



## Case Report

## A case of cerebral aneurysm associated with complex partial seizures

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We report a 20-month-old girl with an unruptured aneurysm of the middle cerebral artery. The initial sign was complex partial seizures. Magnetic resonance angiography showed an aneurysm of the right middle cerebral artery. Cerebral angiography confirmed the presence of a saccular aneurysm. After 3 months, the aneurysm spontaneously thrombosed without neurological deficit. The seizures were controlled by anti-convulsants. The aneurysm was probably near the focus of the complex partial seizures. This is a rare case of a childhood cerebral artery aneurysm that first manifested itself by complex partial seizures.

**Key words:** Cerebral aneurysm; Cerebral vascular anomaly; Epileptogenic focus; Complex partial seizure in infancy; Magnetic resonance angiography

### 1. INTRODUCTION

Cerebral aneurysms are rare in early childhood [1]. One common result of an aneurysm in both adults and children is subarachnoid hemorrhage, and epilepsy from this cause is rare. We report a patient with an unruptured aneurysm of the right middle cerebral artery (MCA) who presented with complex partial seizures. The aneurysm was detected by magnetic resonance angiography (MRA), and it thrombosed spontaneously, which is rare in childhood [2].

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### 2. CASE REPORT

A 20-month-old girl was hospitalized at our hospital for treatment of seizures. The first episode, in which the patient suddenly stared to the left side for about 1 min with impairment of consciousness, occurred when she was 16 months old. The seizures reoccurred every few days. She was first hospitalized elsewhere. Results of electroencephalography (EEG) are shown in Fig. 1. There were spikes and slow waves in the right occipital area (Fig. 1A). Computed tomography (CT) of the brain revealed a high-density lesion in the right temporal lobe (Fig. 2A). Complex partial seizures were diagnosed from the EEG findings and seizure type. Phenytoin and valproate did not control the seizures.

The patient was referred to our hospital for further evaluation and therapy. The family history and perinatal history were negative. Development was slightly delayed; she first walked alone at the age of 18 months. There were no other neurological abnormalities. The

