SEVERE MALARIA WITH DISSEMINATED INTRAVASCULAR COAGULATION

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INTRODUCTION

DISSEMINATED intravascular coagulation (DIC) occurring in infection with *Plasmodium flaciparum* is well known. We report a case of severe infection with generalised bleeding and acute renal failure due to DIC. This case was also characterised by massive haemolysis occurring over a few hours.

CASE REPORT

A 44 year old Chinese male was admitted to the University Hospital Kuala Lumpur, Malaysia with a ten day history of fever. He had previously been treated as an outpatient by several General Practitioners with no improvement. One month prior to this he had left Kuala Lumpur to work as a contract labourer in a known malarious region of the country.

On examination then (the patient was admitted at 4 a.m.) he was alert and cooperative. His temperature was 37.6° C and mild jaundice was noted. No bleeding was noted in the skin, mucous membranes or fundi. His liver was palpable 3 finger breadths below the right costal margin. The spleen was not palpable and all other systems were normal. Emergency investigations revealed a haemoglobin of 7.0 mmol/1 (11.2 gm/100 ml), a total white cell count of 39.8 x 10 /1 (neutrophils 72%) and *P. falciparum* trophozites in the peripheral blood film. Oral chloroquine was then started in the usual dosage.

When seen during the morning round (about 8.00 a.m.) the patient's condition was noted to be stable. Further samples of blood were sent for routine investigation. Two hours later the patient became confused and complained of generalised aches. He was then noticed to be pale with a pulse rate of 90/min. and a BP of 110/80 mmHg. Per rectal digital examination revealed malaena.

Fifteen minutes later the patient had a cardio-respiratory arrest. Resuscitation was unsuccessful. During the course of resuscitation profuse bleeding was noted at the site where the central venous pressure line was inserted as well as at venipuncture sites. The patient also regurgitated "coffee ground" material. After the patient had expired, the results of the haematological and biochemical investigations requested earlier were received.

Haematological investigations revealed haemoglobin 3.0 mmol/1 (4.9 g/100 ml), erythrocytes 2.2 x 10 /1, packed cell volume 0.17 (17%), reticulocytes 45 x 10 /1 (0.9%), platelets 11 x 10 /1 (11,000/ul) and white cell count 28.6 x 10 /1 (28,600/ul). *P. falciparum* trophozites were seen in 58.3% of erythrocytes. Fibrinogen was 1.4 g/1, (140 mg/100 ml), fibrinogen degradation products: protamine sulphate was positive and Ethanol gel negative. Prothrombin time: Control 14 seconds (100%), Test 23.2 seconds (30%). Euglobulin lysis time: 150 min.

Biochemical tests showed urea 74.7 mmol/1 (450 mg/100 ml), glucose 3.4 mmol/1 (62 mg/100 ml). Sodium, potassium and chloride were 132, 7.4 and 80 mmol/1 (132. 7.4, 80 mEq/1) respectively. The total proteins were 52 g/1 (5.2 g/100 ml); albumin 22 g/1 (2.2 g/100 ml); globulin 30 g/1 (3.0 g/100 ml), bilirubin 212.0 umol/1 (12.4 g/100 ml), aspartate aminotransferase 106 IU/1; alanine aminotransferase 14 IU/1 and alkaline phosphatase 74 IU/1.

DISCUSSION

Severe malaria tends to occur in "non-immune" persons. The results of the investigations reveal a marked degree of parasitisation of the

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erythrocytes. The severe thrombocytopenia, low prothrombin activity, low plasma fibrinogen level and the presence of fibrinogen degradation products (FDP) in the blood indicate disseminated intravascular coagulation (DIC). Fibrinolytic activity was normal. The immediate cause of death was probably related to the hyperkalaemia due to acute renal shutdown and massive hemolysis (the haemoglobin fell from 7.0 mmol/1 (11.2 g/100 ml) to 3.0 mmol/1 4.9 g/100 ml) in 6 hours).

DIC occurring in *P. falciparum* infection was first suspected in 1966 based on clearance studies of I^{125} labelled fibrinogen (Devakul *et al.*, 1966). Since then its role in the more serious complications of the infection has been amply confirmed (Reid & Nkrumah, 1972; Jaroonvesama, 1972). In particular, its role in cerebral malaria has been emphasised.

The diagnosis of DIC depends on a high index of suspicion since overt bleeding is very rare. A high parasite count correlated well with the development of DIC (Reid & Nkrumah, 1972). Cerebral symptoms, jaundice and hyperpyrexia should also alert one to the possibility of DIC (Jaroonvesama, 1972).

Complete coagulation studies should ideally be carried out since haemolytic anaemia and thrombocytopenia may occur in *P. falciparum* infections without DIC. Measurement of FDP is probably the most useful single test for DIC in malaria (Reid & Nkrumah, 1972; Jaroonvesama, 1972). Fibrinogen and other clotting factors may be found in normal or even increased concentrations because transient or local increased consumption of such factors may lead to a rebound phenomenon. FDP levels remain elevated for at least 24 hours and occasionally for as long as a week if the initial levels were very high. Lately it has been shown that complement activation triggered immunologically by *P. falciparum* infection also plays an important role in the pathogenesis of DIC (Srichaikul *et al.*, 1975). Hence an increased clearance of complement factor Clq and decreased levels of complement factor C will also contribute to the diagnosis.

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