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# Rat-Bite Fever in a Guatemalan Child: A Case Report

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## Abstract

**Background**: Rat-bite fever (RBF) is a rare zoonotic illness caused by *Streptobacillus moniliformis* or *Spirillum minus*, typically transmitted through rodent bites or environmental exposure. It commonly presents with fever and migratory polyarthritis, often mimicking autoimmune or other infectious conditions, which may lead to diagnostic delay. **Case Presentation**: We report the case of a 10-year-old male from Guatemala who presented with acute febrile migratory polyarthritis following exposure to rodents, without a clearly witnessed bite. The Initial presentation included progressive joint pain involving the ankles, knees, and wrists, associated with high-grade fever and impaired ambulation. Physical examination revealed joint tenderness, swelling, and functional limitation, predominantly affecting the lower limbs, without cutaneous manifestations. Laboratory evaluation showed elevated inflammatory markers. Blood cultures were negative. The patient was treated with intravenous penicillin G, resulting in rapid clinical improvement, and was subsequently transitioned to oral doxycycline to complete a 14-day antibiotic course. The clinical diagnosis of rat–bite fever was supported by epidemiological exposure, compatible clinical features, and response to therapy. **Conclusion**: This case underscores the importance of considering rat-bite fever in children presenting with febrile polyarthritis and relevant environmental exposure, particularly in low-resource settings. Early identification and targeted antibiotic therapy can prevent severe complications.

## Keywords

Rat-Bite Fever, *Streptobacillus Moniliformis*, Pediatric Infectious Disease,

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Zoonosis, Polyarthritis, Case Report

## 1. Background

Rat-bite fever (RBF) is a systemic infectious disease caused by two distinct bacteria: Streptobacillus moniliformis, predominantly in North America and Europe, and Spirillum minus, more commonly found in Asia. The disease is transmitted by bites or scratches from rodents or ingestion of food or water contaminated with their secretions. RBF is rarely diagnosed, yet it poses serious complications such as endocarditis, meningitis, and septic arthritis if untreated. Children living in poor hygienic conditions are particularly vulnerable. Awareness and early identification are crucial for appropriate management [1]-[3].

## 2. Case Presentation

A 10-year-old Guatemalan male presented with a 2-day history of polyarthritis and fever. His mother reported that seven days prior, the child felt a painful sensation in his left ring finger after a suspected rat bite (See **Figure 1**). Initial home management included topical alcohol and oral acetaminophen. Two days before presentation, he developed progressively worsening pain in the ankles, knees, and wrists, with fever and difficulty walking. The patient's history reveals close environmental exposure to rodents within the household. Although a rat bite was not directly witnessed, the presence of rodents in the living environment was confirmed by caregivers. No other relevant zoonotic exposure was identified.

**Figure 1.** Clinical appearance of the left ring finger at admission, showing skin lesion after rat bite.

On admission, the child was alert but in significant distress due to joint pain. Physical examination revealed edema, warmth, and tenderness involving multiple joints, most notably the right knee and left foot (See **Figure 2**). Cutaneous examination identified a small healing lesion on the left ring finger (See **Figure 1**). Laboratory evaluation demonstrated leukocytosis with neutrophilia and elevated C-

reactive protein (See Table 1). Blood cultures were sterile after 5 days of incubation.

Figure 2. Edematous and erythematous dorsum of the left foot at admission.

Table 1. Laboratory findings during hospitalization.

| Test | 1 | 2 | 3<br>Normal Values | Interpretation |
|---|---|---|---|---|
| **Microbiology** | Blood culture: No growth (24 h) | Joint fluid culture: *Burkholderia contaminans* (sensitive) | — | Atypical isolate; clinical correlation required |
| **HIV Screening** | Non-reactive | — | — | Negative |
| **WBC (×10³/μL)** | 8.07 | 8.04 | 8.53 - 10.38 | Within normal range |
| **Neutrophils (×10³/μL)** | 5.40 | 3.80 | 5.99 - 6.56 | Relative neutrophilia |
| **Lymphocytes (×10³/μL)** | 1.86 | 2.72 | 1.42 - 2.28 | Normal |
| **Hemoglobin (g/dL)** | 13.2 | 12.9 | 13.2 - 13.9 | Stable |
| **Platelets (×10³/μL)** | 261 | 272 | 383 - 393 | Reactive thrombocytosis (mild) |
| **CRP (mg/dL)** | 3.11 | — | 0.42 - 0.73 | Decreasing inflammatory response |
| **ESR (mm/h)** | 25 | — | 18 - 21 | Mild elevation |
| **Creatinine (mg/dL)** | 0.49 | — | 0.48 | Normal renal function |
| **BUN (mg/dL)** | 6.0 | — | 9.3 | Normal |
| **AST (U/L)** | 34.1 | — | — | Normal |
| **ALT (U/L)** | 24.5 | — | — | Normal |
| **Total bilirubin (mg/dL)** | 0.37 | — | — | Normal |
| **Albumin (g/dL)** | 4.06 | — | — | Normal |
| **Fibrinogen (mg/dL)** | 486 | — | — | Elevated (inflammatory response) |
| **PT (sec)** | 12.8 | — | — | Normal |

