

A Case of Scrub Typhus in a Child

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Abstract Scrub typhus is caused by *Orientia tsutsugamushi* which is transmitted by an arthropod vector - chigger. Cases in children were often missed or misdiagnosed as a result of atypical presentation. The typical eschar lesion (necrotic centre with an erythematous rim), found in less than half of cases, should alert doctors to the diagnosis of rickettsial infections. The case fatality rate may be as high as 7% in untreated patients. Treatment with doxycycline or chloramphenicol should be started for suspected cases as soon as possible.

Key words Scrub typhus; *Orientia tsutsugamushi*

Introduction

Data from the Department of Health Hong Kong showed an increasing number of notifications of typhus fever (Table 1).

Table 1 Number of notifications of typhus fever

Year	Total cases
1995	7
1996	5
1997	9
1998	9
1999 (Jan-Oct)	23 (11 Typhus Murine 12 Scrub Typhus)

All rickettsioses are zoonoses (see Table 2) Rickettsial infections are transmitted among mammalian reservoirs by arthropod vectors.

Most cases of scrub typhus occurred during the hot humid season between May and October. Few civilian

cases of scrub typhus were notified to the Department of Health. It is suggested that a prospective study utilizing specific serological diagnostic techniques would be of value in assessing the importance of scrub typhus as a cause of 'fever' of undetermined origin in the civilian population of Hong Kong.¹

Case Report

CYL, a seven year old girl, enjoyed good past health until in September 1999 when she had four day history of fever, chills, nausea and upper respiratory symptoms. Physical examination on admission showed a well looking child with generalized maculo-papular rash. Other parts of the examination were unremarkable except perhaps a necrotic lesion with an erythematous rim measured 1.5 cm x 2 cm was noted over the front chest region (see Figure 1).

The family had travelled to Sai Kung and Cheung Chau. There was no travelling history outside Hong Kong documented over the past six months. The mother suspected that the lesion was caused by insect bite while travelling to Cheung Chau one week prior to admission. It also correlated with the onset of symptoms.

Patient was treated conservatively as upper respiratory tract infection initially. However, fever persisted one day after admission and patient became irritable and toxic looking clinically. Laboratory results showed normal complete blood pictures, elevated ESR (20 mm in 1 hour) and transaminase level (59 mmol/L). Clotting profile and electrolytes were normal. Blood film for malaria screen was negative. Rickettsial infection was suspected based

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Table 2

Disease group	Causative agent	Arthropod vector-Transmission	Hosts	Geographic distribution
<i>Typhus</i>				
Murine typhus	Rickettsia typhi/ELB agent	Rat flea or cat flea feces	Rats, opossums	Worldwide
Epidemic typhus	Rickettsia prowazekii	Louse feces	Humans	Africa, South America, Central America, Mexico, Asia
Brill-Zincker disease (recrudescence typhus)	Rickettsia prowazekii	Reactivation of latent infection	Humans	United States, Canada, Eastern Europe
Flying squirrel (sylvatic) typhus	Rickettsia prowazekii	Louse or flea of flying squirrel	Flying squirrel	Eastern United States
<i>Scrub typhus</i>				
Scrub typhus	Orientia tsutsugamushi	Chigger bite	Rodents?	Southern Asia, Japan, Indonesia, Australia, Korea, Asiatic Russia, Indian subcontinent, China

on the "eschar" lesion noted over the front chest region. Patient was then treated with oral doxycycline after full discussion with parents.

Patient improved clinically after treatment and fever



Figure 1 An eschar lesion

settled over the coming two days. Patient was discharged home one week after treatment.

Blood cultures and widal test were negative. First Weil Felix test taken when patient was symptomatic turned out to be 'normal'. Second Weil Felix test taken one month later showed four fold rise in OX K titre.

Weil-Felix agglutination titre

	Acute phase	Convalescent phase
OX K	< 20	80
OX 19	< 20	< 20
OX 2	< 20	< 20

Rickettsia antibody titres for Rickettsia conorii and mooseri were not raised. Serological test confirmed scrub typhus.

Discussion

Scrub typhus is an acute febrile illness that generally causes systemic symptoms of which fever is the most common. It is one of the causes of "fever of unknown origin" in the Asia-Pacific region.

Orientia tsutsugamushi is the causative agent of scrub typhus. It is transmitted by the bite of the larvae of different species of mites; best known of these are Trombicula akamushi and T. deliniensis. Like other vasculotropic rickettsiae, Orientia tsutsugamushi infects endothelium and elicits vasculitis, the predominant clinicopathologic feature of the disease. Once the infective agent is inoculated

through the skin into the dermis via arthropod bite, the rickettsiae attach to vascular endothelium and initiate focal host cell membrane injury by inherent rickettsial phospholipase activity. Local inflammatory and immune responses contribute to vascular injury. Rickettsia-mediated endothelial injury may upregulate the expression of procoagulant molecules on the surfaces of endothelial cells to promote platelet adhesion, leukocyte emigration and coagulation factor consumption, resulting in disseminated intravascular coagulation. Vascular changes may present as a maculopapular or petechial rash or as increased vascular permeability and edema in many organs including the brain.

In adults, scrub typhus may be a mild or severe disease with an incubation period of 6-21 days. At the site of mite bite, the rickettsiae proliferate to form a necrotic eschar with an erythematous rim in less than 50% of cases. Other symptoms and signs were fever (100%), chills (39%), headache (21%), dyspnoea (18%), cough (24%) and gastrointestinal symptoms (18%). A maculopapular rash is present in 21% of cases and involves the trunk and extremities and infrequently the hand or face. Regional or generalized lymphadenopathy is common.² Hepatic dysfunction with elevated transaminase level occurred in 77% of patients.³

In children, rickettsioses were often missed or misdiagnosed as enteric fever as a result of non-classical textbook presentations. Scrub typhus is a rural disease and characterized by fever, tachypnoea and hepatosplenomegaly. Skin rash was rare and eschar was absent in a large case series of 28 paediatric patients in tropical countries.⁴ Complications include severe meningoencephalitis and interstitial pneumonitis.⁵ The case fatality rate in untreated patients may be as high as 7%. Severe rickettsial infections are associated with delays in diagnosis and treatment.⁶ No single laboratory test can fully establish an early diagnosis.⁷ The diagnosis is clinical because no specific serology is available in Hong Kong. Only about 50% of patients with scrub typhus develop Weil-Felix (OX K) agglutinin. Thus, Weil-Felix test can only provide supportive evidence towards the diagnosis. Treatment should be started for a patient with clinically suspect illness while waiting for laboratory results. Therapy includes doxycycline and chloramphenicol.

Tetracycline and doxycycline-treated patients appear to have better outcome than chloramphenicol-treated patients.⁸ Data suggested that 3-day doxycycline therapy is as effective as conventional 7-day tetracycline therapy for the cure of scrub typhus and the prevention of relapses.⁹ On the other hand, the use of tetracycline agents has been discouraged in paediatric patients in fear of the potential for tooth discoloration. However, such an abnormality is cumulative and dose dependent. A short course of doxycycline or tetracycline is unlikely to cause tooth discoloration.

Protective clothing and insect repellent are useful modes of prevention of scrub typhus. Vaccines have not proved effective in this condition.

Doxycycline given once weekly appears to be an excellent antibiotic for the prevention of scrub typhus among personnel exposed to high risk of infection with *O. tsutsugamushi*.¹⁰

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