Hot Water Epilepsy - A Report of Three Cases

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Hot water epilepsy (HWE) is a rare form of reflex epilepsy caused by bathing with hot water. In this paper, we describe three cases with hot water epilepsy.It occurs generally in children with normal psychomotor development and children continue to develop normally after seizure. HWE has usually a favorable prognosis by first avoiding lukewarm water and secondly using either intermittent oral prophylaxis with benzodiazepines or conventional AEDs.

Keywords: *Hot water epilepsy.*

Reflex epilepsy has been defined as seizures caused by external stimuli. Hot water epilepsy (HWE), an uncommon type of reflex epilepsy, occurs while bathing with hot water(1,2). It was first described in 1945 by Allen(2). It has been rarely reported from European countries(3). Satishchandra, *et al.*(4) reported 279 cases with HWE from southern India. They determined that the ratio of HWE to epilepsies varied from 3.6% to 3.9%. Differences among countries may depend on climate conditions, bathing habits, and genetic susceptibilities. In this paper, we describe three cases of HWE.

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Case Report

Case 1: A 21-month-old girl was brought to our clinic with the complaint of convulsions while having a bath by pouring hot water over the head since the age of 6 months. She used to become floppy. This was associated by deviation of eyes, movements like hugging her mother, and followed by loss of consciousness. She was born after an uncomplicated pregnancy and her parents were unrelated. There were no family history of epilepsy and no past history of febrile convulsions. Psychomotor development was normal. Vital signs were stable. Height and weight were consistent with age. Physical and neurological examinations were normal.

Complete blood count, blood biochemistry, and urine and blood amino acid profile were normal. Cerebral computed tomography (CT), interictal electroencephalography (EEG), and electrocardio-graphy (ECG) were also normal.

She had previously four similar convulsions. First, bathing with lukewarm water instead of hot water was recommended. Six months later, at first follow-up visit, her convulsions had decreased but did not completely stop during regular bath. We put her on phenobarbital treatment. At second follow-up visit, she was seizure-free.

Case 2: An 11-year-old female was brought with the complaint of convulsions which started 5 months ago. She was taking valproate (VPA) but she did not get benefit at all. She had deviation of eyes, frothing from mouth, tonic-clonic movements, and loss of consciousness while bathing by pouring hot water over the head. She was born after an

uncomplicated pregnancy from an unconsanguineous marriage. There was no family history of epilepsy or febrile convulsions. Psycho-motor development was normal. Vital signs were stable. Height and weight were consistent with age. Physical and neuro-logical examinations were normal. Complete blood count, blood biochemistry, urine and blood amino acid profile were normal. Cerebral CT, intericatal EEG and ECG were also normal.

Till the admission, she had three similar convulsions. We planned to discontinue valproate gradually and recommended bathing with lukewarm water instead of hot water. She became seizure-free at the first follow-up visit.

Case 3: An 11-year-old girl was admitted to our clinic with the complaint of generalized tonic-clonic convulsion while bathing by pouring hot water over the head. It started 6 months ago. She was taking valproate but her convulsions did not decrease. She was born after an uncomplicated pregnancy from an unconsanguineous marriage. There was no family history of epilepsy. Psychomotor development and physical and neurological examinations were normal. Complete blood count, blood biochemistry, urine and blood amino acid profile, cerebral CT, interictal EEG, ECG were normal. She had five similar convulsions. We recommended bathing with lukewarm water and planned to stop valproate gradually. She was seizure-free at the first follow-up visit.

Discussion

Reflex epilepsies, a rare type of the epileptic seizures, accounts for 6% of all epilepsies(5). HWE is a benign form of reflex epilepsy precipitated by bathing with hot water. Males are affected more than females (M-F: 2.6-3.6/1)(1,3).

A large number of patients with HWE (3.6-3.9% of all epilepsies)(4) have been reported from India. There have been isolated case reports from all round the world, such as Japan and Turkey. In Turkey, people usually have a bath by sitting. Water is collected in a bucket and it is poured over the head or body by using a mug. The temperature of the hot water varies between 40 and 50ºC. Water poured on head or body can cause seizure(4).

The pathophysiology of HWE has not been established clearly but there are various hypothesis. Stensman and Ursing(6) suggested that combination of factors such as contact of scalp with hot water, temperature of water, and stimulation of specific cortical area made up the triggering stimulus. In order to understand further the pathophysiologic mechanisms underlying HWE, an experimental animal model mimicking HWE has been developed(7). They postulated that patients with HWE have an aberrant thermoregulatory system and were highly sensitive to the rapid increase in temperature during bath with hot water pouring over the head, which precipitated seizures. This aberrant thermo-regulatory system appeared to be genetically determined.

Syzmonowicz and Meloff(1) demonstrated focal activity in the temporal or frontal lobe and suggested that there could be a structural lesion in the temporal lobe in HWE patients. However, they failed to show these lesions by neuroimagings (CT and magnetic resonance imaging). Later, Shankar and Satischandra(8) published autopsy findings in three HWE patients and concluded that the most likely pathophysiologic mechanism under-lying HWE could be aberrant thermo-regulation in the genetically susceptible population with possible environmental influences(9).

The most commonly seen seizure type in HWE is complex partial seizure

(CPS)(1,4,10). Satishchandra, *et al*.(4) found that 67% of cases had CPS whereas 33% had generalized tonic-clonic (GTC) seizure.

Interictal EEG studies in HWE are usually normal whereas ictal EEG combined with hot water use shows usually focal epileptic activities and paroxysmal discharges characterized by secondary generalization. By ictal EEG recording, it is possible to make differential dignosis of HWE from the disorders such as, vasovagal syncope and aquagenic urticaria. But it is easily distinguished from febrile seizures by absence of fever in HWE before and after seizure(3,4,9). In our cases, because of the difficulty in inducing hot water epilepsy in our hospital conditions, we couldn't obtain ictal EEG and we tried to make differential dignosis of HWE from febrile convulsions, vasovagal syncope, and aquagenic urticaria by a thorough history.

The management in HWE is done simply by avoiding hot water. However, approximately one third of patients with HWE continue to have seizures even during regular baths and develop nonreflex seizures during follow-up. In these patients, conventional antiepileptic drugs (AEDs) have been used. Satishchandra(11) suggested a new method of intermittent oral prophylaxis with benzodiazepines before a head bath especially in those patients who continue to have seizures during regular baths. In one of our three cases, we used conventional AEDs because she continued to have seizure in spite of bathing with lukewarm water while two patients were already taking valproate.

HWE is a rare type of reflex epilepsy. It occurs generally in children with normal psychomotor development and children continue to develop normally after seizure. HWE has usually a favorable prognosis by first avoiding lukewarm water and secondly using either intermittent oral prophylaxis with benzodiazepines or conventional AEDs.

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