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Electrocardiogram Quiz – Case 41

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A 67-year-old woman presented to the emergency department of our hospital complaining of nausea, fatigue, and a sense of irregular heartbeat of a few hours duration. The patient's medical history included chronic kidney disease stage 2 (CKD 2 – glomerular filtration rate [GFR] 60 mL/min), and arterial hypertension under perindopril. She was hemodynamically stable with normal vital signs. The initial 12-lead surface electrocardiogram (ECG) is depicted below.

Questions

a. What abnormal ECG findings are present?
b. What is the differential diagnosis?

Comment

Hyperkalemia is a common clinical problem that is most often a result of impaired urinary potassium excretion due to acute or CKD and or disorders or drugs that inhibit the renin-angiotensin-aldosterone system (RAAS).

Electromechanical effects of hyperkalemia as depicted on the ECG are summarized in the following; serum potassium >5.5 mEq/L is associated with repolarization abnormalities, demonstrated as peaked T waves (usually the earliest sign of hyperkalemia). Serum potassium >6.5 mEq/L is associated with progressive paralysis of the atria, which is related to P wave widening and flattening, PR segment lengthening, and P waves eventual disappearance. Serum potassium >7.0 mEq/L is associated with conduction abnormalities and bradycardia, seen as prolonged QRS interval with bizarre QRS morphology, and high-grade atrioventricular block with slow junctional and ventricular escape rhythms. Moreover, there can be any kind of conduction block (bundle branch blocks, fascicular blocks), sinus bradycardia or slow atrial fibrillation, or development of a sine wave appearance (a pre-terminal rhythm). Serum potassium level of >9.0 mEq/L causes cardiac arrest due to asystole, ventricular fibrillation, or pulseless electrical activity with bizarre, wide complex rhythm.

It should be noted, though, that in individual patients, the serum potassium level may not correlate closely with the ECG changes. Patients with relatively normal ECGs may still experience sudden hyperkalemic cardiac arrest.

References

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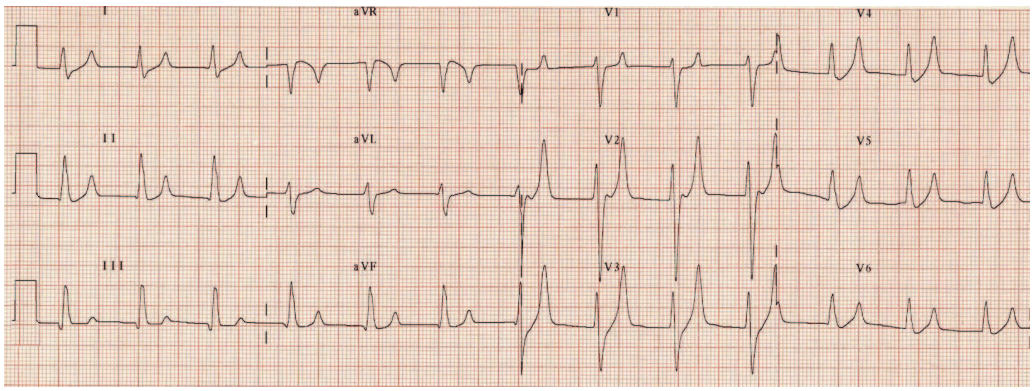

Figure 1