

Transient atrial fibrillation precipitated by hypoglycaemia: two case reports

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Summary: We describe two insulin-dependent diabetic females who presented with severe hypoglycaemia associated with atrial fibrillation which reverted to sinus rhythm after intravenous dextrose. Atrial fibrillation has not previously been reported as a complication of hypoglycaemia in insulin-dependent diabetic patients.

Introduction

Hypoglycaemia is a common and frequently serious complication of insulin therapy. Approximately 10–15% of insulin-treated diabetic patients have at least one episode of hypoglycaemic coma each year.¹ We describe two young insulin-dependent diabetic females who presented with severe hypoglycaemia associated with atrial fibrillation which reverted to sinus rhythm after intravenous dextrose.

checked 6 monthly since 1983 ranging from 8.4–9.6% (normal range 6–8%). She was clinically free of diabetic complications. Thyroid function, autonomic nerve function assessed by standard cardiovascular reflex tests,² chest X-ray and echocardiogram were all normal.

Case reports

Case 2

A 33 year old insulin-dependent diabetic woman, who had been diabetic for 11 years and on an insulin regimen comprising twice daily Velosulin and Insulatard (Nordisk) was brought to the Accident and Emergency Department having been found unconscious in bed. Severe hypoglycaemia was found (plasma glucose <1 mmol/l) using a Yellow Springs Glucose Oxidase Analyser. Her pulse was irregular and blood pressure was 120/75 mm Hg. ECG demonstrated atrial fibrillation with ventricular rate 70–90/min. Intravenous dextrose (25 g) restored normal conscious level after 10 minutes and one hour after admission the ECG had reverted to sinus rhythm with no abnormalities (Figure 2). Auscultation revealed a loud first heart sound and after exercise a soft mid-diastolic murmur. Her glycaemic control had been satisfactory with HbA_{1c} checked 6 monthly since 1983 ranging from 7.9–10.4%. She was clinically free of diabetic complications. Thyroid function and autonomic nerve function assessed by standard cardiovascular reflex tests² were normal. Chest X-ray was normal but echocardiogram revealed mild mitral stenosis, with thickened mitral valve leaflets, normal left atrial diameter and good left ventricular function.

Case 1

A 31 year old insulin-dependent diabetic woman, who had been diabetic for 12 years on an insulin regimen comprising Neusulin (Wellcome) and Hypurin Protamine Zinc (Weddel) was brought to the Accident and Emergency Department having been found unconscious. Severe hypoglycaemia (plasma glucose <1 mmol/l) was confirmed using a Yellow Springs Glucose Oxidase Analyser. Her pulse was irregular and blood pressure was 110/70 mm Hg. Electrocardiogram (ECG) demonstrated atrial fibrillation with ventricular rate 60–90/min. Intravenous dextrose restored normal conscious level after 4 minutes and a further ECG an hour after admission showed sinus rhythm with no abnormalities (Figure 1). Her glycaemic control since diagnosis has been satisfactory with glycosylated haemoglobin (HbA_{1c})

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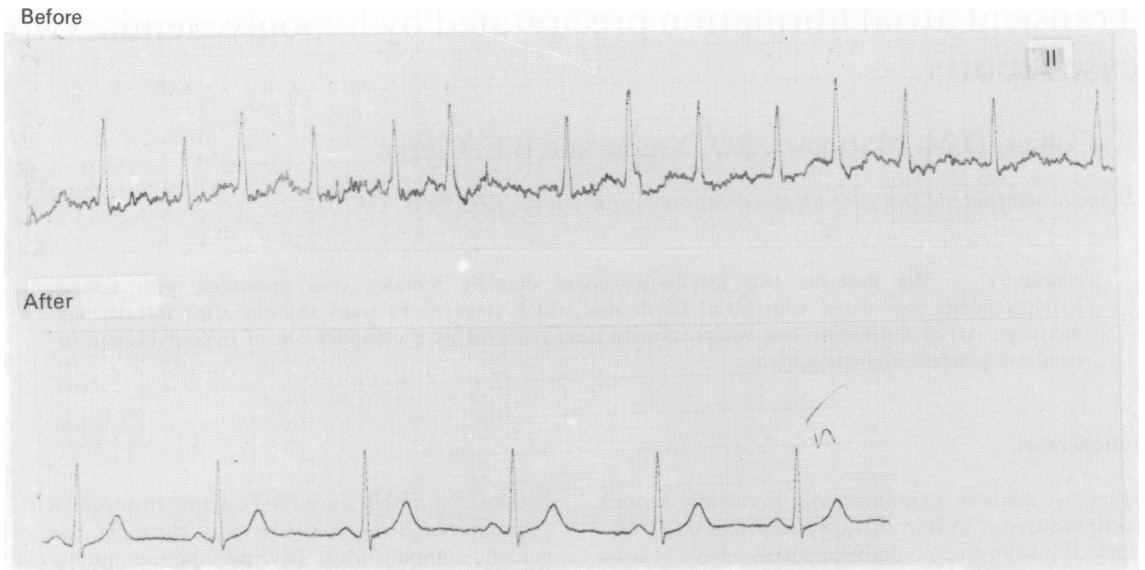


Figure 1 Case 1. Rhythm strip (standard lead II) at presentation and an hour after intravenous dextrose.



Figure 2 Case 2. Rhythm strip (standard lead II) at presentation and an hour after intravenous dextrose.

Discussion

Atrial fibrillation precipitated by severe hypoglycaemia has been reported to occur in non-diabetic patients undergoing 'insulin-shock' treatment for psychiatric illness.³ Arrhythmias and conduction disturbances occurring as a result of an acute cardiac insult, particularly myocardial infarction, are more common in diabetic than in non-diabetic patients.⁴ The only arrhythmias previously reported to occur in hypoglycaemic insulin-dependent diabetic patients are atrial and ventricular premature contractions and less frequently nodal rhythms.⁵ The mechanisms by which hypoglycaemia induces such arrhythmias are unknown but may include the direct effect of hypoglycaemia, hypokalaemia, and increased secretion of noradren-

aline⁵ on a possible background of specific myocardial disease, 'diabetic cardiomyopathy',⁶ and cardiac autonomic neuropathy.²

Although Case 2 had mild mitral stenosis, which is well recognized to be associated with atrial fibrillation, it appears nevertheless that it was the severe hypoglycaemia that provoked the transient atrial fibrillation. Atrial fibrillation has not been reported before as a complication of hypoglycaemia in insulin-dependent diabetic patients.

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