Streptobacillary fever

An unusual cause of infectious arthritis[1]

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A 77-year-old farmer presented with a two-week history of fever, chills, nausea, and generalized symmetric polyarthritis. One week before his illness, the patient was bitten on the right wrist by a rat. His temperature was 38.3 °C. There was a 3-cm raised tender papule at the inoculation site. The left sternoclavicular joint, several proximal interphalangeal and metacarpal joints, and both wrists and ankles were painful and swollen. Synovial fluid white blood cell count was 104,000/mm³, with 90% neutrophils and 8% band forms. Gram's stain demonstrated many gram-negative coccobacillary organisms. The patient was initially treated with oxacillin and ampicillin (8 g/day of each antibiotic) for two days and then with procaine penicillin (600,000 units administered intramuscularly twice a day) for a total of 14 days. The arthritis symptoms gradually resolved. *Streptobacillus moniliformis* grew from a synovial fluid culture from the left ankle and the lesion of the right wrist. This case report demonstrates the rare occurrence of rat-bite fever manifested by septic arthritis successfully treated with penicillin.

Index terms: Arthritis, infectious, drug therapy · Case reports · Rat-bite fever

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Rat-bite fever is an uncommon bacterial illness caused by *Streptobacillus moniliformis* or *Spirillum minus*. The illness is characterized by fever, rash, lymphadenopathy, and arthralgias. Serious complications such as endocarditis and pneumonia may cause death.[1–3] During the past 15 years, there have been few case reports of rat-bite fever associated with severe arthritis.[4–6] This case report describes a patient with rat-bite fever caused by *S moniliformis* who presented with a disabling generalized arthritis that was successfully treated with penicillin.

Case report

A 77-year-old farmer presented with fever, nausea, and generalized arthralgias of two weeks duration. While working in his barn, he had attempted to kill a rat by breaking its neck and was bitten on the right wrist. The wound bled profusely. He "sucked the poison" from the wound and washed his hands. Several days later, he became ill and had severe disabling joint pains. He had no other prior medical illnesses.

On physical examination, his temperature was 38.3 °C. He appeared ill and malnourished. There was no rash or lymphadenopathy. Lungs, heart, and abdomen were unremarkable. There was a 1 × 2-cm painful pustule at the inoculation site on the right wrist. There was also generalized painful synovitis of both wrists, several metacarpal and proximal interphalangeal joints, and the left sternoclavicular joint. Bilateral ankle effusions were also present. Laboratory findings included a hemoglobin of 12 g/dL; hematocrit, 37%; white blood cell count (WBC), 14,900/mm³ with a differential of 78 polymorphonuclear cells (PMN); and 19

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band forms. The Westergren sedimentation rate (WSR) was elevated at 67 mm/hr. The chest roentgenogram was normal and those of all affected joints showed only soft tissue swelling. VDRL was reactive and fluorescent treponemal antibody test was nonreactive. The rheumatoid factor was negative. There was no detectable activity of total hemolytic complement, CH50 measured by Kent-Phife titration, and C4 was reduced at less than 8 mg/dL (normal, 14–51 mg/dL measured by nephelometry). Immune complexes measured by C1q binding were absent and cryoglobulins were present.

A whitish, purulent fluid was aspirated from both ankles, wrists, and the left sternoclavicular joint. Joint fluid analysis from the left ankle revealed a WBC of 104,000/mm^3 with 90% PMN cells. Gram's stain showed sheets of PMN cells, and a coccobacillary organism was present. No crystals were noted. Agglutinins for the Weil-Felix reaction, Brucella, and Leptospira were absent. Hepatitis surface antigen was negative. Blood, urine, and stool cultures revealed no growth.

The patient was initially treated with oxacillin and ampicillin (8 g/day of each antibiotic for two days) and was then given procaine penicillin (600,000 units administered intramuscularly twice a day for 14 days). Joint aspiration of both ankles and wrists were performed on the first three days of therapy. Preliminary joint fluid cultures were negative. After five days of antibiotics, his joint symptoms markedly improved. Joint fluid was sent to Consolidated Biomedical Laboratories (CBL), Columbus, Ohio, which reported growth of *S moniliformis* from both the pustule of the right wrist and the left ankle. Repeat levels of CH50 and C4 were measured and were increased at 42 mg/dL and 14 mg/dL, respectively. His illness was complicated by diarrhea secondary to pseudomembranous colitis demonstrated by colonoscopy. He was free of all joint symptoms three weeks after initiation of antibiotic therapy.

Discussion

The occurrence of rat-bite fever is uncommon, but during the past 30 years it has been reported in laboratory personnel who handle rodents and in rural regions and areas of poor sanitation.[4–10] Brown and Nunemaker[1] and Roughgarden[2] extensively reviewed the history, clinical presentation, and response to treatment. *S moniliformis* was the agent associated with Haverhill fever—an epidemic illness that was transmitted by contaminated milk.

