Osteomyelitis Caused by *Moraxella osloensis*

BARRETT SUGARMAN and JILL CLARRIDGE

Infections Section, Department of Medicine, and Spinal Cord Injury Service, and Laboratory Service, Houston Veterans Administration Medical Center, Houston, Texas 77211, and Baylor College of Medicine, Houston, Texas 77030

Received 26 October 1981/Accepted 8 January 1982

*Moraxella osloensis* osteomyelitis of the femur developed in a paraplegic man. He responded to treatment with oral ampicillin. Disease in humans caused by this unusual clinical isolate is reviewed.

Infections caused by bacteria of the *Moraxella* genus most commonly involve the eyes and have not been frequently reported involving other organ systems (6). This report describes a patient with osteomyelitis caused by *Moraxella osloensis*.

A 34-year-old well-nourished paraplegic paranoid schizophrenic male was transferred to the Houston Veterans Administration Medical Center during June 1981 for further rehabilitation. He had previously been in another hospital for several years. He had been continuously febrile up to 39°C for at least 6 months. Physical examination was remarkable for multiple decubitus ulcers, including a large draining one over the right femur. There was no evidence of joint effusion. An indwelling urinary drainage catheter was in place, as one had been for years. He had received several 7- to 10-day courses of oral antimicrobial agents for presumed urinary tract infection without defervescence.

Laboratory evaluation included multiple decubitus ulcer cultures which grew diphtheroids, group D streptococcus, and a few *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Staphylococcus epidermidis*. His urine cultures grew *P. aeruginosa*, multiple blood cultures were negative (aerobic and anaerobic), and his white blood cell count ranged between 8,500/mm² and 14,700/mm². His hemoglobin concentration was 11.5 g/dl and he had normal lymphocyte count, serum albumin, and total proteins. Roentgenographic evaluation of the right femur revealed osteoporosis and extensive periosteal elevation and lytic changes along most of the femur. Bone biopsy of the right femur was performed after the patient had not received antimicrobial agents for 3 weeks. Gram stain revealed polymorphonuclear leukocytes, and cultures grew only *M. osloensis*.

The patient was treated with oral ampicillin (500 mg four times daily), and the decubitus ulcer drainage decreased significantly within days. He became afebrile after 11 days and remained so on therapy with his white blood cell count below 10,000/mm² for over 3 months. His long-term course has been complicated by poor patient compliance and multiple difficulties, including traumatic compound fracture of the same osteoporotic femur and subsequent superinfection necessitating amputation.

Ground bone was inoculated to five aerobic and five anaerobic media and incubated at 35°C. The blood, chocolate, and colistin-nalidixic acid agar plates were incubated in 6 to 8% supplemental CO₂, and the MacConkey agar plate and Claedler broth tube were incubated in air. After 5 days all plates and the anaerobically incubated Schaedler broth showed no growth and were discarded. The aerobically incubated Schaedler broth was noted to be cloudy on day 6 and was subcultured. Gram-negative rods seen in the broth grew as small colonies on MacConkey, blood, and chocolate agar plates aerobically but not anaerobically. These were identified as *M. osloensis* by the following: (i) Analytab Products, Plainview, N.Y., API 20E number 0000004-01 (signifying the organisms positive only for oxidase and growth on MacConkey agar); (ii) negative nitrate reduction, gelatinase, and phenylalanine deaminase activity; and (iii) positive acetate assimilation and growth at 42°C (7). Identification was confirmed by the City of Houston Health Department.

Lack of turbidity at 24 h with Trypticase soy broth (BBL Microbiology Systems, Cockeysville, Md.) in microtiter antibiotic dilution panels prevented minimum inhibitory concentration determinations. The minimum bactericidal concentrations (>99% killing) in micrograms per milliliter were as follows: amikacin (<0.5), ampicillin (<0.125), carbencillin (<4.0), cefamandole (1.0), cefoxitin (<0.5), cephalothin (1.0), chloramphenicol (2.0), erythromycin (2.0), gentamicin (<0.25), penicillin (0.5), tobramycin (<0.25), and tetracycline (2.0). As determined by the disk-diffusion method, using the National Committee for Clinical Laboratory standards for
Haemophilus zone size, the isolate was sensitive to the above antibiotics and colistin, except for cefamandole and cefoxitin, to which disk sensitivities were not determined.

The genus Moraxella consists of gram-negative coccobacillary, non-saccharolytic, aerobic, oxidase-positive bacteria. Most isolates grow slowly as small colonies on ordinary media (3, 7). The currently recognized seven species are M. atlantae, M. bovis, M. lacunata, M. nonliquefaciens, M. osloensis, M. phenylpyruvica, and M. urethralis. All species except M. bovis have been implicated in human disease (7).

The species M. osloensis was proposed in 1967 to distinguish a subset of organisms which had been classified as M. nonliquefaciens but which grew on a variety of simple media and lacked genetic affinity with the group (3). Also, some of the organisms which were formerly speciated as Mima polymorpha (var.) oxidans would now be identified as M. osloensis (1, 3–5).

There are few reported human infections caused by M. osloensis. This species is not routinely cultured from the inanimate environment, but can on occasion be cultured from normal human nasopharyngeal and genitourinary tracts (6). This organism, or one that would perhaps now be classified as M. nonliquefaciens (4, 8), has been cultured from infected hosts usually considered to be normal. Specific cases include septic arthritis and vaginal discharge (1), necrotic mouth lesion (2), urethritis (8), meningitis (4), meningitis with cerebral spinal fluid shunt (2), and bacteremia with cutaneous lesions (5). Clinical syndromes compatible with gonococcal urethritis, disseminated gonococcal infection, and meningococcal meningitis caused by M. osloensis (and other Moraxella species) were originally misdiagnosed because of the similar clinical history, physical findings, and Gram stain (1, 4–6, 8).

The isolate from this patient was sensitive to a variety of antibiotics, as have been the isolates previously reported (6). A review of 34 Moraxella species isolates (including 9 M. osloensis) reported that 32 were inhibited by ampicillin, and 26 were inhibited by penicillin at 0.1 μg/ml or less (6). Since penicillins have been reportedly used most often to treat M. osloensis infections, it is important to realize that some isolates may be relatively resistant (2, 6). Bactericidal testing may be of benefit in selecting regimens to treat M. osloensis infections of sites where host defense mechanisms operate poorly. However, the patient reported here with osteomyelitis responded to treatment with a penicillin, as have almost all reported patients with M. osloensis infection (1, 2, 4, 5, 8).

Mona Thomas and Bobbye Simon provided expert secretarial and laboratory assistance.

This work was supported by the Veterans Administration.

LITERATURE CITED