Arteriovenous malformations of the brain — curable epilepsy

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Arteriovenous malformations (AVMs) of the brain are an important although infrequently diagnosed cause of epilepsy. They may be associated with epilepsy that is difficult to control medically but that may be amenable to surgical control.

A 43-year-old man presented with a history of sudden onset of a very severe headache, nausea, vomiting and transient photophobia. He was neurologically intact. He reported being epileptic for the past 18 years, suffering attacks of grand mal fits approximately 2 - 3 times every month. The cause of his epilepsy had never been investigated although he had been placed on various anti-epileptic drugs with little success. At presentation he was taking three different anti-convulsant drugs. A computed tomography (CT) scan of the brain demonstrated a bleed in the left frontal lobe, with areas of serpiginous enhancement on contrast administration (Fig. 1). Digital subtraction angiography revealed the presence of an AVM, supplied by feeders from the left anterior and middle cerebral arteries, and draining into the superior sagittal sinus (Figs 2 and 3). EEG examination did not reveal any other epileptogenic focus in the brain. The lesion was completely resected at craniotomy and the associated blood clot was drained. Following surgery, there was a dramatic improvement in the frequency of the seizures. Apart from one grand mal fit shortly after the operation, he has remained free of fits over a period of several months' follow-up and has been weaned down to single-drug treatment.

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Discussion

Epilepsy in Africa is a common neurological problem although the incidence and prevalence are not accurately known. Superstition and misconceptions about the disease are rife and often hinder affected individuals from seeking medical attention.

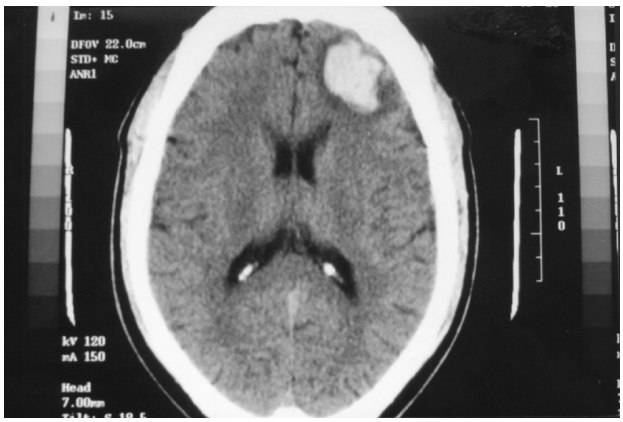

Fig. 1. Non-contrast CT scan showing an acute intracerebral bleed in the left frontal lobe.

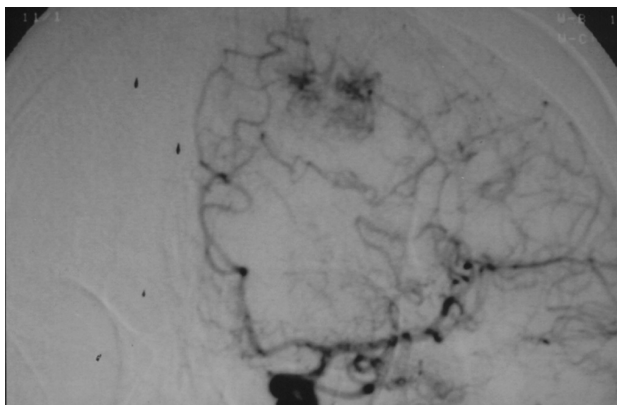

Fig. 2. Angiogram of the left internal carotid artery (arterial phase) showing the left frontal arteriovenous malformation being fed by branches of the anterior and middle cerebral arteries.

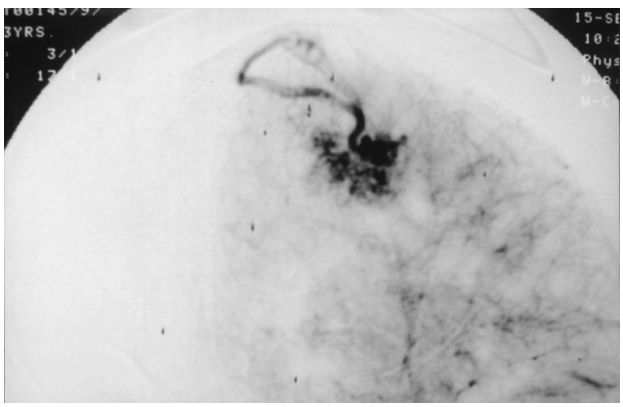

Fig. 3. Venous phase of the angiogram shown in Fig. 2, showing drainage of the arteriovenous malformation into the superior sagittal sinus.

The many causes of non-idiopathic epilepsy include congenital infections, perinatal complications including birth trauma and asphyxia, and later in life, trauma with head injury. Infections such as neurocysticercosis and tuberculosis are important causes, as is HIV, both primarily and as a result of opportunistic infections and neoplasms. Primary and secondary brain tumours, and neurovascular conditions such as aneurysms and AVMs, are also causes of this condition.

AVMs of the brain are congenital lesions formed by disordered arteries and veins. The clinical presentation of symptomatic AVMs is varied. The commonest presentation is haemorrhage, occurring in about half the patients, while about 30% present with epilepsy.[1] A study involving 280 cases of cerebral AVMs[2] showed that patients with small (< 3 cm) lesions are more likely to present with haemorrhage, while those with larger ones frequently present with epilepsy. Other modes of presentation include progressive neurological deficits arising as a result of pressure exerted by the lesion on neighbouring parts of the brain and blood being shunted away from these areas. The natural history of this condition has been described in a comprehensive study.[3] The authors reported a major re-bleeding rate of 4.0% per year, and a mortality rate of 1.0% per year. The combined rate of major morbidity and mortality was 2.7% per year. The proposed mechanisms of epilepsy in AVMs include focal cerebral ischaemia due to arteriovenous shunting, gliosis of the surrounding brain and a secondary epileptogenesis in the temporal lobe.[4] Spontaneously thrombosed AVMs in patients with no previous history of haemorrhage have been associated with intractable seizure disorders.[5]

Reports of the control of epilepsy following AVM surgery have been encouraging. In a large series[2] 83% of those patients with pre-operative epilepsy were seizure free and of those still experiencing seizures, the majority reported significant improvement following surgery. Of those who did not have pre-operative epilepsy, 6% went on to develop it. The mean duration of follow-up in this study was 7.5 years. Excellent results have been reported in other studies,[3,6,7] but a sobering report[8] suggests that by 20 years after surgery, there is a 57% risk of epilepsy in patients who had no seizures before.

Surgery generally offers good prospects for the management of epilepsy in patients with AVMs of the brain. It is also favoured because of the cumulative risk of major morbidity and mortality from haemorrhage of these lesions, especially in younger patients.

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