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病案研究

Focal Seizure in Nonketotic Hyperglycemia.

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ABSTRACT

We report a case, who was not previously known to have diabetes, presented with focal motor seizures. Unsuspected hyperglycemia was disclosed during laboratory investigations. For no other causes were identified, tretatment only with insulin and normal saline soon abolished the focal motor seizures. Throughout the whole course, no anticonvulsants were administered to the patient.

We suggested that focal motor seizure is not necessary caused by the focal cerebral lesion and early recognition of the underlying metabolic derangement is vital.

Keywords: focal seizure, nonketotic hyperglycemia.

A syndrome of nonketotic hyperglycemia (NKH) comprises hyperglycemia, hyperosmolality, and intracellular dehydration with no or mild ketoacidosis[1]. A number of neurological manifestations were found in NKH[2], of which, most published reports are concerned with hyperosmolar coma, a grave condition which represents one extreme of a biochemical continuum[3-6]. The association with focal motor seizure, although not uncommon seen in clinical practice, has rarely been discussed in our journals. We believe that still more cases pass unrecognised.

Case Report

A 58 year-old male farmer presented a history of repeated episodes of "twitching" of left face with turning head and conjugated jerking eyeball to the left side that had occurred abruptly two weeks earlier and had increased in frequency progressively. Each attack lasted about one minute and the patient remained alert, oriented during the attack.

Past medical history was essentially unremarkable, he had no history of head injury,

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diabetes, hypertension, epilepsy, stroke, and heart diseases.

Physical and neurological examinations were normal except for a transient mild degree left side central type facial palsy immediately after "twitching" of left face,

Patient was admitted under the impression of simple focal motor seizure. Laboratory investigations gave the following values: serum glucose, 579 mg/dl; HbA_{1c}, 13.5%; serum sodium, 132 mEq/L; serum potassium, 5.5 mEq/L; serum chloride, 97 mEq/L; serum bicarbonate, 26.7 mEq/L; BUN, 33.1 mg/dl; arterial blood pH, 7.452; PaO_2, 75.9 mm-Hg; and $PaCO_2$, 38.5 mm-Hg. Calculated serum osmolality was 319 mOsm/L. The urine analysis was negative for ketones, but showed 3 + glucose. An EEG showed regional paroxysmal spike and wave over the right centroparietal area with generalization. Computed tomography study of the head was normal. The patient's metabolic picture was consistent with NKH. Insulin and normal saline hydration were given to the patient; the serum glucose value dropped to around 250 mg/dl, and the frequency of seizures decreased. The focal motor seizures disappeared totally two days after admission. This patients remained free of seizures during a four-month follow-up period, and EEG became normal.

DISCUSSION

Since the first report by Maccario et al. in 1965[7], several examples have been documented the association between focal seizure and NKH[2,6,8-12]. In a literature survery of 137 patients with NKH, seizures were presented in 20 patients (14.3%) and 17 (85%) of them were focal motor seizure[13]. Another review of 158 previously published cases of NKH concluded that a quarter of patients had seizure and 19% focal motor seizure[10]. However, it seems unusual to discuss diabetes masquerading as epilepsy in our journals. We believe that with awareness of the association more cases would be identified.

The pathogenesis of focal seizure in NKH is still not clear. According to Singh and Strobos, focal seizure occurs "in a setting of moderate hyperglycemia, hyponatremia or normonatremia, mild hyperosmolality, and lack of ketoacidosis"[14]. Hyperosmolality certainly plays a role. Hyperglycemia of sufficient degree sets up an osmotic gradient between the extracellular and intracellular compartments of the brain, leading to intracellular dehydration and dysfunction[7]. Even though, the hypothesis that the metabolic upset *per se* can cause focal seizure remains uncertain because the majority of patients with NKH are lack of seizures[13].

It is well known that hyperglycemia itself can cause arteriosclerosis of the cerebrovascular system and local vascular insufficiency may render neurons in an areas of cortex more susceptible to the metabolic alteration. Thus, the neuron affected by the insufficient vascularity could become epileptogenic and metabolic abnormalities most likely influence the epileptic threshold, enhancing the localized epileptogenic effect of the lesions[13].

Just like our case with low serum sodium and long period "twitching", some authors reported that hyponatremia was a major abnormality in most of their cases[13,14], especially in those with a prolonged duration of focal seizure. In the opinion of these authors, "the disturbance of electrolytes may have been of importance for the continuous course of twitching" because the

pathology findings indicated widespread edema surrounding the lesion[15].

Lack of ketoacidosis is another metabolic aberration in generating seizure. An acid pH is necessary for both the enhanced formation and decreased transmission of γ-aminobutyric acid (GABA), which is presumed an inhibiting neurotransmitter in the nervous system[13,14]. In NKH, the anacidosis may deplete GABA and give rise to seizure by causing neuronal hyperexcitability. Brain glucose untilization is depressed in both diabetic ketoacidosis and NKH. A compensatory energy production is always achieved by enhancing GABA metabolism via the GABA shunt and derives from ketone body catabolism[14]. Thus, the lowering GABA level in NKH, accompanied with the starving brain can further reduce the threshold for seizure activity. Besides, a ketogenic diet has been suggested to have an anticonvulsant effect and thought to be of most benefit to those children with focal seizure[16].

Early revealing the underlying hyperglycemia state is extremely important for both the management and prognosis. Anticonvulsant drugs are usually ineffective and phenytoin may even be harmful, since it may aggravate hyperglycemia[17]. From the case histories of the coma patients, if their hyperglycemia is not promptly treated, they will develop hyperosmolality with progression from earlier phase of seizure to the impairment of consciousness and the seizure stop at the last[2].

We want to stress again that frequent focal seizure with no obvious cause should suggest the possibility of diabetes.

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以局部性發作爲表現的非酮酸性高血糖：病例報告

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在酮酸性高血糖的衆多神經併發症中，最常被報告的是預後極爲不好的高滲透壓性昏迷；至於局部性發作，就比較不常見了。

我們報告一個在過去史中毫無糖尿病症狀的五十八歲農夫，連續二週有持續不斷的臉部肌肉局部性抽搐。住院後，除了血糖高達 579 mg/dl 以外，沒有其他的不正常發現。我們並沒有給予病人抗癲癇製劑，只給予胰島素以及大量生理食鹽水。兩天之後，臉部局部性發作完全停止。

我們建議，在處理局部性發作的時候，如果沒有其他明顯的誘因，一定要想到是否有高血糖的可能，延誤且不當的處置可能會導致高罹病率及高死亡率的高滲透壓性昏迷。

關鍵詞：局部性發作，非酮酸性高血糖

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