Thyrotoxic periodic paralysis in a caucasian male: the recurrence of attack after radioactive iodine treatment

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Case Report

A 34 year old Caucasian male presented with severe muscle weakness of his arms and legs. He had gone to bed the night before feeling a little weak in both legs after a heavy carbohydrate meal, but woke the following morning unable to sit or stand. He had no respiratory, cardiovascular or gastrointestinal symptoms. There was no family history of a similar problem.

He had had a similar episode ten years previously which had resolved spontaneously. He was diagnosed with hyperthyroidism at that time and was subsequently treated intermittently with carbimazole. This had recently been stopped prior to the administration of radio-iodine therapy four days before the onset of this episode of weakness.

Physical examination revealed flaccid paralysis with areflexia in all four limbs. The rest of the examination was unremarkable.

Investigations revealed serum potassium of 2.0 mmol/L (normal 3.5-5 mmol/L) with normal liver function tests, CRP, full blood count, cardiac enzymes, glucose, calcium and magnesium. His free TSH was <0.01 mu/L (normal 0.40- 5.5 mu/L) and free T4 was 63 pmol/L (normal 10-23 pmol/L). These findings were consistent with thyrotoxic hypokalaemic periodic paralysis.

Treatment was started with intravenous normal saline with added potassium. His symptoms resolved when the potassium level was normal. Fortunately he did not develop rebound hyperkalaemia following K+ infusion. He was recommenced on carbimazole and propranolol and subsequently discharged with an early follow up appointment. He presented to the Accident and Emergency department three days later with similar complaints; the potassium level was 3.2 mmol/l. He recovered spontaneously following this episode without potassium replacement.

Discussion

THPP is characterized by sudden, transient recurrent episodes of flaccid paralysis, usually precipitated by strenuous exercise or consumption of a heavy carbohydrate meal followed by prolonged rest. It is a rare symptom of hyperthyroidism but very occasionally may be the initial presenting complaint. It is more common in Chinese and Japanese patients. We are aware of only one other case report in a caucasian[1]. Subjects present with flaccid paralysis or weakness of all four limbs, particularly the proximal muscles of the lower limbs[2]. Respiratory muscles are usually spared. Euthyroid patients do not develop similar symptoms.

The pathogenesis is uncertain[1]. A role for thyroxine on the sodium, potassium- adenosine triphosphatase (Na, K-ATPase) pump has been postulated. Thyroxine increases the catecholamine mediated shift of potassium into cells via its stimulatory effects on Na, K-ATPase. Untreated thyrotoxic patients with THPP have higher activity of Na, K-ATPase than thyrotoxic patients without THPP. The pump is also activated by insulin and androgens perhaps accounting for heightened activity after a carbohydrate meal and in a male population. The reduction of extracellular and increase in intracellular potassium leads to

a failure of depolarization of the muscle cell membrane.

The treatment of THPP includes potassium replacement and control of the thyroid status[3]. It is important to monitor the potassium replacement because of the risk of rebound hyperkalaemia. It should be remembered that the episodes are caused not by potassium loss but by increase uptake of potassium by the cells. Therefore the total body potassium is maintained although there is a decrease in serum potassium. Maintenance of euthyroid status is essential to avoid attacks. Propranolol has been shown to help to prevent recurrences.

Our patient developed symptoms following radio-iodine treatment. This can be explained by the fact that there is a transient increase in thyroxine in the serum caused by radiation thyroiditis. Patients should be warned about this complication of radio-iodine therapy. At the time of his first episode of weakness ten years earlier his serum potassium was 2.8 mmol/l. but on that occasion, as with his third episode, his symptoms resolved spontaneously.

References

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