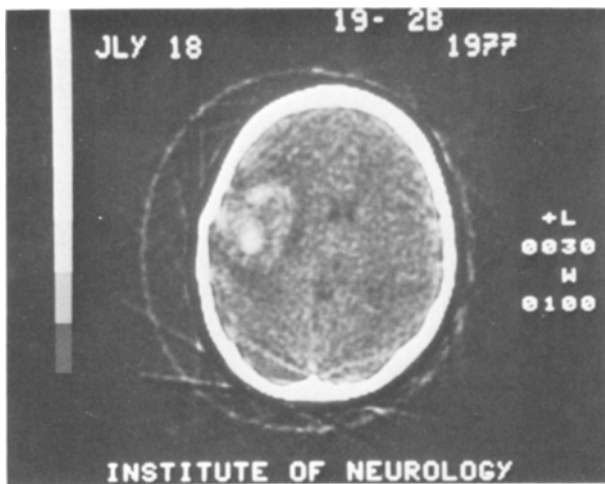


Fig. 2. CT with contrast enhancement before the operation. Note the big zone of increased density in the left fronto-temporal region. In the central part of the zone there is a round lesion of contrast uptake. The zone is surrounded by a strip of low density (brain tissue oedema). The middle structures and anterior horns are markedly displaced to the right. Posterior horn and third ventricle are compressed



Fig. 3. The girl is healthy five years after surgery

aneurysm consists of collagen fibres only. In the neck of the aneurysm typical changes were found such as: absence of the internal elastic membrane, defects of the muscular layer. There was a zone of fibrinoid necrosis in the aneurysm wall, surrounded by fresh thrombotic masses. It was the site of the aneurysm rupture and bleeding into the tumoral tissue.

In some places the adventitia of the artery was intimately attached

to the tumoral tissue (Fig. 7). It may be suggested that the arachnoid surrounding the artery was the source of tumoral growth.

Discussion

According to the literature an association of an aneurysm with different types of tumours in the same



Fig. 4. Large meningioma (big arrow) with haematoma inside (small arrow). Note berry-shaped aneurysm in the centre of the haematoma (two arrows). The aneurysmal wall is in the state of fibrinoid necrosis. The middle cerebral artery has the typical structure (arrowhead). H. E. Microplanar $\times 5$

