

Purpura Fulminans Secondary to Indian Tick Typhus of Spotted Fever Group of Rickettsial Infections: A Case Report

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Abstract:

Rickettsia is a group of vector-borne organisms that beget acute febrile illnesses throughout the world. While the clinical presentation of rickettsial infection is analogous, the causative species and epidemiology can vary depending upon the region. Purpura fulminans (PF) is a rare pattern of intravascular thrombosis and haemorrhagic infarction of the skin that is fleetly progressive and is accompanied by vascular collapse and disseminated intravascular coagulation. We report a case of 11 month old male child presented with high grade fever and necrotic skin lesion over lower limbs. The child was diagnosed with acute contagious PF secondary to Indian tick typhus of spotted fever group of rickettsial infections. Underdiagnosed and misdiagnosed rickettsial infections are an important public health problem leading to an increased morbidity and mortality in cases with PF.

Key words: Rickettsial infections, Purpura fulminans, Weil felix test, Indian tick typhus

Introduction:

Rickettsia is a group of vector-borne organisms that beget acute febrile illnesses throughout the world.[1] While the clinical presentation of rickettsial infection is similar, the causative species and epidemiology can vary depending on the region. It is important to recognize both the typical symptoms and the epidemiology of a given region to rightly diagnose and treat these infections, as they can be associated with significant morbidity and mortality.[2] Rickettsial infections are caused by a variety of obligate intracellular bacteria in the genus *Rickettsia* and are grouped into one of four categories: spotted fever group, typhus group, ancestral group, and transitional group.[3] *Rickettsia rickettsii* causes Rocky Mountain spotted fever, the most severe and utmost well-known of the rickettsial infections in North America.[4] Still, it's important to identify that other species are common in other regions of the world, including *Rickettsia africae*, the cause of African tick bite fever in sub-Saharan Africa, and

Rickettsia conorii that causes Mediterranean spotted fever in Europe and North Africa. *Rickettsia prowazekii* and *Rickettsia typhi* are presented as typhus syndromes. Experimenters continue to discover new species of *Rickettsia* as molecular ways advance.[5]

Purpura fulminans (PF) is a rare pattern of intravascular thrombosis and haemorrhagic infarction of the skin that is fleetly progressive and is accompanied by vascular collapse and disseminated intravascular coagulation.[6] Three types can be identified: Inherited abnormalities of the coagulation system, acute contagious, and idiopathic.[7] Rickettsial infections are a rare cause of PF. In developing countries such as India, the simple, provident Weil–Felix test (WFT) as an initial investigation can guide the clinician in diagnosing and applying appropriate treatment.[8] We describe a case of PF secondary to rickettsial infection, and the importance of WFT in timely diagnosis of this often-fatal condition.

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ISSN No. : (p) 2348-523X, (o) 2454-1982

DOI: 10.46858/vimshsj.9404

Date of Published : 30th January 2023

Case Report:

A 11 month old male child visited our hospital for high grade fever of 8 days duration associated with a skin rash, which started three days after the onset of fever. Child had a history of tick bite after which fever started. The rash was erythematous initially, started over the back and progressed rapidly to involve the lower limbs which were identified as purpura.(Fig 1) The purpura soon became necrotic and develop ulcer with some haemorrhagic blebs. Macular erythema was seen over the trunk (Fig 2), palms, and soles. Measles, Dengue, and Chickenpox rashes were ruled out. Other causes of fever were also ruled out. There was no history of any other associated disorder, no family history bleeding diathesis. Child was well nourished and developmental history was normal. Child did not receive any single vaccine since birth. Child did not receive any treatment before the admission. According to the modified Kuppaswamy scale, child's family belonged to lower class. Child's anthropometry was within normal limits. On admission child had fever of 1010F, tachycardia with hypotension, normal respiratory rate, oxygen saturation was normal. Head to toe examination, other than the rashes, was normal. Systemic examination was also within normal limits. So, the provisional diagnosis was Exanthematous fever under investigation, mostly Rickettsial disease. On investigation, complete blood count revealed dimorphic anaemia with neutrophilic leukocytosis, thrombocytopenia, and an elevated erythrocyte sedimentation rate (ESR). C reactive protein was raised. Liver and renal function tests, Serum electrolytes were within normal limits. Fever profile was normal, except the Weil Felix Test (WFT) which was positive for Ox-19 antigen. Blood culture was negative. Coagulation profile showed elevated prothrombin time and partial thromboplastin time. Chest X ray was normal. The child was diagnosed with acute infectious PF secondary to Indian tick typhus of spotted fever group of rickettsial infections. IV antibiotics (Meropenem and Colistin) were given for 10 days along with oral Doxycycline. Fresh

frozen plasma was transfused. IV vitamin K was given for 5 days. Blood transfusion was given in view of anaemia. Mupirocin ointment was applied over ulcerative lesions. The patient's general condition improved and were referred to plastic surgeon for the management of the extensive loss of tissue.



