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Suspected Tick-Borne Febrile Illness Following Rural Livestock in Central Saudi Arabia: A Case Report

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Patient: Male, 55-year-old
Final Diagnosis: Possible arthropod-borne or rickettsial disease
Symptoms: Fever • rash
Clinical Procedure: —
Specialty: Infectious Diseases • General and Internal Medicine

Objective: Rare disease

Background: Tick-borne infections are underrecognized causes of acute febrile illness in the Middle East, including rickettsial spotted fever and tick-borne relapsing fever. Rickettsial fever commonly presents with fever, headache, and an eschar, while relapsing fever is characterized by recurrent fever episodes. Despite documented cases in Saudi Arabia and Middle Eastern countries, these infections remain underdiagnosed due to nonspecific presentations, limited diagnostic capacity, and low clinical suspicion.

Case Report: A 55-year-old Saudi man presented to the emergency department of King Abdulaziz Medical City, Riyadh, with a history of 2 weeks of intermittent fever and a recently noticed rash. His past medical history included diabetes mellitus type 2 and depression. He was an active smoker with no known drug allergies. He reported intermittent fever and rash following a reported tick bite on the left great toe 2 weeks earlier while he was visiting his camels in a rural area. Examination revealed an erythematous nodule with a central necrotic eschar on the toe and a generalized maculopapular rash. Laboratory investigations were unremarkable except for mildly elevated inflammatory markers. Serologic tests for common viral and bacterial febrile illnesses were negative. Given the suspicion of rickettsial or relapsing fever, we initiated empirical doxycycline and ciprofloxacin. Following significant clinical improvement, he was discharged on doxycycline.

Conclusions: This case highlights the need to consider tick-borne febrile illness in patients with compatible exposure history, rash, and eschar-like lesions. It also illustrates the diagnostic challenges that arise when confirmatory testing is unavailable. Empiric doxycycline may be appropriate when the clinical presentation is compatible and testing is limited.

Keywords: Case Reports • Doxycycline • Relapsing Fever • Rickettsia Infections • Saudi Arabia • Tick-Borne Diseases

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Introduction

Tick-borne infections, although overlooked, are frequently important vectors of acute febrile illness in the Middle East. These infections, such as rickettsial spotted fever and tick-borne relapsing fever, have been identified and documented in Saudi Arabia and other Middle East countries, but continue to be underdiagnosed due to limited diagnostic capacity in some areas, nonspecific clinical presentations, and low clinical suspicion [1]. The Arabian region has various tick vectors, including hard ticks of the genus *Rhipicephalus* and soft ticks of the genus *Ornithodoros*, which transmit spotted fever group rickettsiae and relapsing fever borreliae, respectively [1,2].

Rickettsial infections typically present with fever, headache, and a unique maculopapular rash often accompanied by an eschar (tache noire) at the site of the bite [2]. On the other hand, tick-borne relapsing fever presents as recurrent, cyclical febrile episodes, and rash may occur in a minority of cases [3]. While etiologically distinct, both conditions usually respond dramatically to doxycycline when started early, highlighting the importance of rapid clinical recognition [3].

Rural exposure, particularly in livestock-associated settings, increases the risk of tick exposure and tick-borne infections. We present a case of undifferentiated febrile illness after rural livestock exposure in a middle-aged man in central Saudi Arabia, discussing the clinical features, diagnostic approach, and therapeutic response of these infections in the region.

This case report illustrates a suspected tick-borne febrile illness with overlapping clinical features that complicated the differential diagnosis. It also highlights the challenges of limited confirmatory testing and the role of early empiric management in Saudi Arabia.

Case Report

A 55-year-old Saudi man presented to the emergency department of King Abdulaziz Medical City, Riyadh, with a history of 2 weeks of intermittent fever and a recently noticed rash. His past medical history included diabetes mellitus type 2 (HbA1c 6.3%, on metformin 1000 mg twice daily) and depression (treated with citalopram 20 mg daily and quetiapine 200 mg nightly). He was an active smoker with no known drug allergies.

Two weeks before his presentation, he visited his camels in the Sahban area, which is located around 300 kilometers from Riyadh. During his visit and while caring for his camels, he sustained what he reported to be a tick bite on his left great toe. He subsequently developed a fever that initially responded to acetaminophen. The patient sought care at a private hospital, where he was prescribed antibiotics, topical agents, and



Figure 1. Clinical photograph of the distal foot/toe region demonstrating a localized ulcerative lesion with surrounding erythema, discoloration, and skin desquamation.



