

Case in Point

Bacteremia From an Unlikely Source

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An unusual infection caused by contact with a pet reinforces the importance of educating patients about proper postoperative wound care.

The most common microbes causing postoperative wound infection are *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus epidermidis*, and *Enterococcus faecalis*.¹ *Pasteurella multocida* (*P multocida*) is an uncommon organism causing surgical-site infections.² This article reports a case of a patient who developed a postoperative wound infection due to *P multocida* complicated by a bloodstream infection.

CASE REPORT

A 54-year-old man presented with pain and discharge surrounding his recent surgical site and a 1-day history of fever and chills. Four weeks prior to the presentation, he underwent nodal dissection and reconstructive surgery with a muscle flap on his right leg for a superficial spreading melanoma. The patient noticed wound dehiscence the previous 2 to 3 days and a white-yellowish discharge from the wound.

Six years previously, the patient

was diagnosed with a superficial spreading melanoma on his right thigh. At that time, he underwent wide excision for the localized disease. The patient was doing well until 3 months prior to the admission when he noticed a nodule in his right groin area, which had enlarged to a lump. Fine needle aspiration of the lump and immunohistochemistry showed the presence of malignant cells, positive for S100 and MART-1. These markers are useful for a diagnosis of metastatic melanoma.^{3,4}

A positron emission tomography (PET) scan revealed localized disease with increased uptake only in the groin region. Superficial nodal dissection and sartorius muscle flap placement were performed, and the patient was discharged to his home with drains in place.

Two weeks after his node dissection, the patient was seen in the surgery clinic, and his drains were removed. Three days after his clinic visit, he noticed erythema around the suture line and discharge from the wound, followed by increasing pain, high fever, and chills. The patient reported no history of nausea, vomiting, diarrhea, painful urination, cough, shortness of breath, chest pain, or abdominal pain. His medical history was also significant for hypertension and multiple lipomas on his back and extremities, which were

removed surgically 15 years previously. He had been a chronic smoker and occasionally used alcohol but did not use illicit drugs. The patient was unmarried and lived alone with his domestic cats.

The patient was febrile on admission (38.9°C); heart rate 110 bpm. His blood pressure and respiratory rate were normal. An examination of the right groin revealed an incision mark of about 20 cm in length from his right anterior superior iliac spine travelling inferomedially into his groin with breakdown at the inferomedial aspect, extending one-half to one-third the wound distance. The wound had clean borders with minimal amount of purulent drainage. Induration was noted, extending down the thigh to above the knee level. Sutures remained in place along the superior aspect of the incision site. No other abnormalities were found.

Laboratory studies revealed leucocytosis (white blood cell count, 12,200/mm³). Blood glucose, blood urea nitrogen, serum creatinine, and electrolytes were within normal range. Computerized tomography (CT) scans of the pelvis and thighs with IV contrast revealed normal right common femoral artery and vein with postsurgical changes and thickening of the skin and small air lucencies in the right groin. The patient was started on empiric

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treatment with IV vancomycin and piperacillin/tazobactam.

Due to initial worsening of erythema, piperacillin/tazobactam were stopped and ertapenem was initiated. Blood cultures sets and the culture of the surgical wound were positive for *P multocida*. Vancomycin was discontinued, and the patient rapidly improved. He was discharged on oral moxifloxacin for 2 weeks. After 10 months of follow-up, the patient was doing well and the surgical site wound had healed.

DISCUSSION

Pasteurella multocida is a small, Gram-negative, nonmotile, non-spore-forming coccobacillus with bipolar staining features.⁵ It often exists as a commensal in the upper respiratory tracts of domestic pet species, especially cats and dogs, and may cause hemorrhagic septicemia in cattle, fowl cholera in chickens, and atrophic rhinitis in pigs.^{6,7} *Pasteurella multocida* infection in humans is often associated with an animal bite, scratch, or lick, but infection without epidemiologic evidence of animal contact may occur.⁸

