MEDICAL PRACTICE

Contemporary Themes

Malaria in Birmingham 1968-73

V. E. ANSDELL, C. M. BOOSEY, A. M. GEDDES, H. V. MORGAN

British Medical Journal, 1974, 2, 206-208

Summary

During the years 1968 to 1973 70 patients suffering from malaria were admitted to one hospital in England. Twenty had malignant tertian malaria while the remainder had infections caused by *Plasmodium vivax*, *P. ovale* and *P. malariae*. Malaria should be suspected in every febrile patient who has visited a tropical country, and the diagnosis can be confirmed only by examining blood films. Disseminated intravascular coagulation may complicate the disease, and should be considered in every case.

British workers spending short periods in malarious areas and Asian immigrants returning home for a holiday are often inadequately instructed about malarial prophylaxis, particularly the need to continue this for at least a month after they return home. Companies and travel agencies should be obliged to provide such instructions.

Introduction

The *World Health Organization Chronicle* of 1973¹ gives advice on malaria for travellers. The *Chronicle* advises that before undertaking international journeys tourists and businessmen should be offered information on the risk of contracting malaria

in countries that they intend to visit, how to protect themselves against the disease, and the action that should be taken if they develop fever after returning home. It refers to a 1973 issue of the *Weekly Epidemiological Record*² which provides such information. In spite of the wealth of available advice malaria continues to occur in the United Kingdom, principally among travellers from Asia and Africa. We review here all patients suffering from malaria who were admitted to one centre over a six-year period.

Clinical Features

During the years 1968 to 1973 70 patients (63 male and 7 female) were admitted to the East Birmingham Hospital suffering from malaria. Forty-eight had benign tertian malaria caused by *Plasmodium vivax*, 20 had malignant tertian malaria caused by *P. falciparum*, while the remaining two had an infection caused by *P. ovale* or *P. malariae*. All infections had been acquired abroad; 44 in the Indian subcontinent (42 *P. vivax*, 2 *P. falciparum*), 23 in Africa (18 *P. falciparum*, 3 *P. vivax*, 1 *P. malariae*, 1 *P. ovale*), and three (*P. vivax*) in New Guinea. Of the 44 patients who had acquired malaria in the Indian subcontinent 38 came from Pakistan, most from the eastern part. Fifty-one patients were Asian (38 Pakistani and 13 Indian), 16 Caucasian, and three African. Most were admitted during the summer.

Twenty-seven patients were referred to hospital with a provisional diagnosis of malaria, 22 with pyrexias of unknown origin, and 10 with suspected typhoid fever. The remaining 11

Presenting Symptoms of Malaria

	No. of Subjects		No. of Subjects
Rigors	51	Limb pains	15
Fever (non-tertian)	44	Diarrhoea	11
Headache	36	Abdominal pain	8
Fever (tertian)	26	Confusion	4
Vomiting	26		

Incidence of malaria in England and Wales 1954-72.

Department of Communicable and Tropical Diseases, East Birmingham Hospital, Birmingham B9 5ST

V. E. ANSDELL, M.B., CH.B., Senior House Officer

C. M. BOOSEY, M.B., F.F.A. R.C.S., Registrar

A. M. GEDDES, M.B., F.R.C.P., Consultant Physician

H. V. MORGAN, C.B.E., F.R.C.P., Honorary Professor of Medicine of the Tropics

patients were sent in with miscellaneous diagnoses. The presenting symptoms are shown in the table. On admission the spleen was enlarged in 40 of the 70 patients and the liver in 20. Apart from fever there were no other abnormal physical signs.

Laboratory Investigations

Malaria was confirmed in all cases by examination of blood films stained with Giemsa solution. In five patients the first blood film examined after admission was negative for malaria parasites, which were, however, seen on subsequent films. Of the 70 patients 14 had a haemoglobin of less than 11 g/100 ml at admission. Thrombocytopenia (platelet count less than 100,000/mm³) was present in nine patients with benign tertian malaria and eight patients with malignant tertian malaria. Leucopenia (W.B.C. less than 4,000/mm³) was found in only 10 patients while seven had a polymorph leucocytosis (W.B.C. over 10,000/mm³). Erythrocyte sedimentation rate was measured in 49 of the 70 patients and did not correlate with the severity of the illness. In two patients suffering from malignant tertian malaria there was laboratory evidence of disseminated intravascular coagulation.

