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ACUTE ALTERNATING HEMIPLEGIA*

A Case Report

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Acute alternating hemiplegia in childhood is a rare disorder characterized by onset before 18 months of age and frequent attacks of alternating paralysis. In this case report, a 20-month-old boy having the diagnosis of acute alternating hemiplegia is presented. The diagnosis was based on clinical features. The frequency and severity of the hemiplegic attacks decreased following flunarizine therapy. In this case, cerebral perfusion was investigated during ictal and interictal periods. Tc-99m HMPAO-Brain single photon emission computed tomography (SPECT) revealed normal cerebral perfusion in ictal periods and hypoperfusion in interictal periods. *Key words: acute alternating hemiplegia, cerebral perfusion, flunarizine.*

Alternating hemiplegia in childhood is a rare disorder characterized by frequent transient attacks of hemiplegia lasting seconds or days. Verret and Steele[1] first described this disorder in 1971. Since then, fifty cases have been reported[1-5]. Krageloh and Aicardi[2] proposed the diagnostic criteria for this disorder: (1) Onset of disease before 18 months of age; (2) Repeated attacks of hemiplegia involving both sides of the body; (3) Oculomotor abnormalities during the attacks; (4) Autonomic disturbances associated with hemiplegia or occurring independently; (5) Mental and neurological abnormalities (Table I).

Table I: Diagnostic Criteria in Alternating Hemiplegia (Krageloh and Aicardi[2]), modified by Sakuragawa[6]

1. Onset of disease beore 18 months of age.
2. Repeated attacks of hemiplegia involving both sides of the body.
3. Oculomotor abnormalities during the attacks.
4. Autonomic disturbances associated with hemiplegia or occurring independently.
5. Mental and neurological abnormalities.
6. Ruling out related disorders such as metabolic or vascular disorders.

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Although the etiology and pathogenesis of alternating hemiplegia are unknown, it is considered a variant of migraine. The presence of acute onset and transient attacks of hemiplegia suggest a vascular mechanism. These is some evidence both to support and refute this theory[5,6]. Anticonvulsants and conventional antimigraine drugs are ineffective for hemiplegic attacks. A potent antivaso-constrictor, flunarizine, has been reported to be effective in decreasing the duration and severity of hemiplegia attacks[6-10].

In this report, a 20-month-old boy with acute alternating hemiplegia is presented with the findings of ictal and interictal 99m Tc-HMPAO brain single photon emission computed tomography (SPECT).

Case Report

A 20-month-old boy had been born at term with perinatal asphyxia. There was no family history of any neurological disease. At one year of age, attacks of hemiparesis/hemiplegia were noted. These attacks were considered to be postictal paralyses, and several anticonvulsant drugs including phenytoin, carbamazepine and vigabatrin were administered with no benefical effects.

The patient had recurrent attacks of hemiparesis/hemiplegia during the previous eight months. The frequency varied form three to four attacks per month to two to three attacks per day. The duration of the attacks ranged from 10 minutes to 96 hours. Oculomotor abnormalities such as nystagmus, gaze deviation and strabismus were noticed during some episodes. Various autonomic disturbances (tachycardia, dilated pupils, sweating, alterations in skin color) were associated with hemiplegia. He was miserable and very irritable during the attacks, and cried a lot. Sometimes he had bilateral involvement. Dysphagia and respiratory difficulty was observed during the bilateral attacks. Although he never lost consciousness completely during the attacks, he had a decreased response to external stimuli. Symptoms generally disappeared with sleep. He had moderate developmental delay. His neurological examination revealed brisk deep tendon reflexes, but he had no muscle weakness between attacks.

The following investigations were found to be normal: complete blood count; erythrocyte sedimentation rate; renal, liver, and thyroid function tests; and serum levels of potassium, magnesium, glucose, ammonia, creatine kinase, lactate, and pyruvate. Tests for antinuclear factor, anti-DNA and anticardiolipin antibodies were negative. Urine analysis for amino acids as well as metabolic screening were negative. The serum levels of protein C and S, antithrombin III, C_3 and apoprotein were normal. Electrocardiography, telecardiography and hemoglobin electrophoresis were normal. The nerve conduction study and electromyography were also normal.

