Pasteurella multocida Sepsis – Should Immunocompromised Patients Give Up Their Pets?

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Pasteurella species are gram-negative bacilli that inhabit the oral cavity and gastrointestinal tract of many animals. Their principal reservoir is dogs and cats. Most reported infections in humans are caused by *Pasteurella multocida*. The main clinical manifestations in humans are skin and soft tissue infections, usually associated with animal bites. Nevertheless, deep-seated infections such as arthritis and osteomyelitis have been described. These infections result either from direct inoculation of the periostium at the time of the bite or from local extension of soft tissue inflammation [1]. These infections appear in immunocompetent as well as immunocompromised patients.

Bacteremia with *P. multocida* is relatively rare. Raffi et al. [2] reported 13 cases of *P. multocida* bacteremia over a 12 year period. Of these, 10 patients (77%) had cirrhosis and 2 additional patients had hematological malignancies. Over the past two decades additional case reports of *P. multocida* bacteremia have been published, the majority of which involved patients with underlying diseases.

The case reported in this issue of *IMAJ* by Davidovich and co-workers [3] describes a patient with an underlying hematologic malignancy who developed recurrent *P. multocida* bacteremia and was eventually diagnosed with osteomyelitis of the ankle. The patient owned a pet cat. This case should serve as an important reminder of the risk animal exposure poses for immunocompromised patients. It is known that animal exposure represents a significant risk for this population, yet patients are not always adequately informed of these risks. The U.S. Centers for Disease Control published guidelines for the prevention of opportunistic infections among hematopoietic stem cell transplant recipients in 2000 [4]. In this document the authors dedicated a special section to the prevention of pet-transmitted zoonotic infections. According to these guidelines, HSCT recipients should take certain precautions when dealing with animals. To begin with, patients who own pets should be vigilant about maintaining their pet's health. This means feeding pets high quality food and preventing them from eating garbage, as well as seeking veterinary care promptly. In addition, immunocompromised pet owners should avoid contact with animal waste and litter boxes, since animal feces can transmit several pathogens. The most important pathogen transmitted by feces is undoubtedly *Toxoplasma gondii*. This is a parasite found most often in cat feces. The most common clinical manifestations in immunocompromised patients include encephalitis, pneumonitis and myocarditis, and multi-organ involvement is usual. Mortality approaches 100% when toxoplasmosis remains untreated. The oocysts that are present in the feces require at least 2 days of incubation in order to become infectious. Therefore, litter boxes that are cleaned every day have a low risk of transmitting *T. gondii*. Another parasite transmitted by animal feces is *Cryptosporidium parvum*. This pathogen can be found in non-sterile drinking water as well as in animal feces. In immunocompromised patients, it may cause severe diarrhea which may lead to malnutrition and death. Additional pathogens such as Salmonella sp. and Campylobacter sp. may also be transmitted by animal feces. These pathogens often cause severe, life-threatening diseases in immunocompromised patients. They are most commonly transmitted by young cats and dogs with diarrhea. For this reason, the CDC guidelines strongly recommend that HSCT recipients keep away from ill animals, especially those with diarrhea.

Certain animals may present specific risks and therefore warrant individual mention. First, much like *P. multocida*, Capnocytophaga sp. comprises part of the normal oral flora in canines. These organisms often cause severe sepsis among patients with hematological malignancies, as well as those with asplenia, and chronic steroid therapy. Infection usually follows dog bites. Second, reptiles (e.g., lizards, snakes, turtles) may transmit Salmonella species, which may cause severe, endovascular infection in HSCT recipients. As many as 90% of reptiles could be carriers of Salmonella. Patients are therefore advised to avoid all contact with reptiles and their surroundings. In addition, bird droppings may be the source of *Cryptococcus neoformans*, a type of fungus that can cause meningitis and pneumonia in immunocompromised hosts. Hence, patients should avoid cleaning bird cages and handling bird droppings. Lastly, cleaning fish tanks may expose patients to *Mycobacterium marinum*. This pathogen belongs to the atypical Mycrobacteria and may cause severe skin and soft tissue infections. Therefore, patients should not clean fish tanks. If these exposures are unavoidable, patients are advised to wear gloves and wash hands thoroughly after exposure. Patients are also advised to avoid all contact with sick or stray animals.

These guidelines were intended specifically for HSCT recipients, since they are most vulnerable. However, patients with hematolog-

HSCT = hematopoietic stem cell transplant

CDC = Centers for Disease Control

ical malignancies, such as the patient described in this issue, are also at increased risk for infections. Recently, Norio and Kazuo [5] reported seven cases of severe *P. multocida* infections in patients with hematological malignancies. It is clear that these patients are also at high risk of acquiring pet-transmitted infections, and should therefore be very cautious about exposure to pets.

In conclusion, it seems prudent to explain the risk of animal exposure to all patients with hematological malignancies. According to the CDC guidelines, there is no need to part with most pets, with the possible exception of reptiles, but it is important to understand the risks and to avoid unnecessary exposure. If the report of this case has increased physician awareness of the risks animal exposure presents for immunocompromised patients, then it has served an important purpose.

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