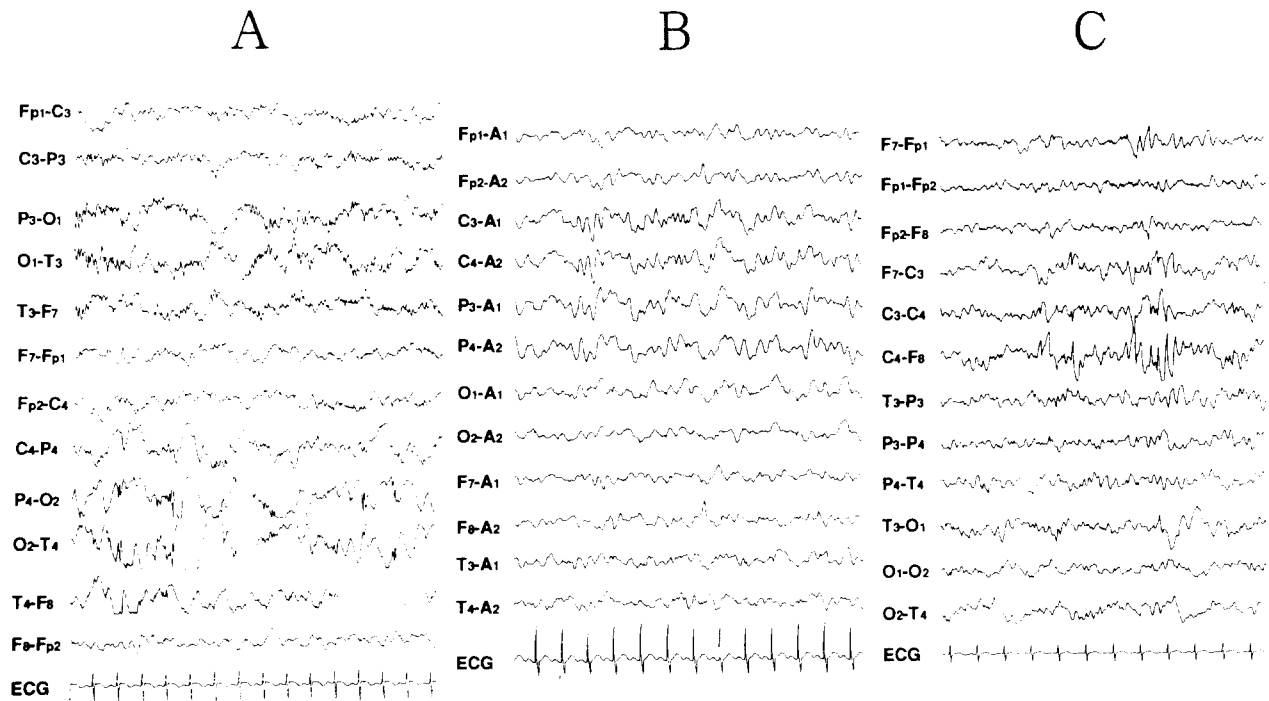


Fig. 1. A: EEG at 16 months of age. The spikes and waves are in the right occipital area. B,C: EEG on admission. The sharp wave is in the right temporal area and the spikes are in the right central area.

laboratory data were normal. EEG showed focal spikes and sharp waves in the right central and temporal areas (Fig. 1B,C). Contrast-enhanced CT showed enhancement of the lesion (Fig. 2B). T<sub>1</sub>-weighted magnetic resonance imaging (MRI) showed a high-signal

area surrounding a signal void in the right hippocampus (Fig. 3A). T<sub>2</sub>-weighted images showed a signal void with a high-signal area inside (Fig. 3B). Because these findings suggested that there was a vascular disorder, probably a partially thrombosed aneurysm, MRA was

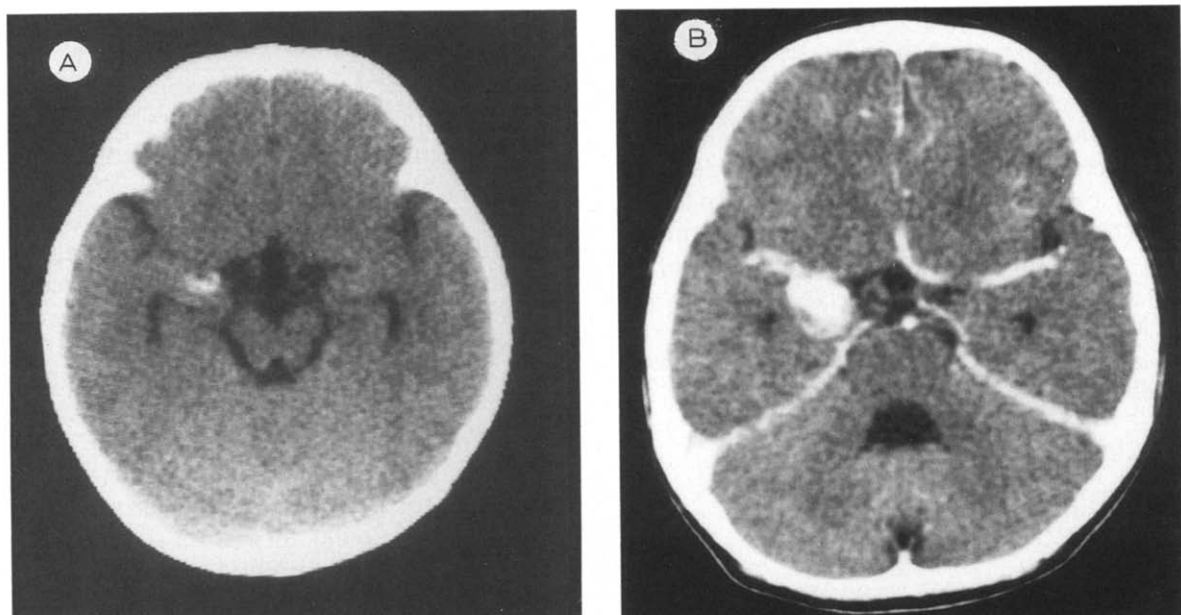


Fig. 2. A: plain CT scan at 16 months of age. There is a high-density area in the right temporal lobe. B: contrast-enhanced CT scan at 20 months. The right temporal lesion is enhanced.

done. MRA showed an aneurysm in the  $M_1$  portion of the right MCA (Fig. 3C). This aneurysm was also revealed by cerebral angiography, which showed a sac-

cular aneurysm of the right MCA measuring  $15 \times 8$  mm (Fig. 3D). There was stenosis of the right MCA proximal to the aneurysm.

