

Too Much of a Good Thing

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A 58-year-old man with diabetes and a history of hypertension presents with complaints of malaise, fatigue and lethargy. His medications include hydrochlorothiazide, ramipril and spironolactone. His ECG is shown in Figure 1.

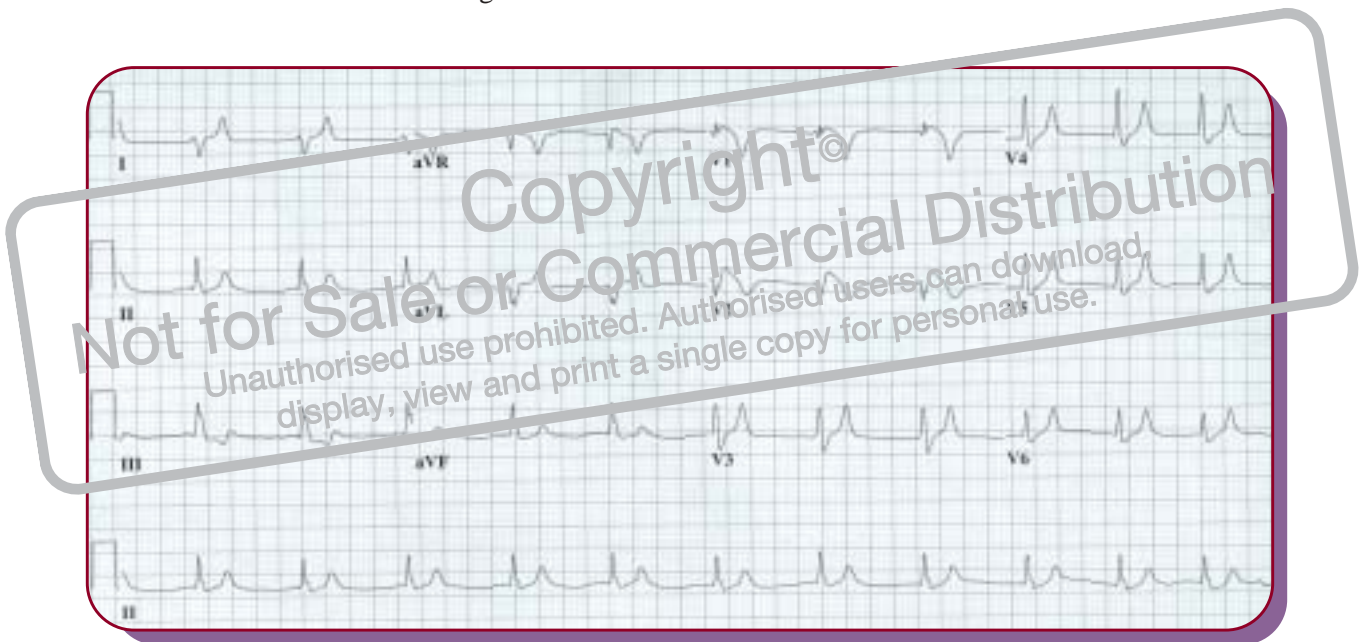


Figure 1. ECG upon presentation.

1. What abnormalities does the ECG show?

2. What is the most likely diagnosis?

This Month's ECG Diagnosis

1. The rhythm is slightly irregular, at a rate of approximately 65 bpm. No P waves can be identified. The QRS duration is within normal limits, although there is a slight intraventricular conduction delay. The T waves are somewhat peaked and abnormally symmetric, particularly in the lateral precordial leads. Leads V₁ and V₂ show abnormal ST-segment elevation.

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2. The ECG changes are typical of severe hyperkalemia. As potassium levels increase, there is a progressive reduction in P wave amplitude. When levels exceed 8.0 mmol/L to 9.0 mmol/L, the P waves may disappear completely, even though the rhythm still originates in the sinus node. This phenomenon, known as sinoventricular conduction, is the likely explanation for this patient's rhythm.

Hyperkalemia of a severe degree also prolongs intraventricular conduction and leads to an increase in the QRS duration. Because the depression of intraventricular conduction is typically diffuse and uniform, both initial and terminal portions of the QRS complex are affected equally, in contrast to typical bundle branch block, which affects only the terminal portion of the QRS complex.

The earliest ECG sign of hyperkalemia is the development of tall, peaked symmetric T waves with a narrow base. ST-segment elevation is much less common, but may be seen in severe hyperkalemia (usually confined to the right precordial leads) and has been termed the "dialyzable current of injury."


The serum potassium level in this patient was 8.3 mmol/L. Appropriate urgent treatment measures led to a prompt reduction in the serum potassium level and an ECG recorded a few hours later was normal (Figure 2). The patient's creatinine was moderately elevated and it appeared likely that the combination of ramipril and spironolactone in this setting was responsible for the acute electrolyte imbalance. The growing clinical use of combinations of drugs with cardioprotective qualities will require appropriate clinical surveillance to reduce the risk of occurrence of problems of this nature. 



Figure 2. Second ECG, recorded a few hours after urgent treatment measures.

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