Clinical Presentation

A 29-year-old Hispanic male with a past medical history of polysubstance abuse (marijuana and cocaine) presented to the emergency department (ED) with acute onset muscle weakness in his bilateral upper and lower extremities. Associated symptoms included "muscle contractions," hand tremors, and heat intolerance. He had similar symptoms two months prior and went to the ED with acute onset weakness in the lower extremities. He was suspected to have viral myositis and incidental hypokalemia. His symptoms improved with intravenous (IV) fluids and potassium supplementation, and he was discharged to home. One month later he went to see his primary care physician (PCP) whose workup included thyroid stimulating hormone (TSH) and free T4 tests. The results were consistent with thyrotoxicosis, but the patient did not follow-up with his PCP.

At this latest ED visit, his physical exam was notable for heart rate 106 beats per minute, blood pressure 153/68 mmHg, and 3/5 strength in the bilateral lower extremities and 4/5 strength in the bilateral upper extremities. Electrocardiogram showed sinus tachycardia and early repolarization.

Differential Diagnosis

Distinguishing thyrotoxic periodic paralysis (TPP) from hypokalemic periodic paralysis (HPP), an autosomal dominant disorder, requires clinicians look for features of hyperthyroidism in the presence of hypokalemic periodic paralysis as well as evaluate family history. Other diagnoses to consider: Guillain-Barre syndrome, spinal cord compression, and sporadic periodic paralysis [1].

Lab test | Lab value | Reference range
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TSH | <0.005 μIU/mL | 0.358 – 3.740 μIU/mL
Free T4 | 4.15 ng/dL | 0.76 – 1.46 ng/dL
Total T4 | 23.7 μg/dL | 4.5 – 12.1 μg/dL
Total T3 | 549.5 ng/dL | 60 – 180 ng/dL
TSH | 456 | Less than 140% baseline
TPO antibody | 4,888 U/mL | Less than 60 U/mL
Thyroglobulin antibody | 36 U/mL | Less than 60 U/mL
Total CK | 153 U/L | 20 – 232 U/L
Potassium | 2.8 mmol/L | 3.5 – 5.1 mmol/L
Magnesium | 1.9 mg/dL | 1.4 – 2.2 mg/dL
Phosphorus | 4.6 mg/dL | 2.5 – 4.9 mg/dL

Thyroid stimulating hormone (TSH), Thyroid stimulating immunoglobulin (TSI), Thyroid peroxidase (TPO), creatine kinase (CK)

Figure 1. Thyroid ultrasound (US) with Doppler flow

Thyroid US showed a thyroid volume of 20.4 cm³ with increased vascularity suggestive of thyrotoxicosis.

Management

The patient was suspected to have Graves disease and was started on propranolol. This muscle weakness improved with IV fluids and aggressive potassium repletion. He was unable to tolerate radioactive iodine uptake testing due to nausea and vomiting with oral iodine. He was empirically started on methimazole with good result and was discharged home on propranolol and methimazole.

Discussion

TPP is characterized by abrupt onset hypokalemia and paralysis primarily affecting the lower extremities in the setting of thyrotoxicosis. It is a rare complication of thyrotoxicosis with a 2% incidence in Asian populations and a 0.1 – 0.2% incidence in non-Asian populations [2]. The diagnosis can often be made on the basis of the clinical manifestations alone. Sometimes the periodic paralysis precedes hyperthyroidism or occurs in silent hyperthyroidism. As a result, physicians may easily overlook the diagnosis, even when life-threatening hypokalemia is present.

The pathophysiology of this disorder is still not well understood. There is an ongoing debate whether TPP is a molecular subtype of Graves disease. Five TPP susceptibility loci have been identified, two of which are shared by Graves disease and TPP [3, 4]. We present an unusual case of TPP in a young adult male of Hispanic ethnicity to raise awareness of this diagnosis.

Conclusions

The incidence of TPP in non-Asian population is low and is often overlooked by physicians. All clinicians must consider as a possible diagnosis in patient with acute onset hypokalemia and lower extremity paralysis.

References