Case Reports

Case 1.—A 37-year-old British carpenter was admitted four weeks after his return from a four-month tour in north central Nigeria. While in Africa he had taken proguanil for malaria prophylaxis but had not continued it after arriving in England. He had become ill one week after his return, but he did not seek medical advice until the day of admission, when he was virtually moribund, being cyanosed and shocked with a barely palpable pulse and unrecordable blood pressure. Haemoglobin was 14.3 g/100 ml and white blood count 11,100/mm³, of which 82% were polymorphs. Serum urea was 140 mg/100 ml and serum bilirubin 6.3 mg/100 ml. Platelets were reduced on a blood film. Of the red blood cells 10% were parasitized with one to three ring forms of *P. falciparum*. He was treated with intravenous chloroquine and hydrocortisone together with oxygen and plasma. On the morning after admission his condition improved but later in the day he again became shocked. At that time haemoglobin was 11.6 g/100 ml, 23% of the red blood cells containing malarial parasites. Treatment was changed to intravenous quinine with satisfactory clinical recovery though his haemoglobin fell to 7.9 g/100 ml necessitating transfusion of four units of blood.

Case 2.—A 31-year-old Englishman was admitted with a severe attack of malignant tertian malaria two weeks after his return from working in Nigeria, where he had taken antimalarial prophylaxis very erratically. On admission he was toxic and confused with a temperature of 40°C. He was jaundiced and moderately dehydrated and his liver and spleen were both palpable. Haemoglobin was 13.1 g/100 ml and white blood count 5,900/mm³, of which 83% were polymorphs. The platelet count was reduced to 30,000/mm³, the prothrombin time was prolonged to 23 seconds (control 13 seconds), and there was an increase in serum fibrinogen degradation products suggesting intravascular coagulation. Serum urea was 144 mg/100 ml and bilirubin 8.8 mg/100 ml. Treatment was started immediately with intravenous chloroquine and on the morning after admission he improved. His temperature, however, again rose later in the day and he became increasingly drowsy, and because of this he was given intravenous quinine together with corticosteroids with slow but satisfactory recovery.

Case 3.—A 38-year-old oil worker was admitted two weeks after returning from a short visit to Nigeria. While in Africa he took proguanil daily but stopped it one week before arrival in England. In Nigeria he had twice been exposed to severe mosquito attack after dusk. A week before admission he had become increasingly unwell with cough, chest pain, and confusion. He sought medical advice and was given ampicillin. On admission he was confused, drowsy, and febrile with scleral icterus and an enlarged liver and spleen. Haemoglobin was 14.5 g/100 ml, 26% of the red blood cells containing *P. falciparum*. White blood count was 10,500/mm³, of which 85% were polymorphs. Platelet count was reduced at 28,000/mm³ and serum fibrinogen at 90 mg/100 ml. Fibrinogen degradation products in the serum were increased to greater than 40 mg/

100 ml and prothrombin time prolonged to 18 seconds (control 12 seconds). Serum urea was 210 mg/100 ml and serum bilirubin 6.9 mg/100 ml. He was given intravenous chloroquine (1.8 g in the first 24 hours) together with heparin 10,000 units six hourly for the probable disseminated intravascular coagulation. He developed an acquired haemolytic anaemia, the haemoglobin falling to 3.8 g/100 ml. Blood could not be obtained for transfusion as his serum contained strongly reactive cold agglutination of anti-I specificity, and the Coombs test was positive. High doses of prednisolone produced a slow but satisfactory rise in haemoglobin.

Treatment

Most patients were treated with chloroquine. Fifty-two adults were given standard oral therapy of four tablets (each containing 150 mg of chloroquine base) followed by two tablets after six hours and then two tablets daily for a further two days. Seven children received oral chloroquine in reduced doses. Four adults with severe falciparum malaria were given chloroquine intravenously and then intramuscularly. Another four adults with malignant tertian malaria of moderate severity were initially treated with oral chloroquine. Two developed profuse diarrhoea and treatment was therefore changed to quinine, while the other two were given chloroquine for the first 24 hours and then given quinine because of deterioration in their condition.

Two children with falciparum malaria whose parents had been treated with quinine after apparent failure of chloroquine were given oral quinine, and a Kenyan Asian with a moderately severe attack of falciparum malaria was given quinine first intravenously and then orally because the four patients who failed to respond to oral chloroquine had also come from East Africa. All 70 patients recovered completely from the attack of malaria.

A two-week course of primaquine 15 mg daily was given to 38 patients with benign tertian malaria after the therapeutic course of chloroquine to eradicate the extraerythrocytic phase of the parasite from the liver and prevent subsequent relapses of infection. Care was taken to exclude glucose-6-phosphate dehydrogenase deficiency before giving primaquine, which can cause haemolysis in patients with this condition.

