Relapsing fever in Cape Town

A case report

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Summary

A 19-year-old male member of the South African Defence Force presented in Cape Town with fever soon after returning from service in northern South West Africa. The typical clinical features of relapsing fever were confirmed by the finding of spirochaetes on stained blood smears. A case report and short review of a disease which has not been reported previously in Cape Town is presented.

Relapsing fever is caused by spirochaetes of the genus *Borrelia*. Various strains and species have been identified but the classification is not exact because strain and species differences are not constant. The 0.2 - 0.5 µm wide and 8 - 40 µm long spiralled organisms are carried by human lice and by ticks of the genus *Ornithodoros* (soft-bodied ticks).

Louse-borne disease (*Borrelia recurrentis* and related strains) commonly occurs in epidemics and requires a human reservoir. The disease is transmitted to man via the infected haemolymph of crushed lice on abraded skin or mucous membranes and not via the bites of living lice. The disease is presently endemic in north-east Africa, Asia and South America. Epidemics occurred after both World Wars with a death rate of 5 - 10%, although death rates of up to 40% have been reported.

Tick-borne disease (*B. duttoni* and related strains) is endemic and almost world-wide in distribution (including tropical Africa). The vector ticks are carried by various rodents and transmit the organisms in their saliva when they feed. The ticks feed at night for short periods and have a painless bite, which accounts for the fact that patients rarely recall having been bitten. Transovarial spread of the spirochaetes from generation to generation of ticks obviates the need for a human or rodent reservoir. The ticks can survive for years without food, often in old uninhabited buildings, and have been known to harbour *borreliae* for many years. The case-fatality rate in tick-borne disease is around 2%.

Tick-borne relapsing fever was first reported in South Africa in 1912 in Zululand, and sporadic cases and outbreaks were noted thereafter. By the 1940s the use of long-acting insecticides to eliminate ticks from human dwellings and improvement in housing conditions resulted in fewer than 100 cases on average being notified annually (mostly in Transvaal Blacks). By the early 1950s these measures had virtually eradicated the disease; only 2 further cases have been notified since then, both in the early 1970s.1

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Case report

A 19-year-old male member of the South African Defence Force who had been on service in northern South West Africa (SWA) returned to Cape Town and was admitted 1 week later with fever. He had experienced a sudden onset of fever with rigors and sweating, severe headache, general weakness and loss of appetite 3 days before admission and was still having the same symptoms.

Malaria prophylaxis had been adequate and he could recall no bites or skin rashes. He admitted to having swum in rivers in SWA.

On admission he was flushed, with conjunctival injection and a temperature of 40.3°C. There were no other abnormal physical findings. Laboratory tests revealed the following: haemoglobin concentration 14.6 g/dl; white blood cell count 5.7 × 10^9/L; 60% polymorphonuclear leucocytes, 35% lymphocytes, 3% monocytes and 2% eosinophils; an ESR of 60 mm/h; a negative malaria smear; and normal urea and electrolyte levels and liver function. His chest radiograph was normal.

There was no growth on blood culture; the midstream urine sample showed a moderate amount of red cells but no organisms, casts or growth; and the VDRL, Paul Bunnell, Australia antigen, hepatitis A IgM, Widal, Weil-Felix, *Brucella* and *Leptospira* agglutination and cercarial complement fixation tests were all negative.

Fever, symptoms and haematuria persisted for 36 hours after admission and then subsided spontaneously. He was discharged 3 days later without a firm diagnosis to return for follow-up 1 week later.

The patient was readmitted 6 days later complaining of the same symptoms as well as a non-productive cough which had been present for 2 days. Physical examination was as before but on this occasion he was more apathetic and had marked photophobia as well as right upper quadrant tenderness. Urinalysis again revealed a trace of haematuria. Blood smears were examined for the presence of spirochaetes and these were found on both thick and thin smears (Fig. 1).

Treatment with procaine penicillin 1.2 × 10^6 U intramuscularly was followed by a drop in temperature within 2 hours and he remained afebrile thereafter. Treatment was...
continued with oral penicillin for 5 days. The day after initiation of treatment (when he was already apyreal) he developed a red, painful eye with miosis; the diagnosis of anterior uveitis was confirmed on slit-lamp examination. This responded well to topical steroid and mydriatic therapy.

Tiredness and weakness persisted for a few days but this soon resolved and when seen again 2 weeks later he was completely well and had suffered no further relapses. Once he became afebrile the haematuria subsided and an intravenous pyelogram was normal.