The incubation period for streptobacillary fever may be as long as three weeks. A macular or petechial rash may occur on the palms and soles similar to that in Rocky Mountain spotted fever.[5] Migratory polyarthralgias and a nonsuppurative arthritis occur in about 50%–70% of cases and are said to be a hallmark of the disease.[1–3] The presence of arthritis is helpful in distinguishing rat-bite fever secondary to *S moniliformis* from *S minus* in which arthralgias rarely occur. There have been no recent case reports describing the synovial fluid analysis, and earlier reports were limited in their descriptions. Brown and Nunemaker[1] described an infant with a prolonged septic illness and joint involvement of the right knee and sternum. Purulent material was aspirated from both sites. Although no joint fluid analysis was reported, *S moniliformis* grew from the sternal abscess culture. Watkins[11] described a patient with polyarthralgias and arthritis of the right wrist. The joint fluid aspirate was described as cloudy, and the culture grew *S moniliformis*. He also reviewed 39 proved cases of streptobacillary fever reported from 1916 to 1945 in the United States. *S moniliformis* was detected in blood cultures in 30 patients; 2 also had positive joint cultures, 1 had a positive skin culture, 3 had positive abscess cultures, 5 had positive agglutination test results, and 3 had positive reaction to animal inoculations.

Although arthritis is the distinguishing feature between the two forms of the disease, there are several other clinical differences. The average incubation period is about five days with *S moniliformis* compared to 13 days with *S minus*. The rash associated with *S minus* occurs after several days of the onset of fever. The rash is maculopapular and initially appears as dark red lesions, which gradually coalesce to form larger eruptions.[7] The lesions associated with *S moniliformis* are much smaller in size and usually appear on the extremities. Petechiae may also occur.

The patient's presentation was unusual in that polyarthritis was the dominant clinical feature. This is the first description to our knowledge of the joint fluid analysis associated with this illness. There is some controversy about the nature of the arthritis associated with streptobacillary fever. Goldstein[3] states that a nonsuppurative migratory polyarthritis is a hallmark of this disease. However, the septic joint fluid and disabling arthritis course of this patient's illness are uncommon features. In addition, the patient had a biologic false-positive serologic test for syphilis, which is reported in about one quarter of patients. There are several features of this patient's disease that suggest that the illness may have been immune mediated. They include transient polyarticular synovitis; hypocomplementemia at the onset of illness, which increased towards normal levels with clinical improvement; and cryoglobulinemia. Similar findings have also been reported in other arthropathies, such as that associated

with gonorrhea and infectious hepatitis in which immune mechanisms may play a role in the pathogenesis.

In 1965, Roughgarden[2] described 62 cases in an update of the American, British, and Canadian literature. The response to penicillin therapy is dramatic, unlike that observed with sulfa or the arsenicals.[2,11-14] The optimal dosage and duration of treatment is unknown, but the current recommendation for uncomplicated cases is 300,000 units of procaine penicillin, administered intramuscularly, every 12 hours for 10 days.

Although streptobacillary fever is a rare cause of infectious arthritis, this diagnosis should be considered in laboratory personnel and others who come into contact with rodents.

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References

1. Brown TM, Nunemaker JC. Rat-bite fever: a review of the American cases with reevaluation of etiology. Report of cases. Bull Johns Hopkins Hosp 1942; **70:**201–327.
2. Roughgarden JW. Antimicrobial therapy of ratbite fever: a review. Arch Intern Med 1965; **116:**39–54.
3. Goldstein E. Rat-bite fever. [In] Hoeprich PD, ed. Infectious Diseases. 2nd ed, Hagerstown, Md, Harper and Row, 1977, pp 1064–1066.
4. Raffin BJ, Freemark M. Streptobacillary rat-bite fever: a pediatric problem. Pediatrics 1979; **64:**214–217.
5. Portnoy BL, Satterwhite TK, Dyckman JD. Rat bite fever misdiagnosed as Rocky Mountain spotted fever. South Med J 1979; **72:**607–609.
6. Cole JS, Stoll RW, Bulger RJ. Rat-bite fever: report of three cases. Ann Intern Med 1969; **71:**979–981.
7. Witzberger CM, Cohen HG. Rat-bite fever: comparison of the spirochetal (Sodoku) and bacillary (Haverhill fever) forms. Arch Pediatr 1944; **61:**123–133.
8. Hayes ER, Kidd EG, Cowan DW. Rat-bite fever due to *Streptobacillus moniliformis*: report of a case occurring in Minnesota. Lancet 1950; **70:**394–395.
9. Prouty M, Schafer EL. Periarteritis nodosa associated with ratbite fever due to *Streptobacillus moniliformis* (erythema arthriticum epidemicum). J Pediatr 1950; **36:**605–613.
10. Burke WA, Kwong O, Halpern R. Ratbite fever due to *Streptobacillus moniliformis*: a report of two cases. Calif Med 1959; **91:**356–358.
11. Watkins CG. Ratbite fever. J Pediatr 1946; **28:**429–448.
12. Altemeier WA, Snyder H, Howe G. Penicillin therapy in rat bite fever. JAMA 1945; **127:**270–273.
13. Wheeler WE. Treatment of the rat bite fevers with penicillin. Am J Dis Child 1945; **69:**215–220.
14. Labensky A. Penicillin in rat-bite fever. Connecticut Med J 1946; **10:**557–558.