Streptobacillus moniliformis Bacteremia in a Child: Case Report

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Abstract
Background: We report a case of bacteremia caused by Streptobacillus moniliformis. Case Presentation and Inter-
vention: A 2 years and 3 months female Kuwaiti child pre-
sented with febrile convulsions, mild cough and vomiting. 
The patient’s history, clinical findings and radiological inves-
tigations were reviewed. There was no history of rat/animal 
bite, but the child had been camping in the desert prior to 
the illness and may have been exposed to rodent excreta. On 
two occasions, blood culture specimens yielded pure growth 
of the organism which was identified by standard diagnostic 
criteria. The patient was successfully treated with cefotaxime 
and clarithromycin. Conclusion: S. moniliformis may be 
a cause of bacteremia even in the absence of rat/animal bites.

Introduction
Streptobacillus moniliformis and Spirillum minus are 
the two causative bacterial agents of rat bite fever. His-
torically, S. moniliformis is known by different names 
such as Streptothrix muris ratti, Actinomyces or Actino-

bacillus muris and Haverhillia moniliformis. However, its 
nomenclature as S. moniliformis is more in general use 
after it was isolated from a laboratory worker [1]. The in-
fection is transmitted to humans by exposure to rat ex-
creta such as saliva, urine or feces, typically by rat bite or 
direct contact with rats. However, humans also may in-
gest excreta via water and such contaminated food as un-
pasteurized milk, causing a disease called Haverhill fever. 
In addition to rats, there may be infection or colonization 
in other animals like mice, guinea pigs, gerbils, ferrets, 
turkeys, cats and dogs. Therefore, these animals may have 
the potential to transmit the streptobacillary disease. 
Haverhill fever typically occurs in epidemic forms, but 
sporadic cases have been infrequently described [2, 3]. A 
recent review article [4] reported that incidence of rat 
bite/rat-associated S. moniliformis disease is seriously un-
derestimated and the infection if untreated carries 13% 
mortality. Rat bite fever typically presents with abrupt 
onset of fever, headache, vomiting and migratory arthral-
gias and myalgias [5]. This is followed by skin rash in 
about 50% of the cases. Some patients may not even have 
fever [6].

Despite the widespread prevalence of S. moniliformis 
in the saliva and excreta of various animal species, acci-
cidental animal bites and the possible contamination of 
human food and drinks, the reported cases are very few 
[4]. The fastidious nature of the organism, diverse clinical
presentation and low index of suspicion amongst clinicians and possibly microbiologists may be largely responsible for underdiagnosis. Fortunately, the disease is both preventable and curable. We present the first documented report of *S. moniliformis* human infection from Kuwait.

**Case Report**

A 2 years and 3 months female Kuwaiti child presented to the pediatric emergency unit with a 1-day history of febrile convulsions, mild cough, and vomiting. The convulsions lasted approximately 15 min and were associated with spasticity of the upper limbs with deviation of the eyes and face to the left, followed by sleep. There was no history of any prior drug intake, trauma, skin rash or chronic illness. However, the mother had given her cephalexin and paracetamol syrup at home for her present symptoms. She was a full-term normal vaginal delivery weighing 3 kg at birth without any perinatal problems. There was no other history of previous hospitalization anytime after birth. There was no family history of epilepsy. While in the pediatric emergency she had one attack of tonic clonic seizures of the upper limbs with eyes and face shifted to the left, and the attack lasted 6–8 min followed by postictal sleep. She had no fever and her pulse, respiration rate and blood pressure were all normal as recorded at the time of hospitalization. Her body weight was 11.9 kg. She had mild pharyngitis.

A blood sample was sent for culture and sensitivity. The patient was admitted to the ward, where she received cefotaxime 300 mg i.v. 6-hourly and i.v. fluids. She remained febrile (38.6 °C) for 3 days, but responded to antipyretic therapy. Another blood culture repeated 9 and 24 days after presentation were sterile. The patient remained asymptomatic on follow-up for 6 months.

**Discussion**

*S. moniliformis* bacteremia is infrequently reported [7], most probably because most of the commercial blood culture systems using 0.05% sodium polyanethol sulfonate as an anticoagulant do not allow the growth of *S. moniliformis*. However, the BD BACTEC Peds PLUS/F which was used in the present case contains only 0.02% sodium polyanethol sulfonate and this concentration has been reported to allow the isolation of *S. moniliformis* [8, 9]. The diagnosis of *S. moniliformis* infection has also been made recently using PCR [10]. However, the gold standard remains isolation of the organism. Typical characteristics like high pleomorphism including ‘string of beads’ appearance together with cotton balls, interwaving wavy filamentous forms and the usual negative biochemical reactions like catalase, oxidase, nitrate, indole, citrate and urease should be sufficient for identification of *S. moniliformis* in most clinical microbiology laboratories.

In the present case, there was no history of rat bite or any rodents or pet animals in the house. However, the history of camping in a desert area frequented by rodents was instructive. It was quite reasonable to believe that our patient would have either played with rodents like gerbils (desert rats) or would have consumed food/drinks contaminated by the rodents. It is customary in Kuwait to go camping in the desert with the entire family for many days as the weather is fine in spring. Also it is not uncommon in Kuwait to find rodents like gerbils, jirds, jerboas, mice and rats visiting the camp houses in search of food. The gerbils in particular are very sociable creatures and are not aggressive unless provoked.

In a typical streptobacillary rat bite fever, there is a history of rodent/animal bite with abrupt fever, headache, vomiting, migratory arthralgias, myalgias, and regional lymphadenopathy. The patient may also present with maculopapular, petechial, or purpular rash on the palms, soles and extremities. However, in Haverhill fever, which is also a form of streptobacillary disease, the patient presents with fever, vomiting and pharyngitis as prominent symptoms. The clinical presentation of our patient is more consistent with Haverhill fever. Given the exposure...
history and clinical aspects of our patient’s case, it is likely she ingested *S. moniliformis* and represents a sporadic case of Haverhill fever.

Since outdoor camping is very common in Kuwait, we recommend that proper measures should be taken to keep rodents at bay while on desert camping. The food should be properly cooked and stored well covered and protected from contamination by rodents. Proper investigations should be carried out on individuals including children who develop signs and symptoms suggestive of streptobacillary disease within 3 weeks of returning from camping in the desert.

**Conclusion**

This report may represent a sporadic case of Haverhill fever due to *S. moniliformis* bacteremia in Kuwait.

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