Discussion

The symptoms of relapsing fever are nonspecific and include fever of sudden onset with rigors and sweating, headache, eye pain (often with photophobia), myalgia and lethargy. Other symptoms which may be present are coughing and dyspnoea, abdominal pain, nausea, vomiting, diarrhoea and epistaxis.

Physical findings are also nonspecific, fever, apathy, flushed facies and injected conjunctivae being the commonest. Splenomegaly (often with tenderness), hepatomegaly, and less often jaundice and even lymphadenopathy, may also be present. A rash (usually erythematous macules but sometimes even petechial or purpuric) occurs in about 25% of patients, usually during or after the first febrile period, and lasts 24 - 48 hours. Microscopic haematuria is a fairly common finding.

The only specific clinical feature is the pattern of the fever. After an incubation period of 4-18 days there is a sudden onset of fever (mean temperature now being 39-40°C), which lasts an average of 3 - 5 days, running a remittent course. This terminates, often owing to a crisis, with a sudden drop in hematocrit. After an afebrile interval of 4-10 days there is a sudden relapse with return of fever and symptoms. Louse-borne disease is usually associated with only up to 3 or 4 relapses whereas in tick-borne disease there may be as many as 13 relapses, usually with milder crises.

Febrile episodes are initiated by proliferation of the organisms and are terminated by the host developing antibodies which help in destroying most of the organisms. The organisms that survive in the absence of host immunity can then proliferate, resulting in a relapse with return of fever and symptoms. Eventually immunity is developed to all antigenic forms and full recovery ensues.

Complications are usually related to the severity of the disease and occur commonly in louse-borne disease, especially in the setting of lowered host immunity. Neurological complications (which may occur in up to 30% of cases of louse-borne disease and 9% of cases of tick-borne disease) include meningitis, meningoencephalitis and transient focal defects. Bronchitis, bronchopneumonia and lobar pneumonia may occur, and even cardiac failure and endocarditis, although these occur only very rarely. Haemorrhagic manifestations varying in severity may be present, and are related to a lowered prothrombin index due to hepatic involvement. Iritis or iridocyclitis occurs in up to 15% of cases of tick-borne disease, usually after the second or third pyrexial episode. The outcome appears to be unrelated to further relapses, leading to visual deterioration in severe cases. Diagnosis should be considered when a febrile illness, especially one involving relapses occurs in a traveller who has visited an endemic area. During the fever the spirochaetes will show up on stained peripheral blood smears in 70% of patients. Borreliae are the only spirochaetes stained by aniline dyes and are found most easily on thick smears. Incubation of blood into rodents will increase the diagnostic yield by about 15%. A further method is to examine suspected ticks for the organism — this, however, is usually limited to epidemiological work. The spirochaetes may also be found (rarely) in cerebrospinal fluid and urine.

Agglutinins to Proteus OXK occur in 90% of cases of louse-borne disease and in 30% of cases of tick-borne disease, and false-positive serological tests for syphilis are present in about 5%. Routine haematological and biochemical investigations show variable and nonspecific changes. Specific serological tests (including a complement fixation test) exist but are not widely available.

Antibiotics used in treatment have included penicillin, streptomycin, tetracycline, chloramphenicol and erythromycin, varying from single-dose therapy to 5-10-day courses (both orally and parenterally). Initiation of therapy may precipitate a Jarisch-Herxheimer reaction — an exaggeration of the natural crisis related to rapid destruction of the organisms — which may result in severe circulatory collapse and even death. This severe reaction has usually occurred in louse-borne disease but may also occur in tick-borne disease. Therapy is aimed at effecting a gradual clearance of spirochaetes from the blood without causing a severe Jarisch-Herxheimer reaction and preventing further relapses. It has recently been shown that single doses of tetracycline 500 mg, erythromycin 500 mg or doxycycline 100 mg orally, or procaine penicillin 6 x 10⁶ U intramuscularly are adequate to clear the blood of spirochaetes. Oral tetracyclines and erythromycin are often followed by a severe Jarisch-Herxheimer reaction whereas penicillin has a more gradual onset of action with a less severe reaction, although there is a slightly higher relapse rate. It is therefore suggested that therapy should begin with single dose of intramuscular penicillin and be followed by a 5-day course of tetracycline (or erythromycin in pregnancy) to prevent relapses.

In conclusion, this is an uncommon disease but one in which awareness may well help avoid a diagnostic dilemma and obviate the fairly considerable morbidity which may occur in this easily treatable condition.

REFERENCES