EEG tracings were obtained during ictal and interictal periods. No epileptogenic discharge was recorded during the attacks. Subcortical paroxysmal activity was noted in the interictal EEG recording. Cranial computed tomography (CT) and magnetic resonance imaging (MR) showed cortical atrophy (Fig. 1). MR angiography was normal (Fig. 2).

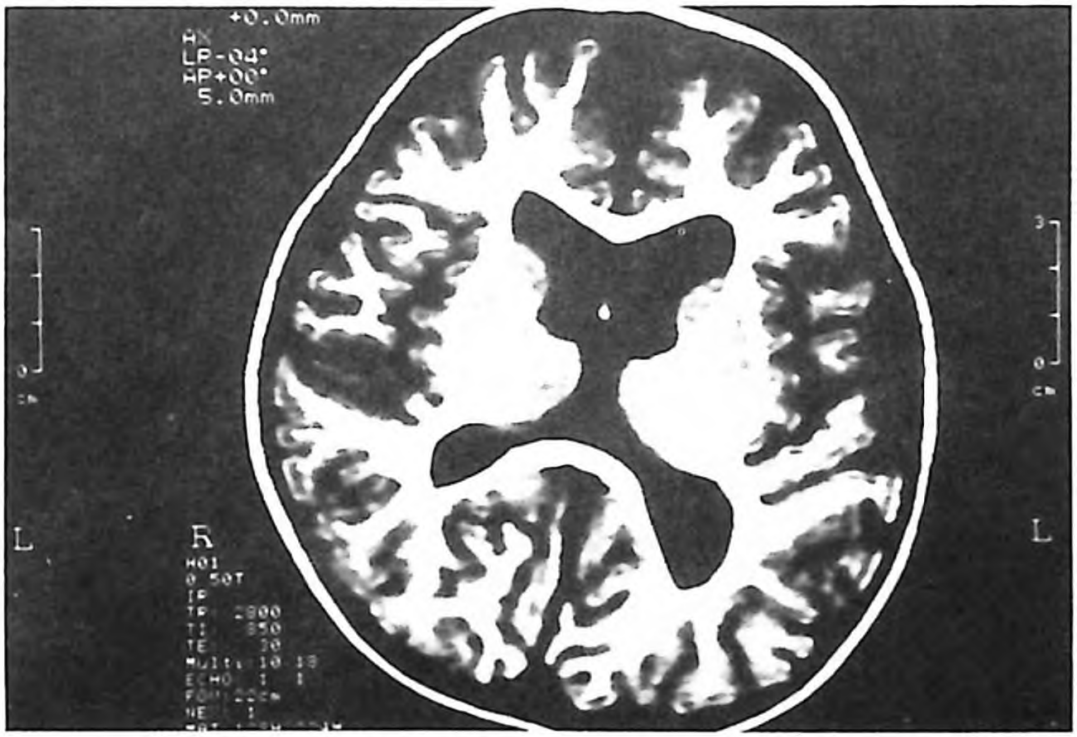

Fig. 1. Axial MR (T2W1): Cortical atrophy.

