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Rickettsia rickettsii infection as an unusual cause of pediatric retinitis: A case report

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ABSTRACT

Purpose: To report a case of infectious pediatric retinitis attributed to Rocky Mountain spotted fever which is rarely reported in the United States.

Observations: A previously healthy 14-year-old male return traveler from Mexico was admitted to the pediatric ICU with septic shock and a diffuse rash. He subsequently complained of blurry vision and was found to have evidence of retinitis on exam. Infectious workup revealed high titers of rickettsial IgM and IgG antibodies. He was treated successfully with 14 days doxycycline and followed up in clinic with improvement in his visual complaints and retinitis.

Conclusions and importance: Rickettsioses are worldwide endemic zoonotic infections caused by Gram negative obligate intracellular bacteria and spread to humans by infected ticks. Rickettsial infections, including Rocky Mountain spotted fever caused by *Rickettsia rickettsii,* are a cause of infectious retinitis, and atypical and zoonotic infections should remain on the differential diagnosis for patients presenting with rash, systemic illness, and visual complaints, even if the patient's travel or exposure history do not immediately suggest a likely rickettsial infection. In general, the ocular manifestations of rickettsial infection improve with systemic doxycycline treatment of the underlying infection.

1. Introduction

The rickettsioses represent a family of arthropod-transmitted diseases caused by the *Rickettsia* genus of Gram-negative obligate intracellular coccobacilli. Rickettsial disease is found worldwide and usually transmitted to humans by the bite of infected ticks. Epidemiologically, the Centers for Disease Control and Prevention (CDC) categorizes Rocky Mountain Spotted Fever (RMSF), caused by *Rickettsia rickettsii,* with closely related illnesses caused by *Rickettsia parkeri,* and *Rickettsia* species 364D; approximately 5500 cases were reported in the United States in 2018.[1] The incidence is greatest in Arkansas, Missouri, North Carolina, Oklahoma, and Tennessee, with cases peaking in the summer months, coinciding with the activity of the *Dermacentor* tick vector.[1,2] The *Rhipicephalus* tick is another rickettsial vector, harboring *Rickettsia rickettsii* and *Rickettsia coronii* (the pathogen responsible for Mediterranean spotted fever).[1] RMSF is also found in Central and South America, transmitted by various tick species.[2] In North America, rickettsial infection most often causes acute febrile illness associated with diffuse rash and varying degrees of organ dysfunction.[2] Here we report a single case of pediatric retinitis attributed to rickettsial infection at an academic medical center in Arizona, USA.

2. Case report

A previously healthy 14-year-old male who was up-to-date on immunizations presented to the emergency department with 5 days of worsening rash, fevers, malaise, nausea/vomiting, and diarrhea. He had recently returned from travel to Mexico and denied exposure to stray dogs, insects, or history of tick bites. On initial exam, patient was febrile, tachycardic, tachypneic, and hypotensive with decreased level of consciousness. He had a diffuse petechial non-blanching rash including the palms and soles (Fig. 1) as well as bilateral conjunctival injection and periorbital edema. Laboratory evaluation was remarkable for profound thrombocytopenia, hyponatremia, decreased renal function, and anion-gap metabolic acidosis. He was intubated, started on broad-spectrum antibiotics including doxycycline, and admitted to the pediatric ICU.

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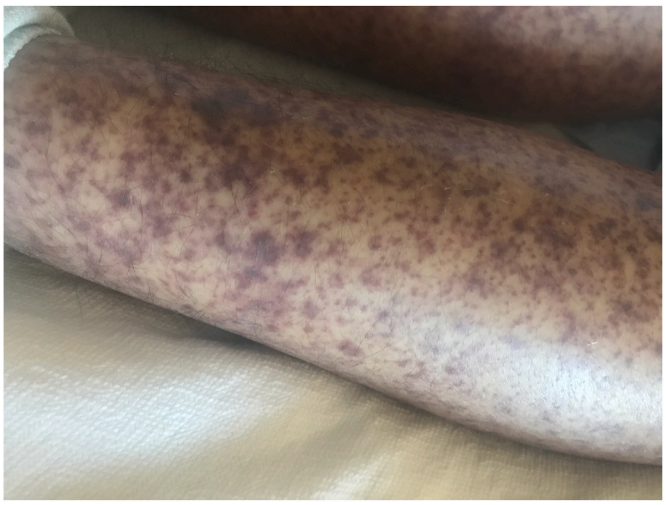

Fig. 1. Diffuse nonblanching petechial rash.

