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Hypokalemic paralysis: Can your thyroid paralyze you?

Case Report

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Abstract

Hypokalemia is a multifactorial electrolyte abnormalities that could be life-threatening. Identifying the cause is of paramount importance for treatment strategies and prevent complications. Hypokalemia can result from Familial and non-familial causes including hypothyroidism. Here we report a case of a 26 year old Hispanic male who presented with ascending paralysis of the extremities from low potassium level as a result of hyperthyroid state.

Introduction

Hypokalemia can result from genetic disorders, metabolic or hormonal abnormalities, medication effect, poisoning and loss from gastrointestinal or renal system. The complications of hypokalemia result from the effect on muscles or cardiac systems. Hyperthyroidism, hyperadrenergic state, hyperaldosteronism and hyperinsulinemia are conditions that can cause hypokalemia by activating the Na-K ATPase leading to increased intracellular shift despite normal total potassium level [1-4]. The aberrant depolarization results in muscle paralysis.Here we report a case of a 26 year old Hispanic male who presented with ascending paralysis of the extremities from low potassium level as a result of hyperthyroid state.

Case Report

A 26 year old Hispanic man presented with one day history of ascending weakness of his extremities. He reported he felt the weakness in his thighsfirst and over time the weakness moved to his arms. The weakness progressed within 24 hours. The review of systems was remarkable for palpitation and tremor. He denies vomiting and diarrhea. He has been trying to lose weight and had tried Salt-based cleansing and thenstartedtaking a high protein supplement for performance enhancementalong with strenuous weight lifting.

At presentation his vital signs were as follows: Blood pressure 159/84 mmHg, Heart rate 110 beats per minute; respiratory rate 20 breath per minute; temperature 99.5F rectally; oxygen saturation on room air 98%, finger stick glucose 121, body mass index 37.9. Physical examination revealed an obese young man in no apparent respiratory distress with deceased strength in both upper and lower extremities (2/5) uniformly. Sensation in all qualities, deep tendon reflexes, speech, vision and cranial nerves were without abnormalities. The rest of the physical examination was non-contributory. His electrocardiogram showed sinus tachycardia, his chest X-ray and urinalysis

were unremarkable. Laboratory examination revealed a potassium of 2.1 mmol/L with normal creatinine. His PH was 7.38 and had lactic acid of 1.64mmol/L. Patient received supplement potassium both via oral and intravenous route. Over the course of his stay his potassium level and his paralysis improved to the point that he was able to walk without assistance. His remained tachycardic without pain or fever. A search for this unexplained high heart rate led to sending thyroid function test which revealed a thyroid stimulating hormone (TSH) level of 0.01uLU/mL (normal range (0.27-4.2) and free thyroxine (fT4) 3.2ng/dL (normal range 0.9-1.8). His thyroid ultrasound and thyroid scan were consistent with hyperthyroidism.The rest of the work up was unremarkable. He was started on atenolol and Methimazol and remained symptom free after the initiation of therapy.

Discussion

Acute muscle paralysis can occur from a variety of disease states, metabolic conditions, medication effects or poisonings [5,6]. Thyrotoxichypokalemic periodic paralysis (THPP) is a condition seen commonly in Asians with an incidence as high as 2% in patient with thyrotoxicosis of any cause. The incidence with other ethnic groups is much lower (10-20 times higher in Asians) [7,8]. Another interesting feature of THPP is that it affects disproportionately males despite the higher incidence of thyrotoxicosis in women. Recent studies suggest the association of chanalopathies with this condition as not all patients with hyperthyroid/thyrotoxic state exhibit the symptoms [9]. In addition, subtle findings of hypothyroidism such as unexplained tachycardia, tremor, heat intolerance, palpitation, hair loss and/or weight loss can be present in THPP.

Our patient started heavy exercise along high calorie intake, with colon cleaning using salt-based liquid. In addition he had palpitation and tremor without fever. The fact that he had no vomiting or diarrhea makes gastrointestinal cause of hypokalemia less likely. His normal PH and glucose level rule out acidosis as a cause of hypokalemia. The rapid recovery of his symptom with potassium supplementation make neurological causes unlikely.His thyroid function test revealed low TSH and high T4. These findings along with ultrasound and Thyroid scan confirmed the presence of hyperthyroidism, He was started on atenolol and Methimazole. Non selective beta blockers are known to reverse symptom of THPP rapidly [10]. No episodes of paralysis occurred after discharge.

Conclusion

Symmetric ascending paralysis may occur from a variety of diseases. One such cause is hypokalemia. Accurate diagnosis of the underlying cause of hyperkalemia is of paramount importance as it affects the course of the disease. Hypokalemia with tachycardia should trigger a search for thyroid related disease.

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