

Tolerating Extreme Hyperkalemia in a Non-Compliant Dialysis Patient

Attaway A^{*1}, Nanavati A² and Dalal S³

¹Pulmonary / Critical Care Fellow, University Hospital Case Western Reserve, Cleveland, Ohio, USA

²Internal Medicine Resident, Western Michigan University School of Medicine, Michigan, USA

³Nephrologist, Western Michigan Nephrology Center, Michigan, USA

***Corresponding author:** Attaway A, Pulmonary / Critical Care Fellow, University Hospital Case Western Reserve, Cleveland, Ohio, USA 44106, E-mail: amy.attaway@uhhospitals.org

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Abstract

Dialysis patients are known to tolerate high potassium due to the chronic hyperkalemia that is inherent in their disease. Despite this, most reports of extremely high potassium (>9 mmol/L) are in the setting of cardiac arrest. We describe the case of a 57-year-old Caucasian male with past medical history significant for end stage renal disease known to be non-adherent to a low potassium diet as well as missed dialysis appointments. Stat potassium off of a basic metabolic panel was 10.2 mmol/L, which was non-hemolyzed and confirmed on repeat testing. A stat EKG was performed which revealed peaked T waves, mildly increased PR interval (200 ms), and mild QRS widening (142 ms). There was no evidence of bradycardia or sinusoidal wave form. The patient received emergent dialysis and his EKG normalized.

Keywords: ESRD, Hyperkalemia

Background

End stage renal disease (ESRD) patients are known to tolerate hyperkalemia with less EKG changes as well as less life-threatening arrhythmias leading to cardiac arrest. Mortality from hyperkalemia is estimated to be 3.1 per 1000 patient-years, whereas on a monthly basis 5-10% of hemodialysis patients have been observed to have hyperkalemia. 24% of ESRD patients require emergency dialysis for hyperkalemia at any given point [1,2].

Case Report

Our patient is a 57-year-old Caucasian male with past medical history significant for end stage renal disease secondary to multiple myeloma and light chain deposition disease. He has a history of non-adherence to a low potassium diet and missed dialysis appointments. The patient had previously stated that he can “feel” when his potassium is too high, especially when he has lower extremity weakness, and he presents to the hospital when these symptoms are significant. Previous to this episode he has tolerated extremely high potassium up to 9.0 mmol/L with only mild EKG changes (Figure 1).

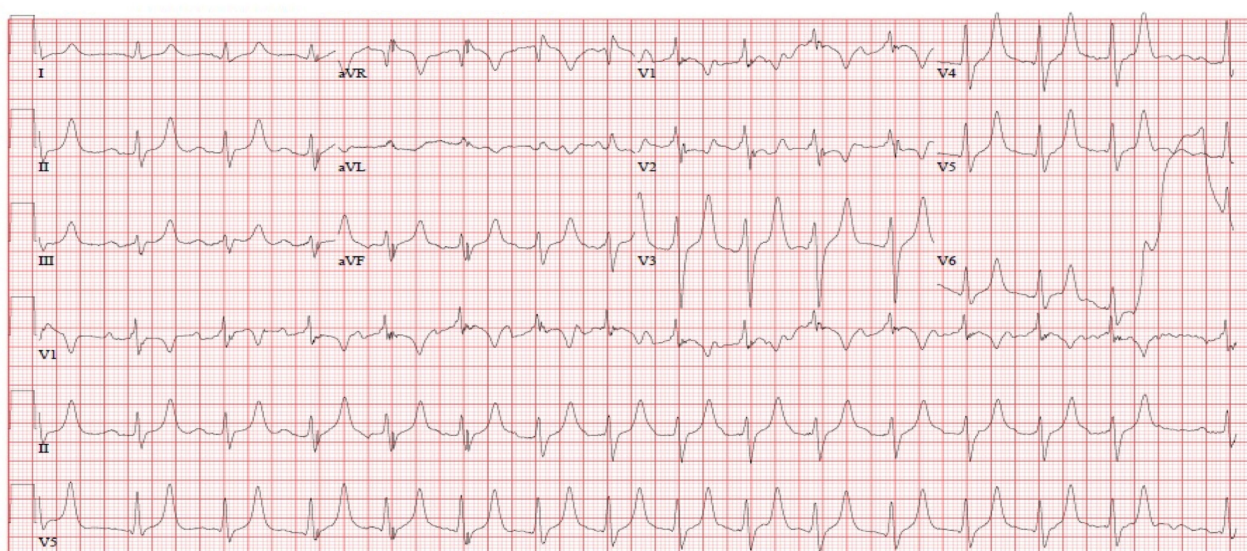


Figure 1: An EKG performed on the patient 1 week prior when his potassium was 9.2 mmol/L. Here we see a ventricular rate of 95, normal PR interval (150 ms), and narrow QRS (108 ms). There remained characteristic peaked T waves

The patient presented in the early morning with lower extremity weakness. His last dialysis was three days prior. His blood pressure on admission was 210/116. He was somewhat confused. Exam revealed 4/5 strength in upper and lower extremities. Reflexes were hypoactive. Stat potassium off of a basic metabolic panel was 10.2 mmol/L which was non-hemolyzed and confirmed on repeat testing.