The majority of animal bites involve dogs (85%-90%), followed by cats (5%-10%). Infectious complications occur in about 15% to 20% of dog-related bites and > 50% of cat-related bites. The sharp and long teeth of cats can easily penetrate human skin, create a deep puncture wound, and even inoculate the periosteal component of bones. Cat-related wounds more commonly progress to serious and deeper tissue infections, including osteomyelitis and meningitis.⁹ Human-to-human transmission is rare, but there are reported cases of respiratory transmission and maternal-to-fetal transmission.^{10,11}

The most common presentation of *P multocida* infection in humans

is soft-tissue infection, appearing as purulent wounds (48%), cellulitis (36%), or abscesses (16%).¹² The infection is characterized by the development of soft-tissue inflammation at the site of contact, which may progress to diffuse, localized cellulitis. High leukocyte and neutrophil counts are typically observed.¹³ Complications of localized infection include rapidly progressive cellulitis, abscesses, tenosynovitis, osteomyelitis, and septic arthritis. The localized infection can also lead to septicemia, which carries a high mortality rate (31%).^{12,14}

Pasteurella multocida septicemia commonly occurs in patients with an immune-compromised status, but septicemia in healthy individuals has also been reported.^{15,16} Apart from local skin and soft-tissue infections, *P multocida* can cause upper respiratory tract infections, lower respiratory tract infections leading to pneumonia, trachea-bronchitis, lung abscess, and empyema, usually in individuals with underlying pulmonary disease. *Pasteurella multocida* meningitis has been associated with cat licks and bites occurring on the face in both the young and the elderly.¹⁷⁻¹⁹

Gram stains of purulent material or other fluid specimens, including blood, sputum, and cerebrospinal fluid, may show small, Gram-negative, nonmotile, non-spore-forming *pleomorphic coccobacilli*. Wright, Giemsa, and Wayson stains enhance bipolar staining. The quickest and most accurate method for confirming an active *P multocida* infection is molecular detection using polymerase chain reaction.²⁰ Evaluations of tenosynovitis, septic arthritis, osteomyelitis, and meningeal enhancement, when appropriate, should be done with CT scans or MRIs.

In < 10% of cases, localized infection by *P multocida* may lead to

bacteremia. The most common predisposing factors associated with bacteremia identified in a review of cases over 20 years at an urban medical center included old age and chronic medical conditions.²¹ Chronic medical conditions involved most commonly were diabetes mellitus, hypertension, and congestive heart failure. Liver dysfunction has also been reported as a significant risk factor in cases of *P multocida* bacteremia. The most common antibiotics used to treat the patients with bacteremia were ampicillin/sulbactam, cephalosporins, and fluoroquinolones.

A brief review of the literature of 21 cases of bacteremia showed that the most common antibiotics used for treatment were penicillins (ampicillin, amoxicillin, and piperacillin) in 11 of 21 cases. After penicillin, ciprofloxacin was the most commonly used antibiotic to treat bacteremia secondary to *P multocida*. The review also identified chronic medical conditions, such as diabetes mellitus, hypertension, congestive heart failure, and chronic obstructive pulmonary disease, as the most common risk factors associated in these cases with bacteremia.

In 17 of 20 cases, patients reported being present in an environment with pets, mostly cats and dogs. Twelve out of 17 patients reported having contact with pet cats and dogs, mostly in the form of bites or pets licking their wounds, and 3 of these were postoperative patients with external wounds.²²⁻²⁴

This patient reported that after discharge from the hospital following surgery for his spreading melanoma, domestic cats at his home repeatedly licked the postoperative wound. This almost certainly was the source of the infection and bacteremia in this patient. These findings stress the importance of educating patients about proper postoperative wound care and

precautions needed if there is potential exposure to domestic animals, such as cats and dogs.

CONCLUSIONS

Pasteurella multocida is an unusual cause of postoperative wound infection. The most common method of acquiring a *P multocida* infection is through contact with pet animals, mostly cats and dogs. Infection can occur not only with animal bites and scratches, but also with licking of open wounds. The rate of infections can be decreased significantly by educating patients about the mode of transmission of infection, its complications, and safety measures needed if they have pets at home. ●

Author disclosures

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