CLINICAL VIGNETTE

Pseudohyperkalemia Associated with Chronic Lymphocytic Leukemia (CLL)

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Case Report

A 75-year-old female with a history of chronic lymphocytic leukemia (CLL) presents to emergency room for right hip pain after a mechanical fall. Imaging studies showed hip fracture, and she underwent open reduction and internal fixation of right hip. The patient's blood test postoperatively showed potassium of 9.3 mmol/L without any EKG changes. The patient was transferred to ICU for hyperkalemia and was treated for hyperkalemia with insulin, glucose, and lasix. She had no history of kidney disease and was not taking any medications causing hyperkalemia. The patient's blood test on admission to the hospital showed WBC, potassium, and creatinine of 173.94 X10E3/uL (84% lymphocyte), 4.0 mmol/L, and 0.4 mg/dL, respectively. A diagnosis of pseudohyperkalemia secondary to leukocytosis associated with CLL was considered. Patient had several hospitalizations later on for different medical problems, and her routine blood tests on several occasions during those hospitalization again showed hyperkalemia. In one occasion, her blood test showed a potassium of 7.9 mmol/L at the time her white blood cell count was 234.93 X10E3/uL. A repeat serum potassium almost one hour later without any intervention showed a normal potassium level of 3.7 mmol/L at that time.

Discussion

Hyperkalemia is a common clinical problem. The major causes of hyperkalemia are increased potassium release from the cells including pseudohyperkalemia, metabolic acidosis, increased tissue catabolism, red cell transfusion, insulin deficiency, hyperglycemia, and most often, reduced urinary potassium excretion, such as acute and chronic kidney disease, hypoaldosteronism secondary to reduced secretion of aldosterone or response to aldosterone.

Pseudohyperkalemia refers to those conditions in which the increased measured serum potassium concentration is usually due to potassium movement out of the cells during or after the blood specimen has been drawn.

The most common type of pseudohyperkalemia is trauma to red blood cells and hemolysis during venipuncture, which is usually detected and reported by laboratory. In patients with increased cellular components of blood, there is a chance of mechanical disruption of blood cells due to handling and transportation of the blood specimen to the laboratory through pneumatic tube transport of the specimens and processing of the specimens, centrifugation.[1,2] In patients with CLL, the leakage of potassium from the elevated white blood cells during handling and processing of blood specimen result in falsely elevated serum potassium. In order to achieve an accurate measurement of serum potassium in these group of patients, cellular components should be separated from the blood specimen by allowing the blood specimen to clot initially and then serum potassium be measured in cell-free serum. Unlike thrombocytosis, this form of pseudohyperkalemia occurs in serum and plasma samples and may be more prominent when blood is sampled in heparinized tubes.[3] Centrifugation of a heparinized tube causes in vitro cell destruction and release of potassium as these cells are freely suspended in plasma.

Although diagnosis and emergent therapy of true hyperkalemia is clinically very significant, recognizing factitious hyperkalemia is very important to prevent potentially hazardous and unwarranted intervention.[4,5] On the other hand by understanding the mechanisms of pseudohyperkalemia clinicians should suspect a serious underlying pathologic process leading to pseudokyperkalemia in order to both reach the diagnosis in a proper time and prevent unnecessary tests and interventions.[6]

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Submitted August 27, 2015