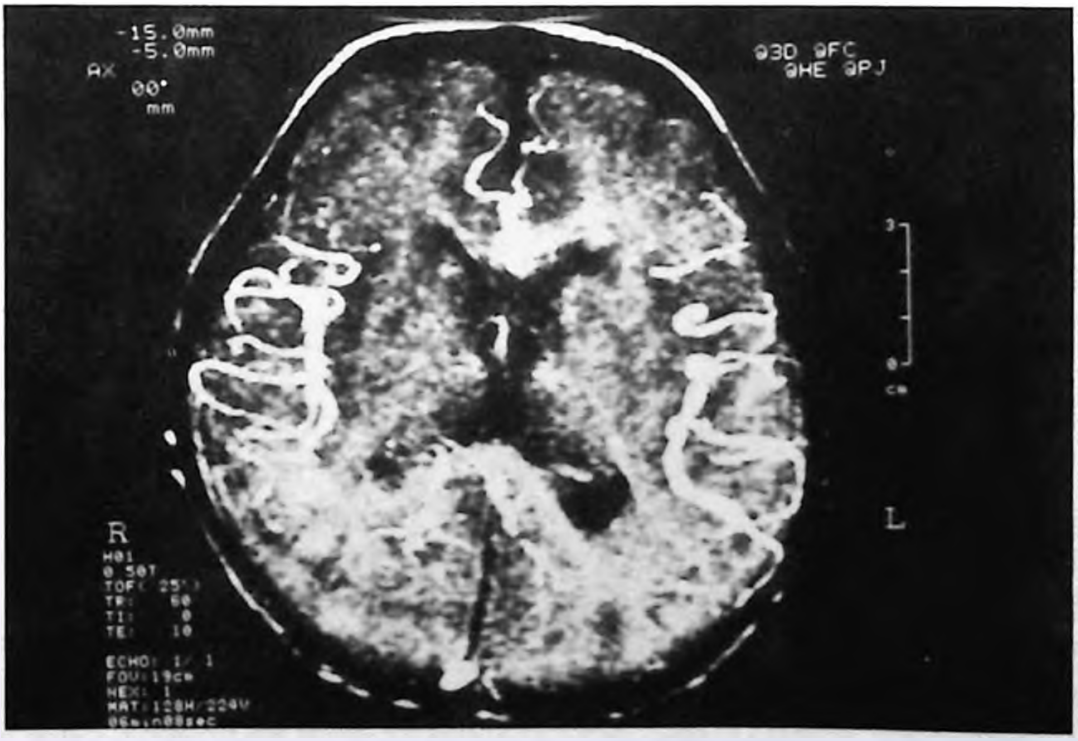

Fig. 2. MR angiography: Normal.

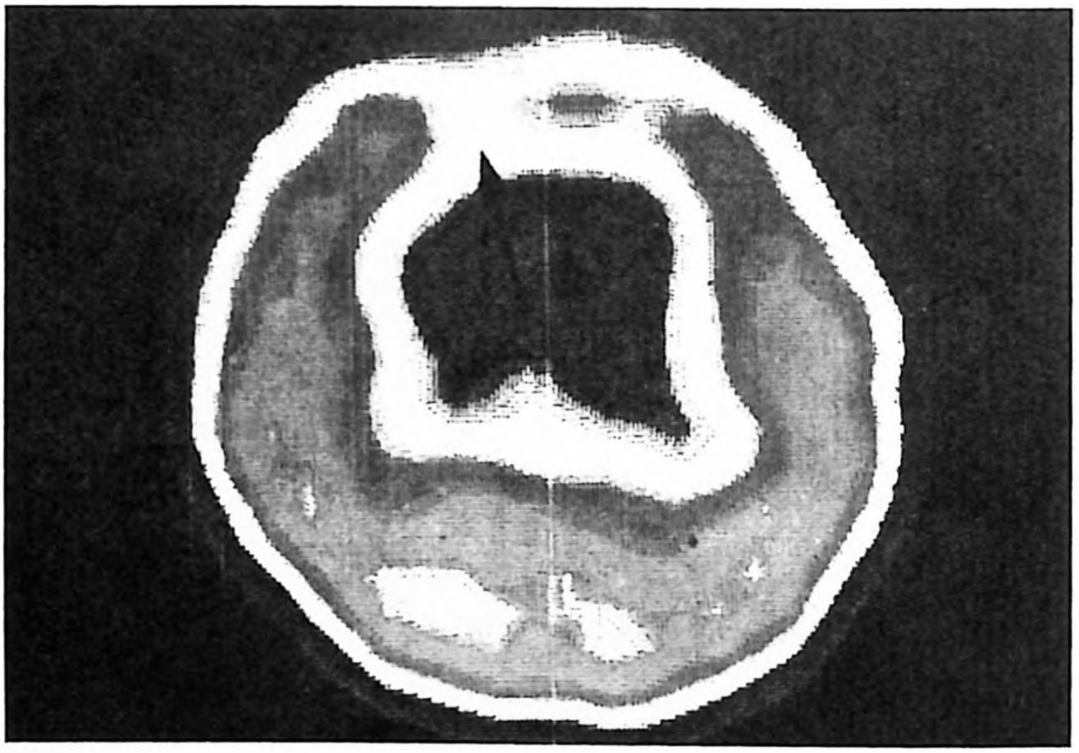

Fig. 3: Interictal Tc99m-HMPAO-brain SPECT: Bilateral hypoperfusion of frontal areas.