Figure 2. Close-up clinical photograph of the distal foot and toe region demonstrating a localized ulcerative lesion with surrounding erythema and skin maceration and desquamation.

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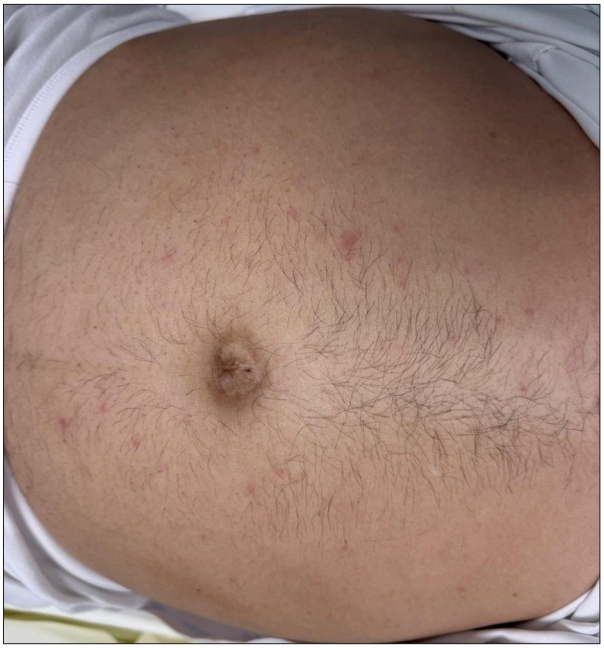


Figure 3. Clinical photograph of the anterior abdominal wall demonstrating scattered erythematous skin lesions.

antipyretics, and experienced partial improvement. During the same visit, he had an incision and drainage procedure for his foot lesion. He later attended another private clinic for wound care and additional topical therapy, but the lesion did not improve. He denied a history of upper respiratory symptoms, gastrointestinal symptoms, chest pain, dyspnea, similar symptoms in the past, neurological deficits, new medications, or sick contact. He could not remember a prior varicella infection.

On examination, the patient appeared well. His temperature was 39.3 °C; other vital signs were stable, with a heart rate of 65 beats/min, blood pressure of 130/71 mm Hg, respiratory rate of 20 breaths/min, and oxygen saturation of 97% on room air. Cardiovascular and respiratory examinations were unremarkable. The abdomen was soft, lax, and without tenderness or organomegaly. Examination of the left lower extremity revealed erythema extending from the foot to the ankle, associated with swelling and tenderness. In addition, a single well-defined erythematous nodule with central crusts over the great toe (the presumed bite site) was noted (**Figures 1, 2**). A diffuse maculopapular rash was noted on the trunk (**Figure 3**) and on both upper and lower extremities (**Figures 4, 5**). The lesions were non-pruritic and included scattered red macules, papules, and 1 vesicle. A pustule was present on the right thigh. The patient had not noticed the rash until it was uncovered during examination. There was no joint swelling or tenderness, and the neurological examination was normal.

Laboratory investigations showed normal electrolytes, elevated inflammatory markers (C-reactive protein level of 73.80 mg/L,



Figure 4. Clinical photograph of the lower limb and ankle region showing the involved lower limb and ankle area with surrounding skin changes.



Figure 5. Clinical photograph of both lower limbs and ankle and foot regions showing bilateral lower limb skin changes with a visible lesion over the distal foot and toe region.

rising to 115.30 mg/L on repeated testing), and mildly elevated liver enzymes (alanine aminotransferase, 48 U/L; aspartate aminotransferase, 53 U/L; gamma-glutamyl transferase, 223 U/L; alkaline phosphatase, 212 U/L). There was no leukocytosis (white blood cell count, 9.48 × 10/L) with normal hemoglobin level (137 g/L) and platelet count (299 × 10/L). The procalcitonin level was 0.25 ng/mL. Renal function was preserved (creatinine, 60 µmol/L; estimated glomerular filtration rate, 129 mL/min/1.73m²). A random glucose level was elevated at 16.2 mmol/L, but it was consistent with his diabetes. Troponin I was very mildly elevated at 44.7 ng/L, without cardiac symptoms or electrocardiogram changes.