Infectious workup demonstrated positive rickettsial serology with IgM = 1:128 (laboratory reference range <1:64) but negative IgG serology, with remaining comprehensive bacterial and viral workup negative. The patient's hemodynamics continued to improve, and he was extubated and transferred out of the ICU after 4 days.

As patient's mentation improved, he complained of right greater than left eye blurry vision not relieved by wearing his glasses. Ophthalmology was consulted, and BCVA measured at 20/30 + 2 OD, 20/20 OS, with IOP, pupils, confrontational field testing, and motility all within normal limits. On slit lamp exam, he had mild trichiasis and subconjunctival hemorrhage OD as well as punctate epithelial erosions OU. Dilated fundus exam demonstrated a 1-disc diameter discrete, raised white lesion superior to the macula OD with small discrete raised white lesions superotemporally and superonasally OD. On the contralateral side, there were small discrete white raised lesions superior and inferior to the optic disc and superiorly in the periphery with scant dot-blot hemorrhage OS (Fig. 2). His presentation was consistent with rickettsial retinitis. His vision loss was attributed to surface disease in setting of trichiasis and corneal irritation which resolved with artificial tears.

The remainder of his hospital course was remarkable for a small pericardial effusion and persistent anemia and thrombocytopenia requiring blood transfusion. He was discharged to home after a 2 week hospital course and completion of 14 days doxycycline. By the time of discharge 2 weeks after admission, his serology reflected rickettsial IgM >1:256 (reference range <1:64) and IgG >1:256 (reference range <1:64), consistent with an acute rickettsial infection which had seroconverted from IgG negative to IgG strongly positive. He followed up with ophthalmology 2 weeks post-discharge and had no visual complaints. On exam, his vision was 20/20 OU, with interval improvement of his retinitis OU. Fundus photos were taken demonstrating resolving white retinal lesions (Fig. 3). He was subsequently lost to ophthalmology follow-up.

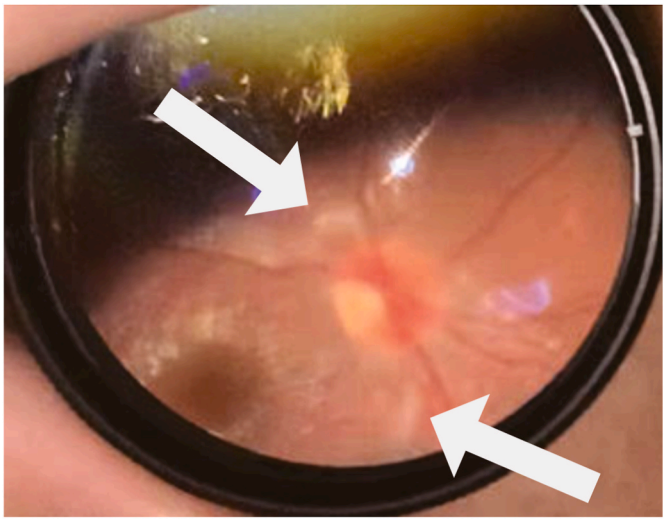

Fig. 2. Bedside photo fundus exam showing OS discrete raised white lesions superior and inferior to optic disc on initial inpatient evaluation (white arrows).