Fig. 1: Purpura Fulminans over lower limb & buttock



Fig. 2: Macular rash over abdomen

Discussion:

Rickettsia preferentially affects the vascular endothelial cells lining the small and medium vessels throughout the body, causing the systemic symptoms and more mortality seen with these infections. The infection of endothelial cells leads to propagated inflammation, loss of wall function, and altered vascular permeability throughout the body.[9] Mortality can take place in severe cases of infection. The mechanisms involved in the rapid entry of the organism into the cell and the downregulation of immune pathways allowing for continuation of infection are being studied to identify new therapeutic targets.

PF is a life-menacing condition characterized by unforeseen progressive cutaneous haemorrhage and necrosis.[10] Three forms have been classified: neonatal, idiopathic, and acute contagious.[6]

Idiopathic or postinfectious PF characteristically occurs one to three weeks after an acute contagious process. The condition is more common in young children, and varicella and streptococcal infections are the most common antecedents. After appearing to recover from an otherwise uncomplicated childhood illnesses, cases suddenly develop expansive areas of purpura, chiefly affecting the buttocks and lower limbs. The complaints may progress fleetly to beget expansive areas of skin necrosis and gangrene of the limbs or digits. Thromboembolic complications may occur later. The pathogenesis involves acute flash drop in protein C, protein S, or antithrombin III levels.[6]

Rickettsial infections have been sometimes associated with it. Among the rickettsiae, *R. conorii*, *R. rickettsii*, and *R. australis* have produced fatal PF. Indian tick typhus has been described as an etiological factor for PF from different regions of India. Scrub typhus has been infrequently associated with it.[11] The rickettsial rash is generally macular, maculopapular, petechial, or palpable purpura resembling vasculitis, and typically involves the palms and soles. A classic trio of fever, rash, and history of tick exposure is frequently cited.[12]

The rickettsial group of infections [13]

Group	Disease	Vector	Host	Organism
Spotted fever	Rocky mountain spotted fever	Tick	Dogs, rodents	<i>Rickettsia rickettsiae</i>
	Rickettsial pox	Mite	Mice	<i>Rickettsia akari</i>
	Indian tick typhus/ Boutonneuse fever/ Mediterranean spotted fever	Tick	Dogs, rodents	<i>Rickettsia conorii</i>
Typhus	Epidemic louse - borne typhus	Louse	Human	<i>Rickettsia prowazekii</i>
	Brill-Zinsser disease	Louse	Human	<i>Rickettsia prowazekii</i>
	Endemic/murine flea borne typhus	Flea	Rats	<i>Rickettsia typhi</i>
Scrub Typhus	Scrub Typhus	Chigger	Rodents	<i>Orientia tsutsugamushi</i>

Presently, utmost rickettsial infections are diagnosed mainly on serologic response, like IgG and IgM to R.

rickettsiae, associated with a high degree of clinical suspicion. While rickettsia can be cultivated in a microbiology laboratory, this approach isn't frequently used to diagnose clinically because the technique is difficult and requires a high level of biosafety containment due to the risk of exposure. Other options to diagnose include molecular tests, such as PCR, in some centers and biopsy of skin. In addition to suggestive or positive serologic tests, cases with rickettsial infections can have thrombocytopenia, hyponatremia, and cerebrospinal fluid pleocytosis. On testing peripheral white blood cell count, it is important to note that this can be elevated, normal, or low and hence may not help us to rule out rickettsial infection. There's high morbidity and mortality associated with rickettsial infection and the serological testing can be negative in early course of illness. Negative tests should not preclude treatment if the clinical suspicion for rickettsial infection is high.[14]

Doxycycline is provident and the medicine of choice for all rickettsial infections in cases of all ages, even during gestation. It was introduced at a dose of 2.2 mg/kg b.d. for a duration of 10 days. Doxycycline is the medicine of choice for Spotted Fever Group (SFG) rickettsiosis, the other medicines generally used are chloramphenicol, macrolides. Susceptibility to antibiotics doesn't vary much among the various species and hence exact species identification isn't essential.[15]

Conclusion:

The key to rickettsial infections is preventing them. Prevention relies on avoiding exposure to tick and flea bitings, particularly while staying in or traveling to endemic areas. Careful examination for insects after outdoor activities and the use of long-sleeved apparel and insect repellent are advised to minimize the rickettsial infections. Underdiagnosed and misdiagnosed rickettsial infections are an important public health problem leading to an increased morbidity and mortality in cases with PF. This case report highlights that there may be more prevalence of rickettsial infections and it should be considered in etiological workup of purpura fulminans.

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