Technetium 99m hexamethyl propylamine oxime (HMPAO)-brain SPECT images were taken during the ictal and interictal periods. Although ictal SPECT examination revealed normal cerebral perfusion, interictal SPECT showed hypoperfusion of the bilateral frontal lobes (Fig. 3).

Flunarizine (5 mg/day), a calcium-channel blocker, was initiated to prevent the acute hemiplegic attacks. After five months of therapy, the duration and severity of attacks decreased significantly (1-2 attacks per month). No adverse reaction was observed.

Discussion

Acute alternating hemiplegia is a rare disease characterized by paroxysmal, alternating hemiplegia and/or tetraplagia beginning in infancy. The diagnosis of this disorder is based on clinical findings. Criteria for diagnosis were defined by Krageloh and Aicardi[2] and developed by Sakuragawa[6]. Epileptic seizure, mitochondrial encphalopathy and complicated migraine should be taken into consideration in the differential diagnosis of acute alternating hemiplegia. It may be difficult to determine whether the attacks are true epileptic, because ictal EEG abnormalities may be seen in both disorders; however, the hemiplegic attacks are unresponsive to anticonvulsant therapy. EEG abnormalities have been detected between hemiplegic attacks in two-thirds of patients. EEG slowing during the attacks has also been observed on the contralateral side in half of patients[11]. We could

not find any abnormality in the EEG recordings of our patient during the attacks, but subcortical paroxysmal discharges were noted in his interictal EEG recording. The patient had been diagnosed with epilepsy based on his interictal subcortical epileptic activity at a university hospital. Several anticonvulsant drugs had been prescribed by various physicians. During his stay in our hospital, a generalized tonic-clonic seizure was observed, and phenytoin therapy was continued while the other anticonvulsant drugs were discontinued.

MELAS syndrome (mitochondrial encephalopathy, lactic acidosis, and stroke-like episodes) may manifest a somewhat similar clinical picture. The presence of normal muscle biopsy findings and normal lactate and pyruvate levels are indicative in distinguishing alternating hemiplegia and MELAS. Although the pathophysiologic mechanism of acute alternating hemiplegia remains obscure, this disorder may be a migraine variant. While a prominent family history of migraine and epilepsy among the first-degree relatives of patients is often found, the parents of our patient had no history of migraine or epilepsy.

A vascular mechanism has been proposed for alternating hemiplegia, but there is no clear evidence to support this theory[3-8]. Cranial CT/MR and angiographic studies do not reveal any evidence of cerebrovascular disease. In advanced cases, cortical atrophy and mild atrophy of the cerebellar vermis may be revealed by CT/MR. Our patient had cortical atrophy and secondary dilatation of ventricles on his cranial MR (Fig. 1). We considered these findings to be the consequence of severe perinatal asphyxia. MR angiography also revealed no abnormal finding (Fig. 2).

Investigations of cerebral perfusion during attacks and between attacks with the use of Brain-SPECT have revealed contradictory results. Ictal SPECT studies have showed hyperperfusion, hypoperfusion or normal findings on the contralateral hemisphere[6, 12, 13]. Zupanc et al.[12] reported hypoperfusion on the left cerebral hemisphere during an acute episode on the right by using 123 I-iodoamphetamine SPECT. They postulated vasospasm as the probable cause of the transient, reversible hypoperfusion of the contralateral hemisphere. In contrast, Kanazawa et al.[13] reported a case with hyperperfusion on the temporal and parietal regions contralateral to the hemiplegic side by 99m-Tc HMPA-SPECT examination. The authors postulated that hyperperfusion may have been due to an underlying seizure phenomenon. Their case was a 12-month-old boy having focal spike discharges on his interictal EEG.

