ST segment elevation following sinoventricular rhythm in a patient with diabetic ketoacidosis

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Abstract

Diabetic ketoacidosis is a major cause of morbidity and mortality in patients with insulin dependent diabetes. Myocardial infarction is an uncommon but well-recognised precipitating cause of diabetic ketoacidosis, accounting for 1% of cases. Many diabetic patients with ketoacidosis initially present with hyperkalemia, which may affect the electrocardiographic morphology. We present a patient with diabetic ketoacidosis and hyperkalemia, whose initial electrocardiogram showed a sinoventricular rhythm and subsequently pseudoinfarction pattern.

Key words: diabetic ketoacidosis, hyperkalemia, sinoventricular rhythm, pseudoinfarction pattern

Introduction

Around 2–8% of all hospital admissions of diabetic patients are for ketoacidosis. Plasma potassium concentrations at presentation are usually normal or high. Potassium concentrations above 6.0 mmol/L have been reported in 20–30% cases at presentation [1, 2]. Hyperkalemia has a profound effect on myocardial conduction and repolarisation and hence on the surface electrocardiogram. We present a patient with diabetic ketoacidosis and hyperkalemia, whose initial electrocardiogram showed a sinoventricular rhythm and subsequently pseudoinfarction pattern.

Clinical case

A 20-year-old man with a history of type 1 diabetes mellitus presented to the emergency depart-
symmetrically peaked and tented. The P wave progressively diminishes in amplitude and eventually disappears when serum potassium concentrations are above 7.5 mmol/L. This may lead to a sinoventricular rhythm. Intraventricular conduction defect is manifested as a widening of the QRS, which often resembles a right bundle branch block with either a left anterior or a left posterior hemiblock [3]. Intraventricular conduction delay is well recognised in hyperkalemia, but ST segment elevation or pseudoinfarction has been infrequently reported in diabetic ketoacidosis [4–7]. It is debatable whether the ST elevation is a primary repolarisation abnormality or an artefact caused by merging of the terminal R’ portion of the QRS with the T wave. It is also unclear whether the changes are due to acidosis or other metabolic abnormalities specific to diabetic ketoacidosis [7].

**Figure 1.** A. Electrocardiography at presentation, sinoventricular rhythm and tall, peaked T waves; B. Electrocardiography 6 hours after presentation and pseudoinfarction pattern in leads D2, D3, AVF and V4–V6.
This case shows that hyperkalemia can simulate myocardial infarction and alter the electrocardiographic appearance. Myocardial infarction is a well-known precipitating factor of diabetic ketoacidosis. Thrombolysis is important for reducing morbidity and mortality resulting from coronary artery disease; however, it should be remembered that metabolic abnormalities can sometimes alter the electrocardiographic appearance.

References