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Serologic testing for syphilis, brucellosis (*Brucella abortus* and *B. melitensis* titers < 1: 160), and malaria was negative. Varicella-zoster virus (VZV) IgM was negative, although IgG was positive (115.70), suggesting either prior exposure or vaccination. Herpes simplex virus (HSV) type 1 IgG was positive, but HSV-2 IgG was negative. Polymerase chain reaction (PCR) testing for HSV-1, HSV-2, and VZV from lesions was not detected. Epstein-Barr virus serology revealed findings suggesting past infection (IgM, 10.00; IgG, 154.00; EBNA-IgG, 281.00). Hepatitis B and C serologies were nonreactive, with evidence of hepatitis B vaccination (anti-HBs > 1000). HIV antigen/antibody testing was negative. Tuberculosis workup, including acid-fast bacilli smear, was also negative. Peripheral blood smear for malaria was negative. Babesiosis was not specifically tested for as it has low epidemiological risk and testing is not available. The patient did not have asplenia, immunosuppression, or travel history, reducing the risk for it.

Radiographic imaging of the left foot and ankle showed normal bone density and joint structure with no acute fracture or dislocation. Mild soft tissue swelling over the medial malleolus was noted along with an inferior calcaneal spur and evidence of a prior injury to the fifth proximal interphalangeal joint. Chest radiography showed no acute changes.

A skin biopsy was obtained during hospitalization from the disseminated rash and specifically from the right forearm. Histopathology showed a focal caseating granulomatous reaction with associated vasculitis. Pathologists commented that these findings are most consistent with rickettsial spotted fever and brucellosis. Brucellosis, however, was excluded based on the earlier-mentioned serologic testing.

The patient was admitted with a working diagnosis of tick-borne febrile illness. The general surgery team evaluated the foot lesion and recommended medical management without surgical debridement. The infectious disease and dermatology teams were consulted and had an impression of a possible arthropod-borne or rickettsial disease. Upon admission, empiric therapy with doxycycline 100 mg twice daily and intravenous ciprofloxacin 400 mg 3 times daily was initiated. The patient showed marked clinical improvement within 72 hours, with resolution of systemic symptoms. Infection control was notified, and it was decided that National Ministry of Health reporting was not necessary.

He was discharged home in stable condition, with the rash still apparent after 3 days of inpatient therapy. Discharge medications included doxycycline hyclate 100 mg twice daily for an additional 7 days, along with his home medications (atorvastatin 20 mg daily, metformin 1000 mg twice daily, citalopram 20 mg daily, and quetiapine 200 mg nightly). At a primary care visit 1 month after discharge, the rash had resolved. He was scheduled for follow-up in the infectious disease outpatient clinic 1 week after discharge, but he did not show up. Till the time of manuscript preparation, the patient had not re-presented to our hospital with recurrent symptoms.

Discussion

This case reflects several features of suspected tick-borne illness in Saudi Arabia: reported rural livestock exposure, acute febrile illness, maculopapular rash, limited confirmatory testing, and clinical improvement after empiric antimicrobial therapy. The clinical presentation shows a case of suspected tick-borne febrile illness, with rickettsial infection favored but unconfirmed. Tick-borne relapsing fever is another possible differential diagnosis. Rickettsial infections have been documented in Saudi Arabian case reports [4,5]. Relapsing fever has also been reported in Saudi Arabia, but the cited report does not establish local tick-borne transmission [6].

As mentioned earlier, rickettsial spotted fever typically presents with the triad of fever, headache, and rash, often with an eschar marking the site of tick attachment [2]. The maculopapular rash in our patient, along with the localized lesion at the assumed bite site, raises suspicion for a rickettsial etiology. However, serological testing was not done to confirm the diagnosis. There are case reports from Saudi Arabia that have described similar presentations in patients with confirmed rickettsial spotted fever group infections, such as an elderly man with fever, purpuric maculopapular rash, and eschar who responded dramatically to oral doxycycline [4]. Another young Saudi patient developed fever, headache, maculopapular rash, and an eschar after a tick bite, with serologic confirmation of acute rickettsial spotted fever group infection and quick improvement on doxycycline [5]. In addition, pediatric cases from Iran have documented fever, rash, and black eschar successfully treated with doxycycline after confirmation of *Rickettsia conorii* subspecies *israelensis* [7].

Alternatively, another possible differential diagnosis is tick-borne relapsing fever, especially considering the patient's rural exposure and the presence of competent soft tick vectors in Saudi Arabia [1,3]. Relapsing fever classically presents with recurrent febrile episodes, although rash has been reported in a minority of cases [8]. While our patient did not report clear documented cyclical fevers, the intermittent nature of his symptoms and partial response to initial antibiotics could be suggestive of this diagnosis. Diagnosis of relapsing fever is confirmed by demonstration of *Borrelia* spirochetes in peripheral blood smears during febrile episodes, which was not performed in this case [3].