Interictal studies measuring blood perfusion by SPECT and cerebral metabolic rate by PET have showed a decrease in cerebral blood perfusion and metabolism. Sakuragawa[6] reviewed 23 Japanese cases with alternating hemiplegia in childhood. He reported that six of the eight patients showed a slight decrease in regional cerebral blood flow between hemiplegic attacks, usually in the region of a middle cerebral artery by using positron emission tomography (PET) or 133 Xe inhalation. In our patient, 99mTC HMPAO-SPECT showed normal cerebral perfusion during the attack and bilateral hypoperfusion of the frontal areas between hemiplegic attacks (Fig. 3). Based on these ictal and interictal SPECT

findings, it may be postulated that transient vasospasm is the underlying mechanism for recurrent hemiplegic attacks due to brain perfusion changes. Contradictory SPECT results may be secondary to different scanning times after the onset of the hemiplegic attacks.

Acute hemiplegic attacks do not respond to any anticonvulsant drugs. A potent calcium-channel blocker, flunarizine, has been reported to be effective in decreasing the duration and severity of hemiplegic attacks[6-10]. In an international collaborative study, Casaer[10] reported that flunarizine was the first truly promising drug for alternating hemiplegia. The mode of action of flunarizine is unknown, but it may exert an effect depending on its antihypoxic, antivasoconstrictive and anticonvulsant properties. Our case also responded well to 5 mg/day aflunarizine therapy. After five months of therapy, the duration and severity of attacks decreased significantly.

Acute alternating hemiplegia should be considered in patients with recurrent hemiplegic attacks. Early diagnosis and treatment may change the course of the disorder.

REFERENCES

1. Verret, Steele JC. Alternating hemiplegia in childhood: a report of 8 patients with complicated migraine beginning in infancy. Pediatrics 1971; 47: 675-680.
2. Karageloh I, Aicardi J. Alternating hemiplegia in infants; report of five cases. Dev Med Child Neurol 1980; 21: 784-791.
3. Mikati MA, Maguire H, Barlow CD, et al. A syndrome of autosomal dominant alternating hemiplegia: clinical presentation mimicking intractable epilepsy; chromosomal studies; and physiologic investigations. Neurology 1992; 42: 2251-2257.
4. Silver K, Andermann F, Alternating hemiplegia of childhood: a study of 10 patients and results of flunarizine treatment. Neurology 1993; 43: 36-41.
5. Andermann E, Silver K, Levin S. Benign familial nocturnal alternating hemiplegia of childhood. Neurology 1994; 44: 1812-1814.
6. Sakuragawa N. Alternating hemiplegia in childhood: 23 cases in Japan. Brain Dev 1992; 14: 283-288.
7. Caers L, Beukelaar F, Amery KW. Flunarizine, a calcium entry blocker in childhood migraine, epilepsy and alternating hemiplegia. Clin Neuropharmacol 1987; 10: 162-168.
8. Overweg J, Binnie CD, Meijer JV et al. Double-blind placebo-controlled trial of flunarizine as add-on therapy in epilepsy. Epilepsia 1984; 25: 217-222.
9. Salmon MA, Curatolo P, Cusma R. Drugs for alternating hemiplegic migraine (letter). Lancet 1984; 27: 980.
10. Casaer P. Flunarizine in alternating hemiplegia in childhood. An international study in 12 children. Neuropediatrics 1987; 18: 191-195.
11. Shirisaka L, İto M, Okuno T, Mikawa H, Yamori Y. Epileptic seizures difficult to differentiate from alternating hemiplegia in infants: a case report. Brain Dev 1990; 12: 521-524.
12. Zupanc ML, Dobkin JA, Perlman SB. 123 I-iodoamphetamin SPECT brain imaging in alternating hemiplegia. Pediatr Neurol 1991; 7: 35-38.
13. Kanazawa O, Shirasaka Y, Hattori H, et al. Ictal 99m Tc-HMPAO SPECT in alternating hemiplegia.