3. Discussion

We report here a case of pediatric infectious retinitis attributed to rickettsial infection in the Southwestern United States which resolved following doxycycline therapy. Pathophysiologically, *Rickettsia* cause a systemic small vessel vasculitis by multiplying in capillary and lymphatic endothelium and can be broadly classified as spotted fevers or typhus-type illnesses.[2] Rickettsial spotted fever patients often present with a systemic illness including high fever, rash, myalgias, and severe malaise 2–14 days following a tick bite. Patients frequently do not notice or report an antecedent tick bite prior to illness onset.[2] Laboratory abnormalities include significant hyponatremia and thrombocytopenia; however, rickettsial antibody titers generally become positive after 7–10 days of illness, often after the patient has sought medical care.[2] Ocular manifestations such as conjunctival injection (33% of RMSF cases) are frequent though often do not require specific additional treatment beyond systemic doxycycline.[2,3] Symptomatic retinitis, often accompanied by vitritis, is occasionally reported in Mediterranean spotted fever (MSF) caused by *Rickettsia coronii*, and asymptomatic retinochoroidal involvement (80% of examined MSF patients) may be even more common.[4] Other retinal findings may include serous retinal detachment.[5] Retinal vascular lesions such as vascular occlusions, subretinal hemorrhage, and tortuous retinal veins have also been reported in rickettsial spotted fevers.[3,6] Anterior uveitis has also been reported in MSF.[7] In one reported case, rickettsial retinitis worsened in response to a steroid trial, then subsequently improved following doxycycline treatment, suggesting that rickettsial retinitis represents true bacterial infiltration rather than a systemic immune response.[8]

Typhus illnesses caused by *Rickettsia* include epidemic typhus (*Rickettsia prowazekii*), endemic/murine typhus (*Rickettsia typhi*), and scrub typhus (*Orientia tsutsugamushi*, no longer classified in genus *Rickettsia*). These illnesses are rare in North America and no longer require national notification to the CDC. Although ocular manifestations of rickettsial typhus illnesses are less frequently reported, optic neuropathy, vitritis, and multiple white retinal lesions have been described in endemic typhus.[9,10]

4. Conclusions

In summary, we report here a rare case of severe pediatric rickettsial spotted fever in the southwestern United States associated with vision changes and evidence of vitritis and retinitis on dilated fundus exam. This case mirrors other cases of rickettsial spotted fevers associated with ocular findings: acute onset of systemic febrile illness including mild visual complaints and retinitis, which resolved following a course of doxycycline. No specific additional treatment was required for the rickettsial retinitis, beyond doxycycline for the systemic rickettsial infection. Prognosis is excellent when doxycycline is initiated within 5 days of fever onset. This case demonstrates the importance of formulating a broad differential diagnosis and retaining a high index of clinical suspicion for atypical zoonotic infection in the appropriate clinical context, even in the absence of a known tick exposure or travel to endemic areas. Moreover, delays in results for esoteric testing often necessitate empiric therapy in the case of rickettsial infection. Thus, a

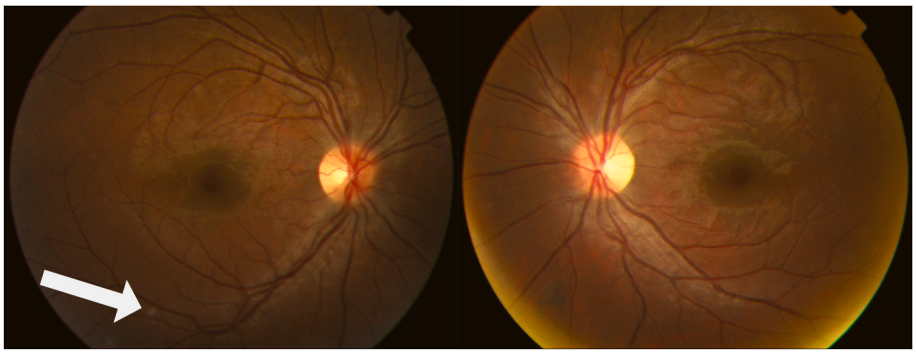

Fig. 3. 2-week hospital follow-up fundus photos demonstrate interval improvement in size and number of white retinal lesions (white arrows).

high index of suspicion, careful history and exam, and, for patients with visual complaints, ophthalmology referral, are critical in the diagnosis and management of rickettsial spotted fevers.

Patient consent

Patient and guardian consent were not obtained for submission of this case report. No personal identifying information was included that could lead to identification of the patient.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Declaration of competing interest

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