By showing focal caseating granulomatous reaction with associated vasculitis, the skin biopsy favored rickettsial spotted fever according to pathologists. The overall histopathological pattern favored a rickettsial etiology, particularly given the prominent

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vasculitic component, which is compatible with the vascular tropism characteristic of rickettsia. However, the caseating granulomatous component is atypical and is not specific for rickettsial infection, warranting consideration and exclusion of alternative infectious etiologies, particularly mycobacterial and fungal infections. No organism was identified on histopathological examination. Therefore, the histopathological findings should be interpreted as supportive of, but not diagnostic for, rickettsial infection, and they correlated with the clinical presentation and microbiological investigation. Moreover, this does not exclude relapsing fever as a possible diagnosis, since it is a clinical and microbiological diagnosis with no role for biopsy in the diagnosis [3]. Also, a blood smear for relapsing fever was not performed.

The tick bite rash in our patient did not meet the characteristic eschar rash of rickettsial spotted fever or relapsing fever rash. This might be explained by the reported history that an incision and drainage were performed 2 weeks earlier on the presumed bite site, possibly altering the appearance of the rash and making it more challenging to recognize.

The diagnostic workup in our patient excluded several important differential diagnoses. Brucellosis, which is a common zoonosis in Saudi Arabia associated with livestock exposure and raw milk ingestion, was ruled out by negative serology. Viral exanthems, including VZV, HSV, and Epstein-Barr virus, were excluded by serologic and molecular testing. Even though it was unlikely because it is rare in central Saudi Arabia, malaria was also appropriately excluded. The absence of specific diagnostic confirmation for rickettsial or relapsing fever infections reflects a common challenge in the region, where specialized testing such as indirect immunofluorescence antibody assays and PCR for rickettsiae or blood smear examination for spirochetes may not be readily available [1].

The decision to initiate empiric doxycycline therapy was appropriate and potentially life-saving. Doxycycline is the first-line treatment for rickettsial infections and relapsing fever, and early initiation in compatible presentations improves outcomes and prevents severe complications [3]. A similar approach was described by Dey et al, who administered doxycycline empirically in a patient with clinically suspected Rocky Mountain spotted fever before definitive laboratory confirmation, with subsequent clinical improvement. Their report further illustrates that treatment may need to be initiated on clinical grounds because serologic testing can be negative early in the course of illness [9]. The significant clinical response observed in our patient within 72 hours might be seen in both rickettsiosis and relapsing fever. This pattern of rapid improvement has been repeatedly found in regional case series of spotted fever treated with doxycycline [4,5,7]. However, given the concurrent ciprofloxacin use and absent microbiologic confirmation, it cannot be solely attributed to doxycycline-responsive arthropod-borne infection.

The epidemiologic factor in these infections is still understudied in Saudi Arabia. Rural exposure, particularly in areas with livestock, increases the risk of tick bites [3]. The presence of hard and soft tick vectors in rural areas of the Kingdom is well documented [1]. Also, serosurveys in Oman have demonstrated evidence of rickettsial exposure among rural populations, implying that these infections are more common than case reports would suggest [1]. Underrecognition likely reflects a combination of nonspecific clinical presentations, limited diagnostic availability, and low clinical suspicion [1]. Because this case report describes a single patient and the tick exposure was never verified, nothing here supports a conclusion that camels specifically transmit these pathogens, that a particular tick species was responsible, or that camels form a separate epidemiologic risk category. Time spent around camels should be read only as a part of the rural livestock setting in which the illness occurred.

Limitations

This case had several limitations. First, the absence of specific microbiologic confirmation prevents definitive etiologic diagnosis. Neither acute nor convalescent sera for rickettsial serology were not obtained. Also, blood smear examination for spirochetes was not performed during the febrile period. Finally, the addition of ciprofloxacin to doxycycline makes it difficult to attribute the clinical response solely to doxycycline, though it was reasonable for empiric coverage of cellulitis.

Despite these limitations, this case emphasizes the importance of maintaining a high index of suspicion for Tick-borne diseases in patients presenting with fever and rash following rural exposure in Saudi Arabia. Clinicians should be familiar with the clinical features of rickettsial spotted fever and relapsing fever, and they should not hesitate to start empiric doxycycline therapy when these diagnoses are suspected, even in the absence of confirmatory testing.

Conclusions

This case highlights that suspected tick-borne febrile illness should be considered in patients with compatible exposure history, rash, and eschar-like lesions, the diagnostic challenges in the absence of confirmatory testing, and that empiric doxycycline may be appropriate when confirmatory testing is limited.

Department and Institution Where Work Was Done

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Patient Permission/Consent Declaration

Written informed consent was obtained from the patient for publication of this case report and accompanying clinical images.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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