**Continued**

| | | | | |
|---|---|---|---|---|
| **aPTT (sec)** | 30.3 | — | — | Normal |
| **INR** | 1.17 | — | — | Normal |
| **Urinalysis** | Normal | — | — | No renal involvement |
| **Protein/Creatinine ratio** | 0.12 | — | — | No nephrotic-range proteinuria |
| **Stool exam** | *Giardia lamblia* cysts (abundant) | — | — | Incidental finding |

Note: **Values are presented as sequential laboratory measurements obtained during hospitalization. Reference ranges are provided when available. Abbreviations: WBC, white blood cells; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; BUN, blood urea nitrogen; AST, aspartate aminotransferase; ALT, alanine aminotransferase; PT, prothrombin time; aPTT, activated partial thromboplastin time; INR, international normalized ratio. The isolation of Burkholderia contaminans was interpreted in the clinical context and considered a contamination.

Arthrocentesis of the affected joint was performed, yielding turbid synovial fluid. Gram staining did not reveal microorganisms. Although a complete synovial fluid cell count was not available, the macroscopic appearance was consistent with an inflammatory process. Synovial fluid cultures required prolonged incubation, consistent with the fastidious growth characteristics of the suspected pathogen, and ultimately yielded *Burkholderia contaminans*. Imaging studies showed no evidence of osseous involvement (See Figure 3 and Figure 4).


Figure 3. Radiograph of the lower limbs showing no osseous abnormalities at admission.

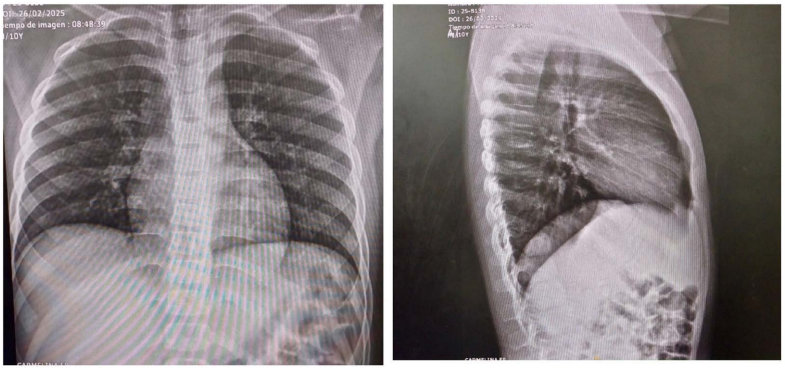

Figure 4. Chest X-ray showing normal cardiopulmonary findings at admission.

Intravenous crystalline penicillin G (2 million IU every 4 hours) was initiated. The patient showed significant clinical improvement within 24 hours (See Figure 5 and Figure 6). After 7 days of IV therapy, he was discharged with oral doxycycline for an additional 7 days. At the 6-week follow-up, the child remained asymptomatic with full joint mobility restored.

Figure 5. Improvement in skin lesion and foot edema after 24 hours of intravenous penicillin G.

Figure 6. Resolved inflammation in the left lower extremity on day 3 of treatment.

## 3. Discussion

Rat bite fever (RBF) is an underrecognized zoonotic infection with heterogeneous clinical manifestations, particularly in pediatric patients, where symptoms such as fever and migratory polyarthritis may mimic autoimmune or viral diseases, leading to diagnostic delay. The disease is primarily caused by *Streptobacillus monil-*

*iformis* in the Americas and Europe, whereas *Spirillum minus* (sodoku) predominates in Asia, reflecting a well-established geographic distribution [1] [2].

