Comment

The four attacks of pericarditis with effusion were considered to be secondary to the subphrenic abscess. Although two loculi of pus were drained, a small focus must have persisted. It is unlikely that there was a direct invasion of the pericardium, as the fluid was repeatedly sterile on culture. The effusion is probably analogous to the oedema surrounding any acute inflammation. The immunity of the pericardium, as compared with the pleura, to involvement by subphrenic inflammation may be due to its relation to the avascular central tendon of the diaphragm.

In conclusion, the importance of early diagnosis and treatment of subphrenic infection is again stressed.

I am indebted to Professor J. Craig and Mr. G. Gordon Bruce for help and criticism.

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An Adreno-renal Syndrome in Malignant Tertian Malaria

The patient whose case is described below developed algid malaria in Co. Down after living with impunity in West Africa for 20 years. It could be postulated that during his journey home he was infected with a different strain of *Plasmodium falciparum*, to which he was not immune. Certainly his peripheral blood showed evidence of a heavy infection with the parasite.

Case Report

The patient, a man aged 41, had lived in West Africa since 1930. He was flown home at the end of August, 1950. When seen on September 16 he was in a grave condition, which, by clinical and pathological interpretation, was found to be a state of uraemia arising as the result of a heavy infection with malignant tertian malaria. Before examination he had had preliminary symptoms of pains in the limbs and general fatigue. His illness can be described in two phases—that of serious peripheral vascular failure, followed by the phase of uraemia with deepening coma.

During the first phase the patient was mentally alert and complained bitterly of severe pains in the arms. On examination his whole body, and especially the limbs, was cold and sweaty, and the joints of his right arm were swollen and painful. It was almost impossible to feel his pulse and to record the blood pressure. The systolic blood pressure was below 60 mm. Hg. His temperature was 95° F. (35° C.) and his spleen was greatly enlarged. A sample of urine was found to be free from albumin. At this stage an electrocardiogram showed normal complexes in the standard limb leads and in unipolar chest leads, and an emergency radiograph of the chest revealed a normal heart and lungs. It was therefore evident that he was in a state of grave circulatory failure of peripheral origin, with hypotension as an outstanding feature, and, at the beginning, a normal urine. Appropriate stimulants were given for his state of collapse.

The next day the second stage of the illness had begun. He gradually passed into a state of coma, from which he could scarcely be aroused. An extensive haemorrhagic skin rash developed on the limbs and in the folds of the groins. Marked oliguria occurred, and his urine was loaded with albumin. The following tests were carried out to determine the cause of his coma.

Investigations.—Blood urea; 120 mg. per 100 ml. Blood slides (thick and thin): accolé forms of *Plasmodium falciparum* and male and female gametocytes in abundance; neither trypanosomes nor *Treponema recurrentis* were seen.

A hanging drop of blood contained no trypanosomes. Blood counts: red cells, 3,740,000; Hb, 70% (Haldane); white cells, 7,800 (neutrophils 50%, eosinophils 24%, lymphocytes 22%, basophils 2%, monocytes 2%). Urine: albumin +, no casts, no red cells, no haemoglobin, no ova. Weil-Felix OX2, OX19, OXK were negative in all dilutions. The Widal reaction was negative for the salmonella group. Agglutination tests for *Leptospira icterohaemorrhagiae*, *Leptospira canicola*, and other West African species of *Leptospira* were negative.

The second phase was therefore characterized by disturbance of renal function with albuminuria and urea retention. As the patient ultimately made a complete recovery and the condition responded dramatically to proguanil, it is reasonable to assume that the heavy malarial infection was responsible for the renal damage, especially as other likely causes had been excluded. Proguanil, 200 mg. daily, was given, and in a few days he made a dramatic recovery. Within seven days his temperature, which had risen at the beginning of the second phase, had settled down, the urinary output was normal, and the urine was free from albumin. All parasites had disappeared from the blood. Later, renal-function tests showed normal function and intravenous pyelography revealed normal kidneys with good concentration power.

Comment

The clinical description of this case of malignant tertian malaria is divided into two distinct phases. The first phase, with its marked hypotension and cold extremities, resembled an acute hypoadrenalism. Significantly there were no urinary changes, and the pain and swelling of the joints are interesting in view of the relation of arthritis to the adrenal glands. Unfortunately, details of electrolytic balance are not available. At any rate, the cardiovascular phenomena were peripheral in origin.

The second stage of the illness has two possible explanations. The albuminuria and features of uraemia may have been due to actual involvement of the kidney by malarial infection—that is, a true glomerulonephritis or nephrosis due to tubular damage—or they may have been due to a dynamic disturbance of renal function consequent on the very low blood pressure of the first phase. It is significant that, although the urine was loaded with albumin, repeated microscopic examination failed to show the presence of red blood cells or casts. Thus the urine did not indicate the presence of glomerular inflammation or rupture of capillaries as would have been expected had a true glomerulonephritis been present. The absence of casts in the urine and the raised blood urea do not suggest a primary nephrosis.

In the first phase the marked and persistent hypotension would be sufficient to cause the second phase of the illness with impairment of renal function due to interference with glomerular filtering pressure, the albuminuria being due to the state of anoxia consequent on the reduced renal blood flow. The urine showed a sharp onset of albuminuria, which cleared up abruptly with treatment. This also supports the dynamic theory, as a true nephritis would most likely have shown a persistent albuminuria for some time even after the acute inflammation had cleared up. Moreover, a few weeks later there was no evidence of renal disease.

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