

Erysipelas-like Cellulitis with *Pasteurella multocida* Bacteremia after a Cat Bite

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A 73-year-old female patient presented with *Pasteurella multocida* erysipelas-like cellulitis, bacteremia, and shock. The onset of the disease occurred 24 h after a cat bit her to the right lower leg. Initially, the picture of bacteremia and shock developed, with minimal local cellulitis. *Pasteurella multocida* grew in blood culture. A combination of amoxicillin and clavulanic acid was therapeutically successful in respect that the signs of bacteremia and shock disappeared. However, extensive erysipelas-like cellulitis developed on the bitten leg within the next 2 days. The disease was efficiently treated with penicillin G combined with netilmicin and administered for 10 days. This report documents the first case of *Pasteurella multocida* erysipelas-like cellulitis with bacteremia and shock.

Key words: amoxicillin-potassium clavulanate combination; antibiotics, combined; bacteremia; bites and stings; cats; cellulitis; penicillin G; netilmicin; *Pasteurella* infections; *Pasteurella multocida*; shock, septic; wound infection

Pasteurella multocida, a nonmotile, nonsporogenic, gram-negative coccobacillus that grows on usual media at 37°C in aerobic or facultatively anaerobic conditions, is a part of the normal flora of the mouth and gastrointestinal tract of many domestic and wild animals, including cats and dogs (1-4). It is found in the oropharynx of 50-70% of healthy cats (3,5).

The infection with *P. multocida* after an animal bite, scratch, or licking generally presents with a clinical picture of cellulitis but rarely with erysipelas-like cellulitis (2,3,6,7). More severe forms of the disease have been described due to local complications (lymphadenitis, osteomyelitis, abscess, arthritis) (1-3,8), septicemia with septic metastases to various organs (1-3), or respiratory tract colonization and spread of the infection through the airways (epiglottitis, bronchitis, infectious bronchiectasis, or pneumonia) (1-3,9-12). Spontaneous peritonitis and localized purulent abdominal cavity inflammation after endoscopic examinations and continuous ambulatory peritoneal dialysis (1,3,13), total arthroplasty infection (14,15), pleural empyema, kidney transplant infection, and endocarditis (16-18) have also been reported in association with an animal bite or animal licking of the skin and mucosa in individuals keeping dogs and cats as pets. Interhuman transmission of the disease has not been described, but *P. multocida* was found as a commensal microorganism in the respiratory tract of individuals with a chronic pulmonary disease and ocu-

pathologically exposed to animals (3). We present the second known case of *P. multocida* infection with a clinical picture of erysipelas-like cellulitis (2), but the first one with concomitant bacteremia and shock.

Case Report

A. J., a woman, born in 1924, was admitted to the hospital for fever (39°C), tremor, general fatigue, and confusion, some 34 h after her cat bit her on the right leg (two bites, four bite wounds) and 10 h after the onset of the disease. She had not taken any medication, only washed the wounds with alcohol.

As a young adult, she suffered from exudative pleuritis. At the age of 25, she was treated for tuberculous spondylitis for a year, and at the age of 63, she suffered a stroke. Over the last few years, she had been taking a diuretic because of leg swelling.

On admission, she was febrile (39.1°C), confused, immobile, in a severely impaired general condition and shock. Her heart rate was accelerated (118/min), and her blood pressure (BP) was 16/10 kPa. Both legs were doughily edematous, with four small bite wounds surrounded by mild redness on the anterior aspect of the lower third of the right leg. Except for the described details, the patient's status was consistent with her age.

Laboratory tests showed leukopenia (2.4x10⁹/L) with immature neutrophilia (13% nonsegmented and 69% mature polymorphonuclears), mild anemia (erythrocytes

$3.4 \times 10^{12}/L$, hemoglobin (Hb) 111 g/L, and thrombocytopenia ($60 \times 10^9/L$), mildly elevated blood glucose (BG) (7.8 mmol/L), creatinine 160 $\mu\text{mol}/L$, and prolonged prothrombin time (PT) (48%). *P. multocida*, sensitive to penicillin G and aminopenicillins and moderately resistant to netilmicin, was isolated in blood culture – 2 pairs of aerobic and anaerobic cultures were positive in the bioMerieux Vital blood culture system (bioMerieux, Marcy l'Etoile, France). After 48 h, the isolate was subcultured onto sheep and chocolate agar plates. Disc diffusion test on Mueller-Hinton agar was performed for susceptibility testing. From the second day on, the combined therapy of amoxicillin and clavulanic acid brought the temperature down to 37.5°C. The patient's general condition improved. However, severe and sharply demarcated redness developed on the lower two thirds of the leg (Figs. 1 and 2), with ipsilateral femoral lymphadenitis.

After 7 days of treatment, laboratory tests showed the erythrocyte sedimentation rate (ESR) of 101 mm/h, leukocytes (L) 7.6, E 3.7, Hb 124, platelets (Plt) 90, BG 7.7, creatinine 119, bilirubin 33.8 $\mu\text{mol}/L$, aspartate aminotransferase (AST) 30 U/L, and gamma glutamyltranspeptidase (GGT) 41 U/L. Sodium, potassium, chloride, blood urea nitrogen (BUN), alanine aminotransferase (ALT), alkaline phosphatase (AP), lactate dehydrogenase (LDH), creatine phosphokinase (CP), serum protein, protein electrophoresis, serum

immunoglobulins (IgA, IgG, IgM), and complement fragments (C3, C4) were normal. PT was 58%. On the second day from the introduction of penicillin G with netilmicin, the patient became afebrile.

