

Hypokalemic Thyrotoxic Periodic Paralysis in Female - A Report of 2 Cases with Review

Dr. L. Nilachandra, Registrar (PMR)

Dr. AK. Joy Singh, Assistant Professor (PMR)

Dr. Brogen Akoijam, Assistant professor (Community Medicine)

Dr. N.B. Singh, Director, RIMS

Regional Institute of Medical Sciences, Imphal 795004, Manipur

Abstract

Hypokalemic thyrotoxic periodic paralysis (HTPP) is a rare disorder, which is common among male Asian descents though hyperthyroidism is commoner among females. Clinical manifestations are same as that of familial hypokalemic periodic paralysis except for the presence of hyperthyroidism, which may be overlooked. Reports on HTPP occurring in females are scarce. We investigated all 12 cases with recurrent attacks of nocturnal hypokalemic periodic paralysis without a family history for possible HTPP since June 1998. We are reporting two cases of HTPP in female from this North-Eastern state of the country with Mongoloid features because of its rarity and to highlight the importance of testing thyroid function in such cases.

Key Words : Hypokalemic thyrotoxic periodic paralysis (HTPP), Hyperthyroidism

Introduction

Periodic paralysis is a relatively rare hereditary muscle disorder. Until recently, existence of thyrotoxic periodic paralysis was not thought of in this state of Manipur where the people have a mongoloid/an oriental background. When there is no familial involvement and when there are episodes of periodic paralysis during prophylaxis with acetazolamide among the indigenous population with negative family history suffering from hypokalemic periodic paralysis, we started studying thyroid function in these patients since June 1998. So far we have tested thyroid function in all 12 patients diagnosed and treated as cases of hypokalemic periodic paralysis in the Department of Physical Medicine and Rehabilitation, Regional Institute of Medical

Sciences, Imphal. We were surprised when we found very low thyroid stimulating hormone level in 2 female patients during their acute attacks. They are reported here because of its rarity and occurrence in females. We have not come across many reports of thyrotoxic periodic paralysis occurring in females.

Case no. 1

In June 1998, a 38 years old female patient was referred to the Department of Physical Medicine and Rehabilitation for physiotherapy. She complained of sudden weakness of all four limbs associated with difficulty in respiration. She had 5 similar attacks within the previous 2 years. There was no familial history of similar attack. She was treated earlier with intravenous drips and potassium supplements.

On examination, she was afebrile, pulse rate was 84/min and blood pressure was 118/80 mm of Hg. Her higher mental functions and cranial nerves were intact. Limbs were

*Address for correspondence: Dr. L. Nilachandra Singh
Department of Physical Medicine and Rehabilitation Regional
Institute of Medical Sciences, Imphal-795004*

hypotonic with muscles power less than 2/5 in both upper and lower limbs. Reflexes could not be elicited and planter was nonresponsive. Sensory was intact. Fundus was normal.

Routine haemogram, urine analysis, blood sugar, blood urea, serum creatinine, creatine phosphokinase (CPK), serum Na⁺, etc. were within normal limits. Serum K⁺ was 2.9 mEq/l. Thyroid function test showed very low TSH level (0.1mU/ml). E.M.G. showed total electrical silence. Compound Motor unit Action Potential (CMAP) was not recorded on motor nerve stimulation. Hypokalemia was corrected within 48 hours of onset of paralysis with potassium supplementation and she showed dramatic improvement in muscle power and deep tendon reflexes. She was again independent in all activities of daily living within 4 days of onset. Antithyroid drug was started from the 5th day and it took around 3 months to become euthyroid. She remained asymptomatic till date on antithyroid drug.

Case no. 2

A 40 years old female of hypokalemic periodic paralysis was referred to the Department of Physical Medicine and Rehabilitation for EMG and NCV studies in October 1999. She noticed weakness of all four limbs when she wakes up in the early morning. She complained of similar episodes on three occasions within the last 2 years, which were treated successfully with potassium supplementation. There was no history suggestive of a familial involvement or attacks precipitated by exhaustion or food.

On examination, her higher mental functions and cranial nerves were intact. Limbs were hypotonic with muscles power less than 2/5 in proximal groups of muscles and hyporeflexic without planter response. Sensations were intact. She was afebrile with a pulse rate of 90/min and blood pressure of 110/80 mm of Hg.