Chest X-ray was clear. EKG revealed peaked T waves, mildly increased PR interval (200 ms), and mild QRS widening (142 ms). There was no evidence of bradycardia or sinusoidal wave form. The patient received 10 units of insulin and 1 amp of D50 in the ER and went straight to the dialysis unit. He underwent emergent dialysis and both his mental status and EKG normalized (Figure 2) (Table 1).

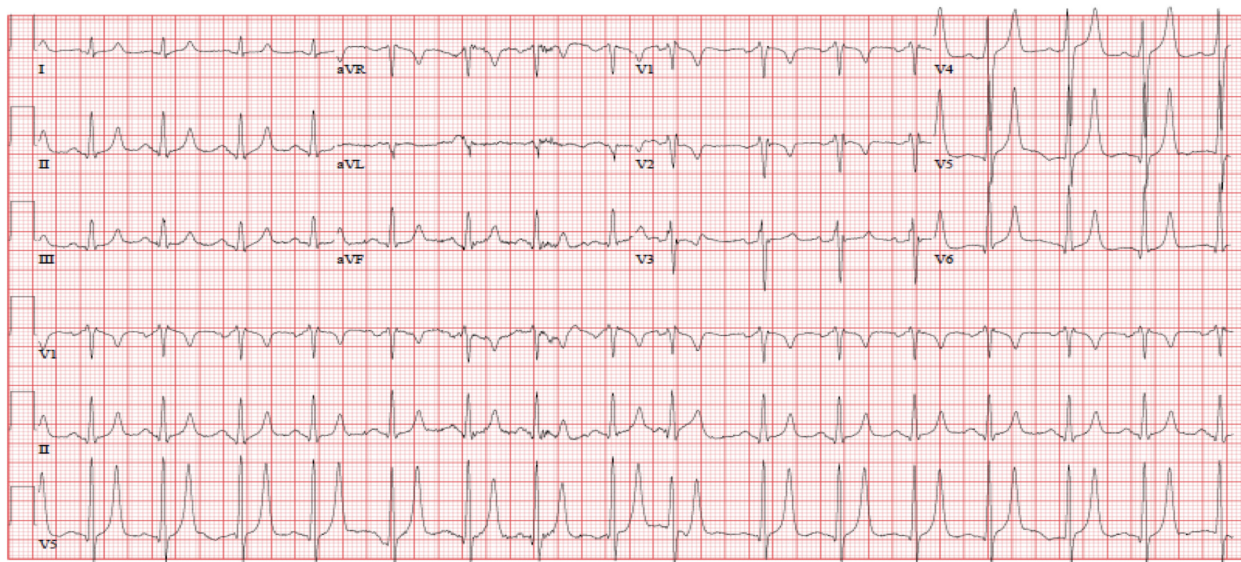


Figure 2: An EKG performed shortly after admission when the patient's potassium came back as 10.2 mmol/L. He had sinus tachycardia (126) with characteristic peaked T waves, flattened p waves, an increased PR interval (200 ms), and QRS widening (142). While a sine wave is not yet present, there are early changes that could represent the beginnings of this morphology

	Pre dialysis	Post dialysis
Sodium (mmol/L)	133	136
Potassium (mmol/L)	10.2	7.3
Chloride (mmol/L)	97	99
CO₂ (mmol/L)	21	25
BUN (mmol/L)	85	66
Creatinine (mmol/L)	11.1	8.6
Calcium (mmol/L)	9.9	9.3
Albumin (g/dL)	3.1	3

Table 1: Stat potassium was 10.2 mmol/L which was non-hemolyzed and confirmed on repeat testing

Discussion

Previous studies that have documented extreme hyperkalemia have all been reported in the setting of cardiac arrest, or else have not been as high as 10.2 mmol/L [3-5]. The only other case of extreme hyperkalemia without arrest was a patient reported in Hong Kong with a potassium of 10.7 mmol/L. The 2007 case represented a 47-year-old female who also had ESRD secondary to chronic glomerulonephritis on hemodialysis [6]. In our case, it was important to exclude pseudo-hyperkalemia, which can be the result of mechanical trauma during venipuncture or else secondary to thrombocytosis or severe leukocytosis. In our patient both his WBC and platelet counts were normal [7]. He also underwent venipuncture without a tourniquet, his sample was sent stat and reviewed as "non-hemolyzed" by the lab, and his repeat potassium level was the same value.

Conclusion

The phenomenon of chronic hyperkalemia in ESRD patients and physiologic tolerance of the cardiac myocardium has been well documented in previous studies. Patients with ESRD have been shown to tolerate hyperkalemia with less EKG changes [1,2]. There have been case reports of patients with severe hyperkalemia (>9.0 mm) that have had completely normal EKGs as well [7]. The ability to adapt the myocardium may be related to slow increases in potassium causing less electrophysiologic consequences. However, the exact mechanism remains unknown [8]. While hyperkalemia is a common problem for dialysis patients, those who tolerate extreme levels like our patient are the exception rather than the rule. Hyperkalemia remains a significant risk factor for mortality in the dialysis population and should be treated as a true medical emergency.

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