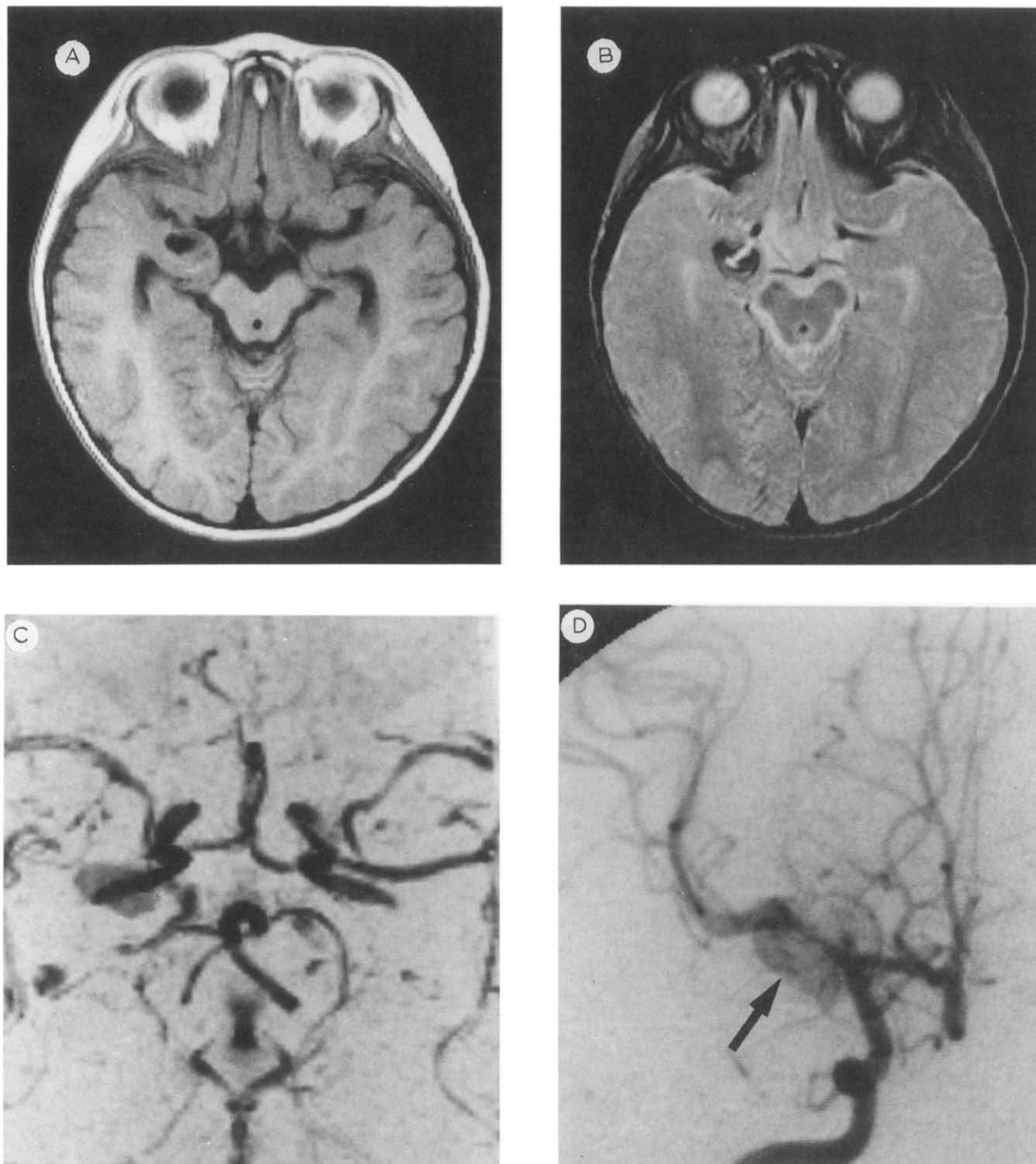


Fig. 3. Initial MRI, cerebral angiography, and MRA. A: the  $T_1$ -weighted image shows a signal void surrounded by a high-signal area in the right hippocampus. B: the  $T_2$ -weighted image shows a signal void containing a smaller high-signal area. C: MRA shows a large aneurysm in the  $M_1$  portion of the right MCA. D: digital subtraction angiography done during the first admission shows a large saccular aneurysm of the right MCA (arrow). The parent artery is narrow.

The seizures were controlled by valproate, diazepam, and carbamazepine. Three months later, the patient was re-admitted because surgical treatment was

planned. MRI and MRA were done again. The thrombosed aneurysm was visible, but the right MCA was not (Fig. 4A-C). Cerebral angiography (Fig. 4D) showed