Complete haemogram, routine urine analysis, blood sugar, urea, serum creatinine, creatinine phosphokinase (CPK), Na⁺ were within normal limits. However, serum K⁺ level was low (2.8 mEq/L). EMG showed CMAP of very low amplitudes with normal nerve conduction velocities. Thyroid function test showed serum T3 (200g/dl), T4 (20g/dl) and a remarkably low level of TSH (0.1u/ml). A final diagnosis of thyrotoxicosis hypokalemic periodic paralysis was made. She was treated with a combination of oral and intravenous potassium supplementation and she became asymptomatic within 36 hours of the initiation of treatment. Antithyroid drug was started on the 7th day of the episode and is being continued. She remained asymptomatic since then.

Discussion

Thyrotoxicosis periodic paralysis is a thyroid related neuromuscular disorder that, in a global perspective, only affects a small percentage of patients with thyrotoxicosis of any etiology^{1,2}. HTPP manifests as recurrent episodes of hypokalemia and muscle weakness lasting from hours to days (may last upto a week). It is a rare disorder affecting primarily men of Asian descent. It is also reported to be common among young Latin Americans³. Upto 10% of thyrotoxic patients may have this condition. The thyrotoxicosis may be overlooked for many months. Occasionally, the only indication of the thyrotoxicosis is a depressed level of thyroid stimulating hormone⁴. Males are 6-20 times more commonly affected than females despite a higher incidence of thyrotoxicosis in females. It may be because of decreased penetrance in women. Some women have only infrequent attacks. In some studies, upto 13% of Asian thyrotoxic men have had periodic paralysis⁵, which may be an autosomal dominant trait in Asians⁵. Certain HLA antigen including A2,

Bw22, Aw19, and DRW8 have been also incriminated⁶.

Dietrich reported a young Native American female with HTPP. Thyrotoxic periodic paralysis is an under diagnosed but probably a frequent complication of hyperthyroidism in Caucasians. Early recognition of the conditions is essential to investigate and treat the underlying thyroid dysfunction whose symptoms are usually mild. The episodes of periodic paralysis lasting about 1-96 hours resolve with the correction of the hypothyroidism⁷. The paralysis is mainly confined to proximal limb and trunk muscles and usually spares oropharynx and diaphragm⁸. The clinical presentation, in majority of cases, is similar to familial periodic paralysis; however, the therapies proven to be effective differ in the two syndromes⁹. Periodic paralysis, without familial background, manifests only in the thyrotoxic patients¹⁰. It is a self-limiting disorder provided the underlying hypothyroidism is treated. Hypokalemia, hypophosphatemia, and mild hypomagnesemia are characteristic features of thyrotoxic periodic paralysis (TPP). Hypokalemia occurred in 100% and hypophosphatemia in 80% of the episodes¹¹. Gonzalez-Trevino O reported a case of normokalemic periodic paralysis in a Mexican man with thyrotoxicosis¹².

The pathogenesis of TPP is uncertain, but there is evidence of a decreased activity of the calcium pump³. It has been suggested that the membrane Na⁺-K⁺ pump is involved in the pathogenesis of this complication. However, other reports emphasize the role of Na⁺-K⁺ pump independent K⁺ influx, which would be specific for TPP¹². Acetazolamide is not helpful in preventing the attacks. Acute attacks respond to potassium administration.

The incidence was 8.6% among male and 0.4%

among female thyrotoxic patients according to a survey performed in the three major thyroid clinics in Japan in 1957. The incidence of paralysis in 1991 was 4.3% among male and 0.04% among female thyrotoxic patients, indicating more than a 40% decrease in incidence. The possible cause of the decrease is related to the changes in food consumption habit; less carbohydrate and more protein were taken in 1991 than in 1957¹³.

Rone¹¹ reported occurrence of euthyroid thyrotoxicosis periodic paralysis. Risk factors for TPP include the postprandial state after carbohydrate- rich meals and post exertional state. At least 2-week "window of vulnerability" for TPP appears to exist after initiation of antithyroid therapy.

The diagnosis of periodic paralysis can be aided by demonstrating a decrease in compound motor unit action potential (CMAP) amplitude after several minutes of exercise which improved dramatically after treatment, when a euthyroid state is achieved. Therefore, the exercise test is a useful electrophysiological means of monitoring the neuro-muscular status of patients with thyrotoxicosis periodic paralysis prior to and after treatment of the thyrotoxicosis¹⁵.

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