The local finding showed gradual improvement (inflammation, swelling, and tenderness subsided). After 18 days of antimicrobial treatment, the following laboratory findings were obtained: ESR 65, L 3.8, E 3.5, Hb 112, Plt 148, bilirubin 22, and AST 27. PT was 58%, whereas fibrinogen, BG, BUN, creatinine, ALT and GGT were normal. Antistreptolysin O antibodies titer was normal, and the antistaphylococcal antibodies titer (ASAT) was 4.0 IU. Clinical status was normal, BP was 20/10 kPa. The patient was discharged from the hospital 27 days after the cat bite or 25 days after the admission.

Discussion

P. multocida infection in humans can take three clinical forms: local soft tissue infection after contact with animals (bite, scratch, licking); respiratory infection in individuals with chronic pulmonary disease usually preceded by a colonization of the upper airways after inhalation of *P. multocida* from the domestic animal's saliva; or bacteremia, with or without septic metastases to various organs (1-3). More severe forms of the disease, which include bacteremia with or without septic metastases, occur in immunocompromised individuals, patients with



Figure 1. Anterior view of the patient's right lower leg: 4 punctiform bite wounds and sharply delineated redness involving more than 2/3 of the lower leg.



Figure 2. Posterior view of the patient's right lower leg: sharply delineated redness involving more than 2/3 of the lower leg, with a pronounced hemorrhagic component.

underlying chronic diseases, pregnant women, and neonates. Immuno competence of the host is more important than the virulence of the microorganism (1-3). Our patient had had lung tuberculosis as a young adult, and later in life, she had suffered from bone tuberculosis, as well as latent diabetes and arteriosclerosis (a history of stroke). The tests performed spoke against other forms of immunodeficiency.

The most common injuries inflicted by cats are scratches and punctiform wounds, localized on the lower extremities, and the most common pathogen is *P. multocida* (>50%) (1,4). The infection most frequently involves hands and face (1), and manifests itself within several hours to 3 days from the event, with swelling, redness, and pain at the site of injury and a purulent, usually grayish, malodorous discharge. Injuries inflicted by long, thin cat teeth are more often associated with complications. Elevated body temperature of >37.2°C, lymphadenopathy, and lymphangitis occur in up to one third of the patients (1). A mixed infection is usually present (19,20). Local complications (osteomyelitis, tenosynovitis, and arthritis) develop in approximately 40% of the infected wounds (1,5). The prevalence of individual pathogens isolated from these wounds varies from study to study (1,20,21).

In patients with predisposing factors, bacteremia develops within 3 to 5 days from the bite (3). In our patient, the period of incubation was 24 hours. The clinical presentation of sepsis is uncharacteristic and cannot be distinguished from sepsis due to other causes without bacteriological finding. Shock associated with *P. multocida* bacteremia is recorded in 50%, hypotension in less than 50%, and letal outcome in 37% of the patients (3). The outcome of the disease depends on the predisposing factors for the development of bacteremia. Leukocytosis was recorded in more than 50% of patients with bacteremia (3), whereas in our patient, leukopenia with anemia and thrombocytopenia was observed, which is not unusual in septic conditions.

Descriptions of erysipeloid-like disease are very rare, and only one case has been reported (2). Our case is the first one with bacteremia and shock. In our patient, the finding of increased ASAT may have suggested the presence of mixed infection with *P. multocida* and *Staphylococcus aureus*.

A 3 to 5-day lasting prophylactic treatment is recommended in all cat bites examined by a physician within 8 hours from the event, in order to reduce the incidence of infection from 15%-20% to 5% (1,22).

Antimicrobial therapy is indicated in all infected wounds. It should be directed against both an aerobic and aerobic agents of the oral flora. Before the introduction of therapy, culture should be obtained from all infected wounds (aerobic and anaerobic), and empirical antimicrobial therapy should be prescribed according to the finding of Gram stained slide or to the known data about the oral flora sensitivity. When a severe clinical picture of cellulitis develops in a patient with predisposing factors for the development of bacteremia, other biological specimens should also be obtained for bacteriological analysis (blood, urine, sputum, cerebrospinal fluid, synovial fluid, pleural exudate, ascites, etc.). In most cases, penicillin G is the therapy of choice, especially for animals

bites, because it is efficient against the most common causative agents (*P. multocida*, most oral anaerobes, and *Clostridium* spp.). In case of suspected *S. aureus* infection, a combination of amoxicillin and clavulanic acid, or penicillins resistant to penicillinase should be administered. Antibiograms should be performed on all isolates, because *P. multocida* shows various susceptibility to antibiotics, and strains resistant to penicillin have been isolated in both humans and animals (1,3,23,24). The duration of treatment depends on the type of infection, including its severity and localization. Cellulitis is usually treated for 10-14 days (1).

Individually adjusted antitetanic prophylaxis should be administered to all such patients, irrespective of the type of lesion, because of the possible wound contamination with *Clostridium tetani* spores (20).

In conclusion, bacteremia caused by *P. multocida* is rarely encountered in clinical practice. Only 144 cases of this infection, most often in immunologically compromised hosts, have been reported in medical literature in English during the 1936-1999 period. Erysipeloid-like cellulitis is even less frequently seen. The patients suffering from chronic, exhausting diseases (cirrhosis, chronic renal insufficiency, diabetes mellitus, arteriosclerosis, etc.), those with congenital or acquired immunodeficiency, or those with orthopedic arthroplasty or artificial valves should be warned that close contact with pets, primarily cats and dogs (bites, scratches, licking, inhalation of aerosol contaminated with animal saliva) may have fatal consequences.

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