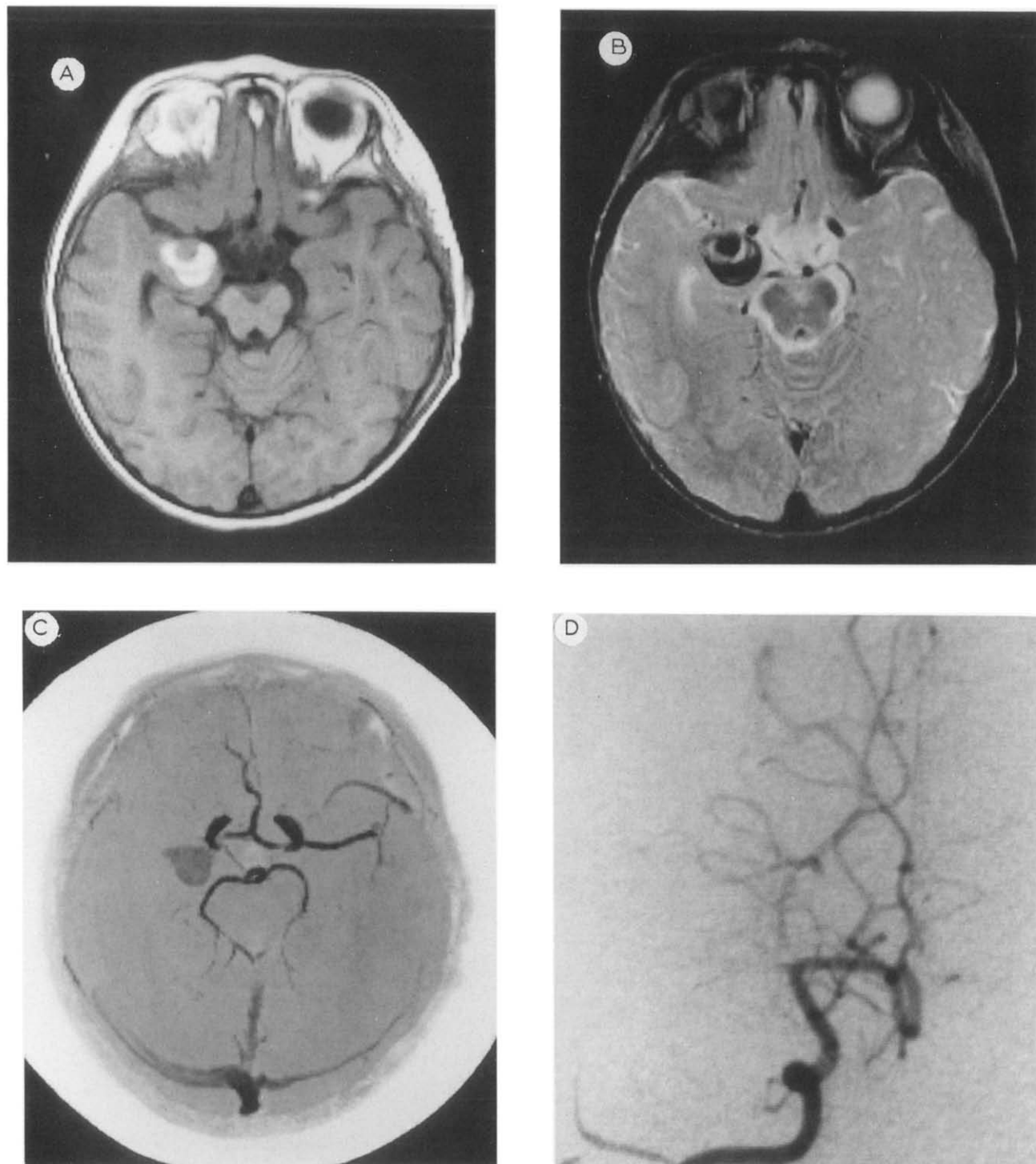


Fig. 4. MRI, MRA, and cerebral angiography on second admission. A: the  $T_1$ -weighted image shows a high-signal area in the right hippocampal region. B: the  $T_2$ -weighted image shows a signal void containing a smaller high-signal area. C: MRA shows that the aneurysm had thrombosed, but that the right MCA had not. D: digital subtraction angiography. The trunk of the right MCA and the aneurysm are not visible.

occlusion of the right MCA; the aneurysm was not seen. Through collateral vessels, there was retrograde filling of the area distal to the MCA occlusion.

[<sup>123</sup>I]Iodoamphetamine single-photon emission tomography showed decreased cerebral blood flow in the right temporoparietal region. There was no neurologic deficit.

### 3. DISCUSSION

The MCA is frequently the affected artery in children with cerebral aneurysm [1]. The signs and symptoms of unruptured aneurysms can include headache, cranial nerve palsies, and other neurologic deficits. Epilepsy is an initial manifestation of unruptured aneurysms in adults [3–6], but to the best of our knowledge, there are few reports of epilepsy in this condition in early childhood [1]. Aneurysms associated with epilepsy are usually large, and are often of the MCA [3–6]. The seizure type is usually of complex partial seizures [3–6], although the type depends on the location of the aneurysm.

In this case, it seemed that the aneurysm caused the epilepsy. Complex partial seizures are uncommon in children under 3 years of age [7,8]. Etiological factors associated with complex partial seizures are birth asphyxia, congenital infections, neoplasms, arteriovenous malformations, and congenital cerebral anomalies. Aneurysm is a very rare cause of