

Liquorice-Induced Severe Hypokalaemic Rhabdomyolysis with Acute Kidney Injury

Dear Editor,

Hypokalaemia is uncommonly reported as a cause of rhabdomyolysis and serum creatine kinase (CK) is often not measured when hypokalaemia is detected. We report a 71-year-old male who was working as a traditional medicine vendor, with a background history of hypertension and diabetes mellitus, presenting with generalised body weakness and myalgia for a few days followed by a mechanical fall. There was no history of diarrhoea or vomiting, signs of infection or alcohol intoxication. He was not previously on statin or steroid treatment. There was generalised body weakness with power grade of 3-4/5 on the Medical Research Council (MRC) scale. Vital signs were stable. Initial investigation showed serum potassium of 1.9 mmol/L, bicarbonate of 26 mmol/L, magnesium level of 0.66 mmol/L, creatinine of 698 $\mu\text{mol/L}$ from normal baseline level and spot urinary potassium of 29 mmol/L. His serum CK was noted to be 19,000 U/L with urine myoglobin level of >30,000 ug/L. He was diagnosed as hypokalaemic rhabdomyolysis with acute kidney injury (AKI). His condition was further complicated with Ogilvie's syndrome secondary to severe hypokalaemia. He was admitted to high dependency ward for aggressive intravenous potassium replacement. Hypomagnesaemia was corrected. His condition gradually improved with a total of 1294 mmol of parenteral potassium replacement given over a duration of 2 weeks. Hypokalaemic workup revealed low plasma renin activity (0.06 ug/L) and low serum aldosterone (51.8 pmol/L). Further questioning revealed that he had a history of consuming herbal preparations for general well-being. It contained liquorice, a potential cause of hypokalaemia with hyporeninaemic hypoaldosteronism. The pseudo-obstruction of intestine, AKI and rhabdomyolysis resolved with normalisation of serum potassium (Fig. 1). Upon follow-up at 3 months, his renal function remained normal with no recurrent hypokalaemia.

Rhabdomyolysis is an unusual complication of severe hypokalaemia. Previous study found that up to 28% of patients with hypokalaemia were associated with biochemical evidence of rhabdomyolysis, concluding that subclinical rhabdomyolysis can often be undiagnosed.¹ Reported causes of hypokalaemia complicated with rhabdomyolysis include distal renal tubular acidosis,²

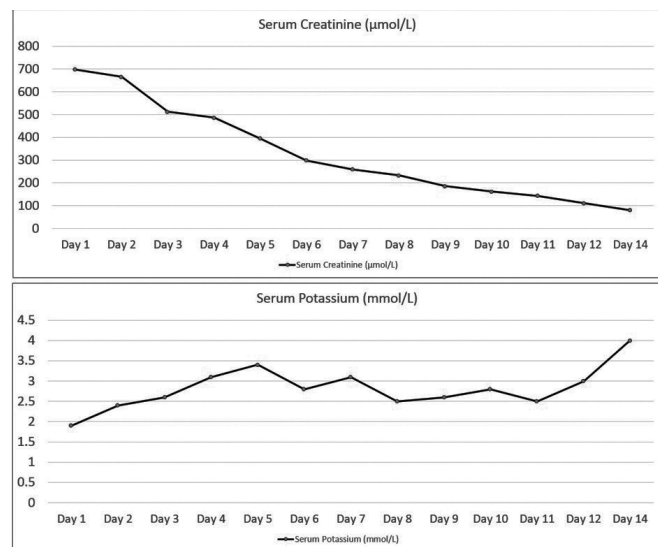


Fig. 1. Chart of serum creatinine and potassium showing improvement of acute kidney injury with correction of underlying hypokalaemia.

primary hyperaldosteronism,³ chronic diarrhoea, diuretics, Gitelman syndrome and liquorice use. In these reports, presenting serum potassium ranged from 1.1 mmol/L to 2.0 mmol/L. In our case, the probable cause of profound hypokalaemia is the consumption of liquorice, which is commonly used in the preparation of traditional medicine. Liquorice and liquorice extract contain glycyrrhizin. Both glycyrrhizin and its hydrolytic product in human tissues (glycyrrhetic acid) inhibit the enzyme (11 β -hydroxysteroid dehydrogenase) which converts active cortisol into its inactive form, cortisone. Thus, the regular intake of glycyrrhizin raises the bioavailable amount of cortisol in a dose-dependent way. The resulting hypercortisolism induces hypokalaemia. In parallel, the inhibition of 11 β -hydroxysteroid dehydrogenase increases bioavailable aldosterone in the renal collecting ducts, whereby more potassium is secreted into the urine. The severe "double-hit" hypokalaemia leads to the destruction of skeletal muscle.⁴ Potassium release from muscle cells during exercise normally mediates vasodilation to increase blood flow to muscles, therefore profound hypokalaemia

promotes the development of rhabdomyolysis by decreasing muscular perfusion.⁵ Importantly, the release of potassium from muscle cells with rhabdomyolysis can mask the severity of underlying hypokalaemia, posing a potential diagnostic challenge.

In conclusion, hypokalaemic rhabdomyolysis is often under-recognised and can be associated with life-threatening sequelae. High vigilance and prompt treatment are crucial to improve the clinical outcome.

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