

Fever in an 8-Month-Old Infant Following a Rat Bite

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Abstract

Rat-bite fever (RBF) is a zoonotic infection caused by Gram-negative microaerophilic *Streptobacillus moniliformis* and *Spirillum minus*. Rat-bite fever predominantly affects the population in areas of poor socioeconomic status. The disease has been reported in high-income countries where rats are commonly kept as pets. The case described below is that of an 8-month-old infant boy who was diagnosed with rat-bite fever.

Keywords: Rat-bite fever in child; Treatment of rat-bite fever arthritis

Introduction

An 8-month-old boy was admitted to the Department of Children's Infectious Diseases of the Medical University of Warsaw in September 2013 with a 3-day-history of fever (up to 39°C) after being bitten while asleep in the right ring finger. A rat was found in the apartment and was suspected to be the source of the bite. The injury to the hand was superficial. Post-exposure prophylaxis for rabies was initiated. Within 5 hours of the first dose of the vaccine, VERORAB, a fever (up to 38.8°C) was reported.

Findings on examination included nasal discharge, a macular and papular rash on the extremities, as well as pharyngeal erythema and lymphadenopathy. Blood examination revealed hemoglobin level of 11.6 g/dl and leukocyte count of $13.5 \times 10^3/\text{mm}^3$ with 64% neutrophils and platelets of 246 G/l. C-reactive protein (CRP) level was 0.28 mg/l ($n < 5.0$). Renal and liver function tests were within normal limits. The infant was discharged home on ibuprofen. Three days later the patient returned and was admitted with non-resolved signs and symptoms including recurring fevers only briefly abated by ibuprofen.

On admission the boy was in a good condition and afebrile. Findings on examination included a transient rubelliform, nonpruritic, macular rash on the upper left and both lower limbs, a laceration on the fourth finger of the right hand, a red macula of 5 mm in diameter on the index finger, palpable cervical, nuchal, submandibular, and axillary lymph nodes, pharyngeal erythema, nasal discharge, the liver and spleen 0.5 cm below the costal margin, and a hydrocele of the right testicle. Diagnostic tests revealed elevated C-reactive protein of up to 18 mg/l; ($n < 10$ mg/l) and anemia (Hgb 10.8 g/dl; RBC 4.13 T/l). Leukocyte count and blood film were comparable to those from the first testing (WBC $10.1 \times 10^3/\text{mm}^3$, neutrocytes 52%, lymphocytes 36%, monocytes 11%, plasmocytes 1%). Chest X-ray was normal. The boy received a second dose of the VERORAB vaccine. The working diagnosis at that time was Coxsackie virus infection. Symptomatic treatment was continued. Over the next few days the child was observed to have fevers (up to 39°C), a new macular and papular rash on the palms and soles, enlargement of the spleen

and liver (increased to 1 to 1.5 cm below the costal margin), loss of appetite, sporadic vomiting, and excessive sleepiness. On day 6, the patient developed both active and passive restrictions in the movement of the right hip joint. At that time a diagnosis of rat-bite fever was made. The diagnostic tests showed a further increase in inflammation markers (CRP 29 mg/l; procalcitonin 0.85 ng/ml). The red blood cell parameters remained unchanged, while an increased neutrophils count and left shift were noted (WBC $10.5 \times 10^3/\text{mm}^3$; band neutrophils 28%, segmented neutrophils 36%, lymphocytes 25%, monocytes 7%, basophiles 1%, atypical lymphocytes 3%). Two sets of blood cultures (BD BACTEC Peds Plus/F Culture Vials) yielded no growth, whereas a third blood culture and pustule aspirate from the index finger of the right hand demonstrated growth of *Staphylococcus viridians*. The isolate obtained on the fifth day of the antibiotic treatment was identified as a contamination. An echocardiogram failed to show vegetation and in consultation with a cardiologist the diagnosis of infective endocarditis was excluded. Ultrasound of the right hip joint revealed no effusion.

The patient was started on penicillin (200000 IU/kg/day) while amikacin was discontinued after one dose once infective endocarditis was excluded. The body temperature normalized on the first day after the antibiotic treatment was initiated. Two days later the right hip joint range of movement improved, followed by resolution of the lymphadenopathy and hepatosplenomegaly. Over the next few days popular lesions on the head and petechiae were observed.

Intravenous treatment with penicillin continued for 10 days, followed by oral therapy for another 7 days. Repeat blood tests showed normalization of CRP and blood smear. Thrombocytosis (583G/l) and mild anemia (Hgb-10.2 g/dl; RBC-4.11 T/l) were noted.

The child was discharged home in good condition after a third dose of VERORAB vaccine.