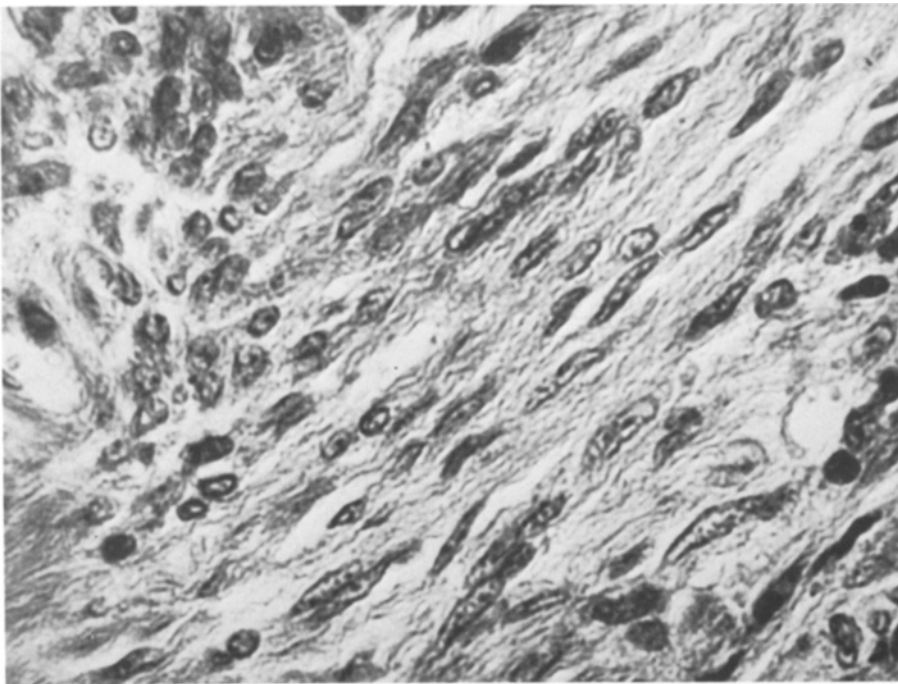


Fig. 5. Microscopic picture of fibroblastic meningioma. H. E. $\times 200$

brain occur very rarely. The rate of such coexistence is 0.2–0.7% of all brain tumour cases^{3, 4, 10, 15}. In several reports only 1–2 cases were described^{1, 2, 5–9, 11–14}.

In 1961 Taylor¹⁵ found 7 published cases in the literature of the previous 65 years and 8 unreported cases from English neurosurgical clinics with the addition of one personal case.

In 1972 Pia, Obrador and Martin¹⁰ have analyzed

116 cases of the association collected from the literature and by questionnaires from many leading clinics. The authors added eight personal cases from their clinics in Giessen and Madrid. In the above-mentioned coexistence the initial signs and symptoms were connected with the tumour in 66% and with the aneurysm in 22% of the cases.

Only 34 brain tumours from 116 cases collected by

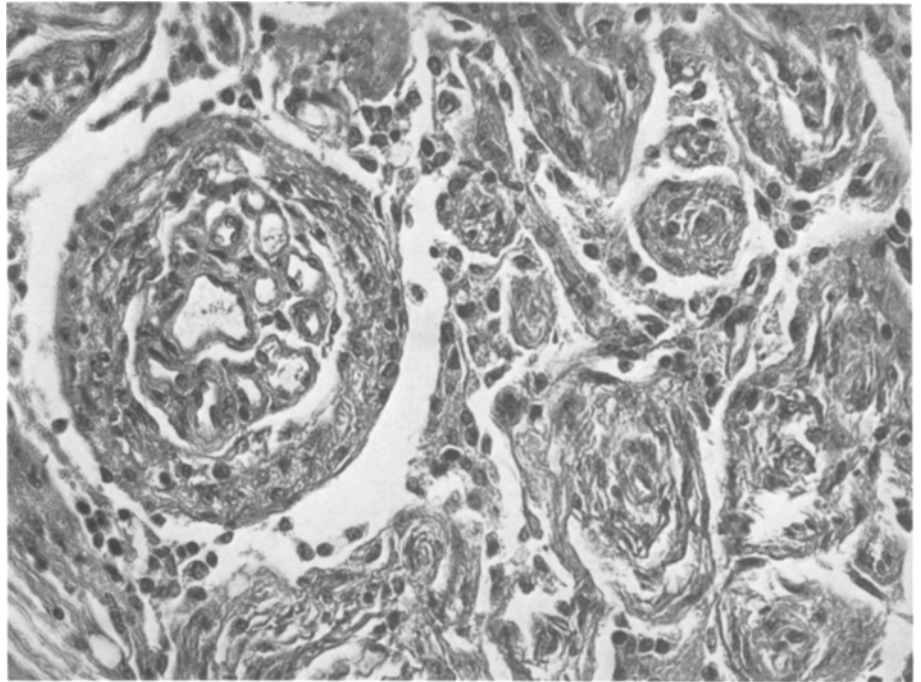


Fig. 6. Concentric structures in the tissue of the meningioma. H. E. $\times 200$

