Corynebacterium kutscheri Infection of Skin and Soft Tissue following Rat Bite

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Corynebacterium kutscheri is a common bacterium isolated from the oral cavity of healthy mice and rats. We report the first well-documented case of C. kutscheri human infection which followed a rat bite. The microorganism was identified by conventional biochemical tests and confirmed by 16S rRNA gene sequence analysis.

CASE REPORT

A 7-month-old infant girl was admitted to the hospital with an infected right middle finger. Apart from premature birth at 32 weeks gestation, the patient had no other medical illness. Twelve days prior to admission, the patient had been bitten on the right hand by a rat. Following the bite, the patient developed swelling and erythema of the finger despite daily wound cleansing with saline. The patient initially presented to the emergency department, where an incision and drainage were performed; frank pus was noted, and a swab sent for microscopy and culture. The patient was treated with 200 mg amoxicillin–28.5 mg clavulanic acid orally twice a day, but purulent discharge and cellulitis persisted. The patient underwent deep debridement of the right middle finger, and no discrete collections were identified. The patient received intravenous doses of 400 mg ceftriaxone daily and 65 mg metronidazole three times a day for 5 days, followed by 160 mg amoxicillin–22.8 mg clavulanic acid orally twice a day for 15 days and made a full clinical recovery.

The Gram stain of the initial swab from the incision and drainage revealed polymorphonuclear leukocytes, but no organisms were seen. Pure growth of slightly irregular gram-positive bacilli was noted on horse blood agar and chocolate plate. The organisms were seen. Pure growth of slightly irregular gram-positive bacilli was noted on horse blood agar and chocolate plate. The organisms were identified by conventional biochemical tests and confirmed by 16S rRNA gene sequence analysis. The catalase and nitrate reduction tests were positive. Hydrolyses of urea and esculin were also positive. Carbohydrate fermentation reactions occurred with glucose, maltose, sucrose, and pyrazinamidase, but not with mannitol and xylose. The CAMP test was negative. The penicillin MIC was 1.0 \(\mu\)g/mL, as determined by Etest (AB Biodisk, Solna, Sweden) (7). Using a BBF crystal gram-positive identification system (Becton Dickinson and Company, MD) and API Coryne v3.0 (bioMérieux, Marcy-l’Étoile, France), the microorganism was identified as Corynebacterium kutscheri with 99.9% confidence on both systems (biotypes 2760041527 and 7051325, respectively).

DNA was extracted using a Roche High Pure PCR template preparation kit with lysozyme (F. Hoffmann-La Roche, Basel, Switzerland). Sequence analysis was performed with 462 nucleotides at the 5' end of the 16S rRNA gene, and a GenBank BLAST search (National Center for Biotechnology, Bethesda, MD) was carried out. The patient’s isolate had 100% sequence homology with the Corynebacterium kutscheri rRNA nucleotide sequence with GenBank accession number X82063 (data not shown) (12).

C. kutscheri was first isolated in mice in 1894 (9). It has since been described as a commensal bacterium in mice, rats, and voles and has been identified in the oral cavity, esophagus, colon, rectum, and submaxillary lymph nodes of these rodents (1, 9). It was first called pseudotuberculosis, as clinical disease with the organism resembled mouse tuberculosis, with pulmonary abscesses and caseating necrosis. Typically, C. kutscheri causes latent infection in healthy mice and rats but can cause severe illness when an animal is immunocompromised or nutritionally deficient (1, 3a, 9, 10). Illness is characterized by bacteremia with septic emboli and end-organ disease in the kidneys and livers of mice and the lungs of rats (3a, 9, 10).

Phylogenetically, C. kutscheri closely resembles other diphtheroids of clinical significance in humans (11), including Corynebacterium diphtheriae, Corynebacterium pseudotuberculosis (6), and Corynebacterium ulcerans (3). It has not been reported as a commensal in humans or an environmental pathogen. Human infection has been limited to two case reports, although there were no associations with rodent bites and the data supplied did not definitively establish an identification of the pathogen as C. kutscheri, as noted in the comprehensive review by Funke et al. (5). In the possible case of chorioamnionitis and funisitis described in Fitter et al. (4), the isolate did not reduce nitrate and only sucrose and urease reactions were listed. In the other case of septic arthritis, described in Messina et al. (8), there was no specific information about which carbohydrates were fermented.

We believe that this report is the first definite case of Corynebacterium kutscheri causing infection in humans. Notably, in this case a soft tissue infection occurred in the context of a
recent rat bite. *C. kutscheri* was identified using commercially available identification systems, and the identification was confirmed by 16S rRNA gene sequencing. Rat bite fever caused by *Streptobacillus moniliformis* or *Spirillum minus* (2) is well described, and *C. kutscheri* should be considered as another causative microorganism in the spectrum of rat bite-associated bacterial disease in humans.

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The authors report no conflicts of interest.

REFERENCES