Discussion

In capital city of Poland no cases of wild rat bites among children or infants have been reported. It is a result of good municipal waste management and socioeconomic status.

According to epidemiological records (EPIMELD) of the National Institute of Public Health such health problem (Streptobacillary fever, spiralny fever, rat bite fever) has not been listed.

The diagnosis of rat-bite fever was suggested by the history of an animal bite followed by the triad of symptoms: recurrent fevers, restrictions in the movement of the right hip joint and a polymorphic rash resembling hand, foot, and mouth disease [1-3]. The skin rash occurred 3 days after the bite. 10-88% of the published cases with RBF had presented a rash similar to the hand, foot, and mouth disease [3-7]. Banerjee et al. [8] suggest that in children below 12 years such triad of symptoms as: fever, iliac joint symptoms, and a polymorphic rash is characteristic for RBF.

Maculopapular rash with lymphadenopathy and pharyngeal erythema in any febrile child in a good condition is mostly caused by viral infection, especially Enteroviruses, which have prominent summer-fall seasonality.

Primary testing showed no evidence of bacteremia therefore the patient was treated symptomatically. Adverse reaction after Verorab vaccine such as a rash is uncommon, whereas a fever was reported within 5 hours of the first dose. The second dose of the vaccine was given when the child was febrile and had transient rash. Post-exposure prophylaxis for rabies was initiated as the potential risk of transmission of the infection from wild rat bite existed. Over the next few days, the patient suffered from recurrent fevers and dysfunction of the right hip joint, the rash became more noticeable.

In the meantime, further increase in markers of inflammation was observed (elevated CRP, leukocytosis, anemia).

Arthralgia or arthritis affecting small and large joints occurs in 50-100% of cases [2,4,9,10]. Both active and passive restriction in movement of the hip joint is more common in children. Similar clinical course of RBF was reported by Nood and Petres, who noted involvement of the large joints in half of all cases [11]. RBF affects various joints leading to arthralgia or arthritis. The severity and extent of joint involvement depends on the course of the disease, individual differences in the immune system and time.

In the case reported here, the patient had no clinical evidence of arthritis, but the diagnostic tests were carried out very early (within the first day of the joint dysfunction). Bacterial identification is difficult and being such yielded unsurprisingly no *Streptobacillus moniliformis* isolated from the blood cultures prior to the commencement of antibiotics.

Authors of many reports confirm, that anaerobic media with absence of substances that inhibit the growth of *S. moniliformis* (for example sodium polyethanol sulfonate in a concentration higher than 0.02%) may optimize the pathogen isolation. Experiences with enriched of commercial blood culture media with 10-20% rabbit serum, ascitic fluid or 5% horse blood improved cultures results [3,6,12].

Because of a significant mortality rate in untreated RBF- up to 13% and as high as 53% in patients with endocarditis, particular in infants we are convinced that every suspicion of RBF based on the clinical course should be treated [9,12].

Our patient was treated with high doses of penicillin G for 10 days. Recovery and normalization of the body temperature was observed from the first day of the treatment and the movements of the right hip joint improved from the third day.

The course of RBF in an 8 month-old child is presented below (Figure 1).

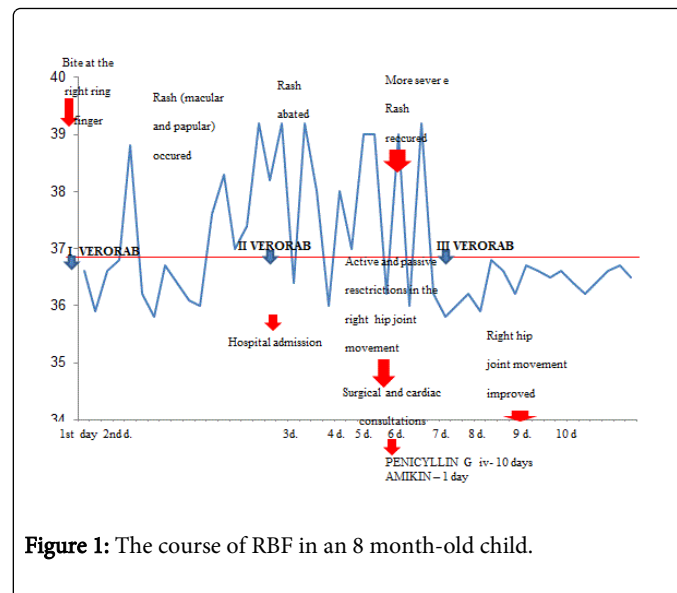


Figure 1: The course of RBF in an 8 month-old child.

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