

Falciparum malaria-induced hypoglycaemia in a diabetic patient

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Summary: We report a patient with diabetes mellitus who suffered severe falciparum malaria complicated by profound and persistent hypoglycaemia. The hypoglycaemia evolved before therapy with quinine was begun and resolved with eradication of the parasitaemia. The patient reverted to her baseline hyperglycaemia despite continuation of quinine. This case illustrates the critical role of falciparum malaria in the pathogenesis of malaria-associated hypoglycaemia, rather than quinine-mediated mechanisms. Anticipation of hypoglycaemia in falciparum malaria and its vigorous treatment may improve the poor prognosis associated with this complication.

Introduction

Hypoglycaemia is a life-threatening complication of falciparum malaria infection.¹ The pathophysiology of this treatable complication is controversial with both the parasite^{2,3} and quinine therapy^{4–6} implicated. We report a patient with noninsulin-dependent diabetes mellitus (NIDDM) who suffered severe falciparum malaria infection complicated by profound hypoglycaemia. The hypoglycaemia evolved before quinine administration and resolved as the parasitaemia was successfully eradicated.

Case report

A 55 year old diabetic patient, who had returned from Kenya 12 days prior to admission, complained of a 6 day history of spiking fever and shaking chills. NIDDM had been diagnosed 5 years earlier and controlled with chlorpropamide 125 mg daily at blood glucose concentrations of 7–9 mmol/l. The patient stopped the chlorpropamide 6 days prior to admission. On admission she was in good nutritional state, with temperature 40°C, pulse 120/min, blood pressure 90/60 mmHg and hepatosplenomegaly. Peripheral blood smear showed intense parasitaemia with 30% of the erythrocytes infested with falciparum malaria. Other laboratory findings were: haemoglobin 11 g/dl,

leukocytes 11,000/ μ l, urea 10 mmol/l, creatinine 180 μ mol/l, bilirubin 84 μ mol/l, lactic dehydrogenase 780 IU/l (normal range: 90–280), aspartate aminotransferase (AST) 300 IU/l (normal range: 7–40), alanine aminotransferase (GPT) 155 IU/l (normal range: 6–60) and normal prothrombin and partial thromboplastin time. Repeat blood glucose determinations on the day of admission were 5.7, 4.8, 4.2 and 3.5 mmol/l (normal range: 3.7–6.1).

Oral quinine 650 mg three times a day and tetracycline 250 mg four times a day was initiated with intravenous fluid, glucose and electrolyte replacement. During the first hours and before quinine was administered, blood glucose levels continued to fall to 2.6 mmol/l (Figure 1) and continuous intravenous infusion of 10% glucose solution was added. Despite this measure, the patient experienced symptomatic hypoglycaemia of 1.4 mmol/l, which rapidly responded to intravenous glucose 20 g. Over the next 3 days the patient received prophylactically 120 to 150 g glucose daily intravenously. By the sixth day the parasitaemia had decreased to 2% with concomitant improvement in liver function tests. Clinically, the patient was stable and eating a high carbohydrate-protein diet. She still received as prophylaxis 60–90 g glucose intravenously daily. Nevertheless, episodes of symptomatic hypoglycaemia, with values as low as 1.8 mmol/l recurred. By day 9, parasites were no longer detected in the peripheral blood and parenteral glucose was discontinued. Subsequently, spontaneous hypoglycaemia superimposed with blood glucose ranging from 7.5 to 16 mmol/l despite continued quinine therapy.

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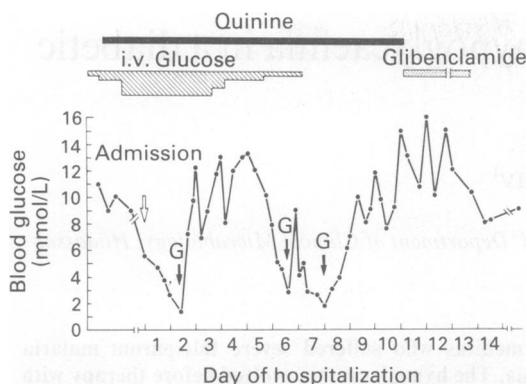


Figure 1 Blood glucose levels during hospitalization in relation to administration of glucose, quinine and glibenclamide. G denotes i.v. bolus of 50% glucose solution.

Discussion

It is only in the last decade that hypoglycaemia has emerged as a serious complication of falciparum malaria,¹ affecting primarily children³ and pregnant women⁷ and associated with a very poor prognosis.⁸ The delay in its recognition may have resulted from misattribution of the hypoglycaemia-induced neurological signs to cerebral malaria as well as from limited resources for continuous metabolic monitoring.¹ The pathogenesis of hypo-

glycaemia in severe malaria is still a matter of controversy with both increased glucose consumption by the parasite^{2,3} and quinine-induced hyperinsulinaemia⁴⁻⁶ implicated. Regardless of the precise mechanism, the hypoglycaemia can be aggravated by compromised nutrition⁹ and malabsorption,^{10,11} two conditions frequently encountered among malaria patients.

The patient reported herein was in excellent nutritional state and, presumably, with plentiful glycogen reserves secondary to NIDDM.¹² Since she was severely ill (survival with 30% parasitaemia is exceptional) and off anti-diabetic therapy, problems in glucose homeostasis were anticipated. Continuous monitoring of blood glucose clearly demonstrated that hypoglycaemia evolved prior to quinine therapy and resolved despite its continuation. Subsidence of the hypoglycaemia occurred only in parallel with the cure of the infection. It is noteworthy that neither the patient's good nutritional status nor her diabetic background was able to protect her from the severe and persistent hypoglycaemia.

In conclusion, this case illustrates the critical role of severe falciparum malaria infection in the pathogenesis of hypoglycaemia and argues against significant quinine-mediated mechanisms. Hypoglycaemia is a life-threatening but potentially treatable complication which needs to be anticipated in any patient with severe falciparum malaria infection.

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