Prophylaxis

Antimalarial prophylaxis was taken regularly by 10 of the 16 European patients while in the tropics but only three continued for the required four to six weeks after returning home, and they developed benign tertian malaria two to six months after stopping the prophylactic agents. The remaining seven patients stopped taking antimalarials as soon as they arrived in the United Kingdom. Six developed malaria within two weeks of stopping the drug, five developing malignant tertian malaria and one a *P. ovale* infection. The seventh patient developed malaria caused by *P. malariae* 12 weeks after arrival in the U.K. One family of four who had lived in a non-malarious zone of Zambia did not take antimalarials during a holiday in Mombasa on their journey home and all developed malignant tertian malaria within 10 days of arriving in Britain. Another patient who took proguanil for only the first few months of a two-year stay in Port Harcourt, Nigeria, developed a very severe attack of malignant tertian malaria several days after arrival in the United Kingdom.

Only two of the 54 non-European patients had taken any form of antimalarial prophylaxis while in the tropics.

Discussion

Since 1968 the incidence of malaria in England and Wales has significantly increased (fig.). Most infections from Asia are of

Incidence of malaria in England and Wales 1954-72.

the benign tertian variety whereas malignant tertian malaria is commonest in travellers from Africa. Many of our Asian patients had lived in England for some years and had contracted their infection while on holiday in India or Pakistan. There is an increasing trend among Asian immigrants to return to India or Pakistan on holiday and to take their children with them, many of whom have been born in Britain. The parents have possibly lost their natural immunity to malaria and the children have never acquired it. The predominance of patients from one area of Pakistan in our series is due to the fact that many Asian immigrants in Birmingham originate in this part of the Indian subcontinent.

Malaria should be suspected in every febrile patient who has visited a tropical country. The diagnosis can be confirmed only by examination of a blood film and it may be necessary to examine several films before the malaria parasites are seen. In one of our patients five films showed nothing abnormal and the diagnosis was established only on the sixth film. The white blood count is often unhelpful. Malaria is usually said to be associated with leucopenia, but this was present in only 10 patients in this series. Seven of our patients had a polymorph-leucocytosis.

Disseminated intravascular coagulation occurs in many different infections, including malaria,³ and may be fatal. Two of our patients developed this complication, which should be considered in every patient suffering from malaria. The platelet count and prothrombin time must be estimated in every case,

and if these are abnormal serum fibrinogen and fibrinogen degradation products should be measured. The treatment of intravascular coagulation is controversial but there is evidence that intravenous heparin is beneficial, and this was given to one of our two patients with disseminated intravascular coagulation.

Chloroquine is the drug of choice for the treatment of all forms of malaria though resistance to chloroquine has been reported from the Far East and also from several areas in South America. Four of our patients with malignant tertian malaria were apparently not responding to chloroquine and improved only when given quinine. Possibly a larger initial dose of chloroquine might have been more effective in these extremely ill patients. We did wonder, however, about the possibility of chloroquine resistance, which has not so far been seen in Africa.

Antimalarial prophylaxis was taken by most of the European patients but only three continued it after returning to Britain, and all developed benign tertian malaria two to six months after stopping the prophylaxis—which had possibly prolonged the incubation period of the disease.⁴ British artisans spend short periods working in West Africa, often in the oil industry, and three of the most seriously ill patients with malignant tertian malaria were in this category. They are often inadequately instructed in antimalarial precautions, both during their stay in Africa and after returning to the United Kingdom. While abroad excessive consumption of alcohol may result in a failure to take antimalaria prophylaxis regularly and sometimes to unnecessary exposure to mosquitoes after dusk. Companies sending employees to malarious regions should be obliged to give detailed instructions regarding the prevention of malaria and ensure that they are carried out. Only two of the 54 non-European patients took any form of prophylaxis and travel agents organizing tours to Asia and Africa should give advice to European and non-European clients about anti-malaria precautions. Satisfactory prophylaxis can usually be obtained with either proguanil 100-200 mg daily or pyrimethamine 25-50 mg once a week. In certain areas chloroquine 300-600 mg per week may be preferred and if there is doubt local medical advice should be sought.

References

- ¹ World Health Organization Chronicle, 1973, 27, 254.
- ² World Health Organization, Weekly Epidemiological Record, 1973, 48, 25.
- ³ Jaroovwesama, N., *Lancet*, 1972, 1, 221.
- ⁴ Horstmann P., *British Medical Journal*, 1973, 3, 440.