Clinical Case Study

Too Much of a Good Thing: A Woman with Hypertension and Hypokalemia

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CASE DESCRIPTION

CASE

A 64-year-old woman with a history of paranoid schizophrenia, hypertension, hyperlipidemia, and unexplained chronic hypokalemia presented in the outpatient psychiatric clinic for a routine follow-up visit with no specific complaints. Her history and review of systems revealed no remarkable findings. Her medications included an over-the-counter oral potassium supplement (equivalent to 2.5 mmol 3 times daily) and olanzapine (10 mg daily). She appeared well, and her physical exam was notable only for hypertension (188/105 mm Hg). A blood sample was obtained and blood chemistry tests were performed for routine monitoring.

Laboratory evaluation showed concentrations within reference intervals for the patient's serum sodium (142 mmol/L), urea nitrogen [2.9 mmol/L (8 mg/dL)], creatinine [53 μmol/L (0.6 mg/dL)], magnesium [1.0 mmol/L (2.4 mg/dL)], and glucose [5.2 mmol/L (94 mg/dL)]. Her total carbon dioxide was high at 43 mmol/L (reference interval 22–32 mmol/L), and her serum potassium was critically low at 1.9 mmol/L (reference interval 3.7–5.2 mmol/L). The critical potassium result was reported to the ordering physician, who arranged patient transport to the emergency department.

In the emergency department, the patient was persistently hypertensive (170 –180/95–110 mm Hg). Review of the patient's earlier records showed prior hypokalemia (2.1 and 3.3 mmol/L). Her electrocardiogram was normal. The patient reported no prescription diuretic use, laxative abuse, prolonged fasting, diarrhea, or vomiting. A repeat serum potassium measurement was 2.1 mmol/L, and at that time the patient's serum osmolality was calculated to be 301 mOsm/kg. No arterial or venous blood gas measurements were performed. An untimed urine collection showed urine creatinine of 884 μmol/L (10 mg/dL), urine sodium 73 mmol/L, urine potassium 21 mmol/L, and urine osmolality 226 mOsm/kg. The primary abnormal findings were hypertension with concurrent hypokalemia and metabolic alkalosis.

The patient was placed on continuous cardiac monitoring and given intravenous and oral potassium. Morning aldosterone [<0.06 nmol/L (<2.0 ng/dL)] and renin (<14.2 pmol/L per h) were low. The medical team wondered why this patient had developed such severe hypokalemia. Subsequent interviews with the patient identified the likely cause of her hypertension and severe hypokalemia.

Questions to Consider
• What are common causes of hypokalemia in the setting of hypertension?
• What are some medications or foods that can alter potassium handling?
• What are possible mechanisms for this patient's hypokalemia and hypertension?

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Final Publication and Comments

The final published version with discussion and comments from the experts will appear in the December 2009 issue of *Clinical Chemistry*. To view the case and comments online, go to http://www.clinchem.org/content/vol55/issue12 and follow the link to the Clinical Case Study and Commentaries.

Educational Centers

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