complex partial seizures [9]. It is not known how an aneurysm causes epilepsy. At least three mechanisms have been proposed: compression of the adjacent cortex by the aneurysm [4], subclinical hemorrhage from the aneurysm resulting in tissue damage with later development of an epileptic focus [4–6], and ischemia secondary to embolization by the thrombus from an unruptured thrombosed aneurysm [6]. Our patient had complex partial seizures and the EEG findings were of focal spikes and slow waves from the occipital to the temporal area in the right hemisphere. The aneurysm was adjacent to the cortex of the right medial temporal lobe, and it was large. These factors may have been associated with the seizures.

During the first admission, cerebral angiography showed stenosis of the right MCA proximal to the partially thrombosed aneurysm. Occlusion of the par-

ent artery of an aneurysm is very rare [10]. That the patient had no neurological deficit suggests that the occlusion progressed slowly. Compression of the parent artery by the aneurysm itself and the propagation of thrombosis from the aneurysm may occlude the parent artery [10]. We assume that compression of the parent artery by the aneurysm slowed the blood flow, and that the thrombus was propagated from the thrombosed aneurysm into the parent artery.

Treatment for epilepsy caused by an unruptured aneurysm includes anti-convulsant therapy and surgery. Surgery can prevent subarachnoid hemorrhage and alleviate seizures. For epilepsy, an aneurysmectomy is more effective than wrapping of the aneurysmal walls [4]. In our patient, there was little risk of subarachnoid hemorrhage, because the aneurysm and parent artery had thrombosed.

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