ECG Diagnosis: Hyperkalemia

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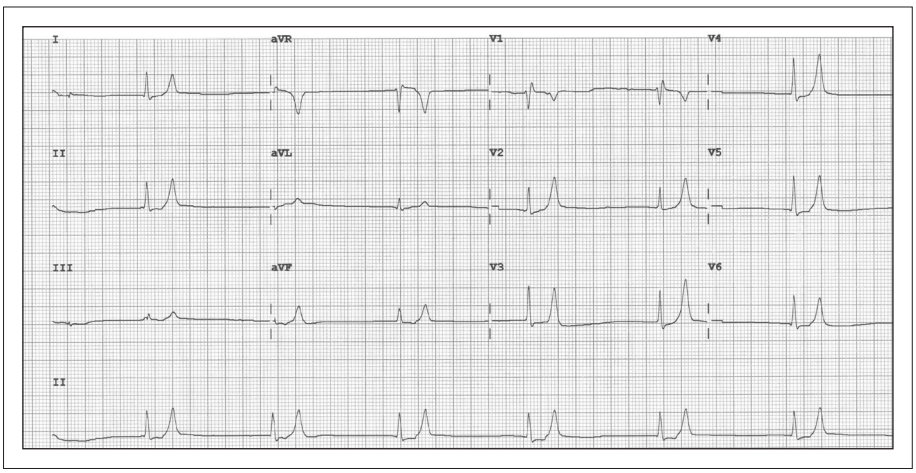

Figure 1. 12-lead ECG from an 82-year-old man with acute renal failure and hyperkalemia (serum potassium 8.6 mEq/dL).

Demonstrates a ventricular junctional escape rhythm (41 beats/min), with absence of P waves and peaked T waves.

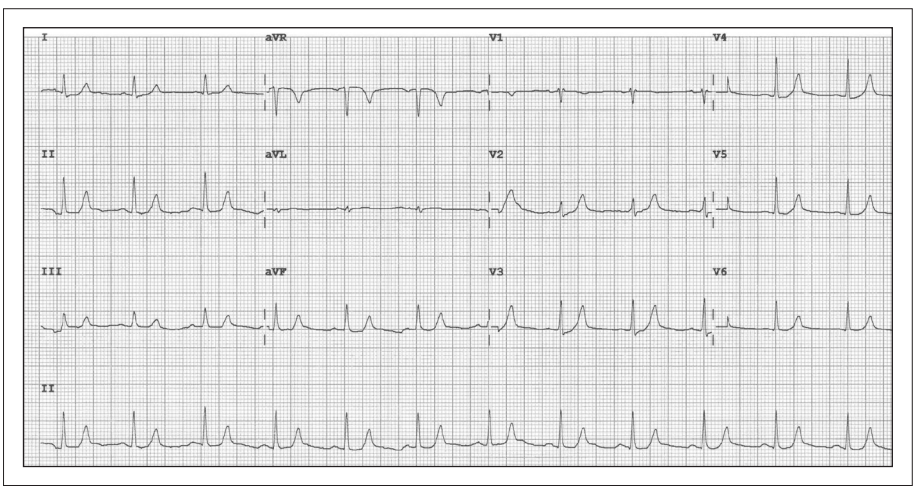

Figure 2. 12-lead ECG from same patient following treatment of hyperkalemia with intravenous calcium gluconate, insulin, glucose, normal saline, and oral kayexalate (serum potassium 6.2 mEq/dL).

Demonstrates a normal sinus rhythm (75 beats/min) with resolving peaked T waves.

Diagnosis of hyperkalemia is usually based on laboratory studies, although the electrocardiogram (ECG) may contain changes suggestive of hyperkalemia. Typical ECG findings in hyperkalemia progress from tall, "peaked" T waves and a shortened QT interval to lengthening PR interval and loss of P waves, and then to widening of the QRS complex culminating in a "sine wave" morphology and death if not treated.[1-3] Treatment of life-threatening hyperkalemia focuses on blocking the effects on myocyte transmembrane potential and cardiac conduction, as well as decreasing extracellular potassium levels.[3] Calcium (intravenous calcium chloride or gluconate) can effectively block the effect of extracellular potassium elevation on cardiac myocytes within minutes by restoring a more appropriate electrical gradient across the cellular membrane.[2] Sodium bicarbonate, beta-2 adrenergic agonists, and the combination of glucose and insulin all drive potassium intracellularly and lower the extracellular serum potassium level.[3] Finally, excessive body potassium can be removed with sodium polystyrene sulfonate (Kayexalate), whereas hemodialysis represents the definitive method to reduce serum potassium levels.[2,3] ❖

References

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