In high-income countries, most reported cases originate from North America and Europe, often associated with pet rodents, laboratory exposure, or occupational risk. In these settings, access to advanced microbiological techniques facilitates organism identification and confirmation [1]. Conversely, in Latin America, RBF remains markedly underreported, with only sporadic case reports. This discrepancy likely reflects underdiagnosis rather than a true low incidence, driven by limited laboratory capacity and low clinical suspicion [3].

The diagnosis of RBF remains challenging worldwide due to the fastidious nature of *S. moniliformis*, which requires specific culture conditions and may be inhibited by anticoagulants commonly used in blood culture systems, leading to false-negative results [1]-[3]. In our case, microbiological isolation may have been further limited by the absence of culture under appropriate anaerobic or enriched conditions, which likely contributed to the lack of growth and failure to isolate the organism. These diagnostic limitations are even more pronounced in low and middle-income countries, including Guatemala, where access to specialized microbiological methods is often restricted. Therefore, clinical suspicion based on epidemiological exposure plays a crucial role in diagnosis [4] [5].

In this context, the present case represents a clinically suspected rat – bite fever rather than a microbiologically confirmed infection. Despite negative blood cultures, the diagnosis was supported by the characteristic exposure history, compatible clinical presentation, and favorable response to targeted antimicrobial therapy. Given the known difficulty in isolating S. moniliformis, clinical diagnosis remains essential in such scenarios.

The isolation of *Burkholderia contaminans* from synovial fluid represents an atypical microbiological finding. Given its known association with environmental contamination and the absence of clinical features consistent with infection by this organism, this result was interpreted as most consistent with contamination rather than true coinfection. This interpretation was further supported by the patient's favorable clinical response to therapy directed at rat-bite fever. Similar discrepancies between clinical and microbiological findings have been described, underscoring the importance of clinical judgment in suspected cases [6] [7].

Guatemala and other Latin American countries present environmental and socioeconomic conditions that may facilitate rodent exposure, including urban overcrowding, inadequate sanitation, and close human-animal interaction. Despite these risk factors, published data from Central America remain scarce, highlighting a significant gap in regional surveillance. Given that RBF has historically been associated with poverty and rodent exposure, its true burden in Guatemala is likely underestimated [8].

Clinically, RBF has been classically described with a triad of fever, rash, and migratory polyarthralgia; however, presentations may vary, particularly in children, and cutaneous manifestations may be absent [2]. The case consistently re-

flects a febrile and migratory polyarthritis presentation without cutaneous involvement. If left untreated, RBF can lead to severe complications such as endocarditis, meningitis, and septic shock, with mortality rates reported between 10% and 13% [1]. Early recognition and prompt antibiotic therapy are therefore essential [8]-[10].

The differential diagnosis of febrile polyarthritis in this patient includes septic arthritis due to other bacterial pathogens, reactive arthritis, acute rheumatic fever, viral arthritis, and juvenile idiopathic arthritis. Septic arthritis was considered less likely due to the polyarticular involvement and absence of isolated joint destruction. Reactive arthritis and viral etiologies were considered but deemed less consistent with the clinical severity and systemic findings. Acute rheumatic fever was not supported by the absence of carditis or other Jones criteria, and juvenile idiopathic arthritis was considered unlikely given the acute presentation and rapid response to antimicrobial therapy.

The patient was initially treated with intravenous penicillin G, followed by oral doxycycline, in accordance with established recommendations for the management of rat – bite fever. This therapeutic approach is supported by prior reports and clinical guidelines describing the efficacy of beta - lactam therapy with subsequent oral step–down treatment. Doxycycline was selected as an appropriate oral agent given the patient's age (10 years) and its proven effectiveness against the primary causal agent suspected in this case report [10]-[12].

In resource-limited settings, empirical treatment based on strong clinical suspicion may be lifesaving. RBF should therefore be considered in the differential diagnosis of fever and migratory polyarthritis in pediatric patients, particularly in Latin American settings such as Guatemala, where zoonotic awareness among clinicians is essential to improve early diagnosis and optimize patient outcomes [10]-[12].

## 4. Conclusion

This report underscores the importance of considering rat-bite fever in pediatric patients with polyarthritis and systemic symptoms, particularly following rodent exposure. Prompt antibiotic therapy is essential to prevent severe outcomes. Clinicians in resource-limited settings should maintain awareness of zoonotic infections in children.

## Consent for Publication

Written informed consent was obtained from the patient's guardian for publication of this case report.

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## Conflicts of Interest

The authors declare that they have no competing interests.

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