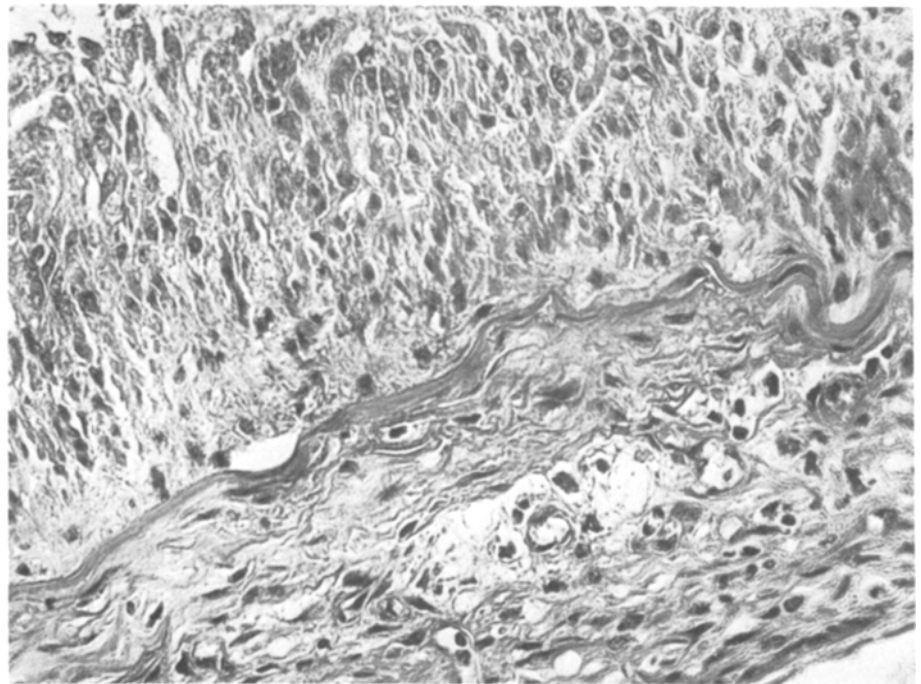


Fig. 7. The growth of the tumour cells from the adventitia of the middle cerebral artery to the tumoural tissue. H. E. $\times 200$

the authors were meningiomas. It is noteworthy that the incidence of the coexisting aneurysms with meningiomas and pituitary adenomas is about two times higher than with other brain tumours. The higher relative frequency of middle cerebral aneurysms, especially with convexity tumours was also stressed. There was a predominance of aneurysms ipsilateral to the tumour and related to the arteries which supply the tumour¹⁰.

In 1976 Handa *et al.* collected from the literature 134 cases of intracranial aneurysms occurring with brain tumours and added seven personal cases. Gökalp *et al.*³ described four such personal cases. Nevertheless, we could not find in the literature any case of the location of an aneurysm inside a meningioma as in our case.

The surgical treatment of coexisting aneurysm and brain tumour is connected with a high risk irrespective of whether the tumour, the aneurysm, or both are

surgically treated. According to Pia *et al.*¹⁰ the post-operative mortality was 40%.

The genesis of aneurysm and tumour coexistence is a most interesting and unsolved problem. Several opinions were expressed in the literature. Dysgenetic defects in the arterial wall and also in the brain and its covering cells is the most common suggestion. It is supported by our case, because the first clinical sign (petit mal attacks) as early as at the age of two years, led us to suppose a congenital origin of the tumour. A congenital defect in the arterial wall exactly in the same brain zone may lead to the aneurysm formation.

The opinion was expressed that certain brain tumours, mainly of the skull base causing a local disturbances in cerebral circulation, may serve as a predisposing factor for the development of arterial aneurysms¹⁰. Increased regional blood flow because of tumour supply may also play a role in aneurysm formation^{3, 10}. The above-mentioned predominant ipsilateral location of an aneurysm and a tumour and its relation to the same artery support this suggestion.

There was an opinion that direct tumour influence on the arterial wall may also be involved. In our case, the meningioma may be suggested to have damaged the middle cerebral artery wall acting as an aetiological factor in aneurysmal formation. The close attachment of tumoural tissue to the arterial wall, proved in our case microscopically, may support the suggestion. But a counter-argument may be proposed: meningiomas quite often include major cerebral vessels without such consequences. It seems considerably less probable that the meningioma during its growth around the middle cerebral artery has included a congenital aneurysm of the artery.

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