

CASES

River otter bite in a 52-year-old woman: managing animal bites

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In late summer, a previously healthy 52-year-old woman was swimming in a lake in southern Quebec when she was bitten by a marine animal. As she swam toward shore, she and a nearby friend recognized it as a river otter (*Lontra canadensis*; see Figure 1), which began to aggressively pursue her, biting and scratching both of her legs before she could escape. The woman sustained numerous deep, open wounds on her legs. It was unclear to the patient what had triggered the attack: she had not knowingly provoked the animal, nor had she been swimming near its den.

The patient presented to a local community hospital immediately after the incident. The treating physician performed primary closure of the open wounds without antibiotic chemoprophylaxis. Tetanus toxoid and the first dose of rabies vaccine were administered in her deltoid muscles. In addition, rabies immune globulin was instilled subcutaneously around the open wounds. The patient presented to a community infectious diseases clinic four days after the injury because of worsening pain at the site of the wounds. There was no erythema, swelling, warmth or discharge from the wound. Nonetheless, the sutures were removed, and oral ciprofloxacin and clindamycin were prescribed, because the patient had a documented severe allergy to penicillin.

Four days after starting the antibiotics, the patient presented to our tertiary care emergency department with increasing pain, swelling, redness and warmth at the site of her wounds. She had no symptoms of systemic illness. On examination, she was afebrile, and her vital signs were within normal limits. The open wounds were surrounded by cellulitis (Figure 2), without fluctuance or evidence of a deeper infection. The results of laboratory investigations, including a leukocyte count, were within normal limits. While in a monitored setting, and after samples had been taken

for bacterial culture, the patient was started on ertapenem. This change in antibiotic therapy was made to cover for potential resistance to ciprofloxacin or clindamycin in a patient with severe penicillin allergy. The patient was then discharged from the emergency department for outpatient antibiotic therapy, which was well tolerated.

Four days after her visit to the emergency department, the patient attended our infectious diseases clinic, at which point substantial improvement of her skin and soft-tissue infection was noted. Ertapenem was continued for a 10-day course, and she received the remaining doses of rabies postexposure prophylaxis (days 3, 7 and 14 after presentation) at a local government clinic, according to provincial protocol.¹ Bacterial culture of samples from the infected wounds, taken after initiation of antimicrobials, did not reveal a pathogen. One month later, the wounds had healed without further complications.

Discussion

Animal bites are common. The resulting injuries include lacerations, avulsions, punctures,

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KEY POINTS

- Otter attacks on humans occur infrequently.
- Antibiotic prophylaxis after an animal bite is indicated for clinically significant wounds and for patients who are immunocompromised. Primary wound closure is routinely indicated only for facial wounds.
- Tetanus prophylaxis should be administered for any bite wound that breaks the skin if the patient has not received previous doses of the tetanus toxoid, if the vaccination history is unknown, if the most recent dose was administered more than 10 years ago, or if the most recent dose was administered more than 5 years ago and the wound is severe.
- Rabies prophylaxis must be considered for all patients with mammal bites, particularly if there was unusually aggressive behaviour. If rabies immune globulin is given, it should be instilled around the bite wounds (if anatomically possible), with the vaccine being administered at a remote site.

scratches and crush injuries. In the United States, animal bites account for an estimated 800 000 medical visits yearly and 1% of all emergency department visits.² Land mammals are responsible for most bites, whereas marine mammals are an infrequently reported cause of animal bites.

Risk of bacterial infection

Bacterial infections are an important complication of animal bites. This risk is modulated by several factors: the animal species; the site, size

and depth of injury; and the delay between the bite and initial medical consultation. Infection most commonly occurs in the form of localized cellulitis, with or without deeper tissue involvement. The pathogenic organisms may originate from the environment, the victim's skin flora or the animal's oral flora, which often reflects the microbiome of its diet. Whenever possible, samples should be taken from all suspected wound infections for aerobic and anaerobic bacterial culture, to guide antibiotic therapy.

Appropriate wound care after an animal bite is crucial. No data on the specific management of other bite wounds is available. However, extrapolating from the management of other animal bite injuries, important principles include proper local care and suitable antimicrobial prophylaxis when indicated. Irrigation of the affected area and judicious débridement of devitalized tissue are important, to decrease the rate of subsequent infection. Primary wound closure is generally not recommended by guidelines except for facial wounds.³ Antimicrobial prophylaxis, for up to five days, is recommended by guidelines in the setting of animal bites in the presence of primary wound closure, moderate to severe injuries, lesions to the hand or face, or deep injuries that may have penetrated the periosteum or joint capsule, as well as in patients who are immunocompromised.⁴ Patients who are asplenic, who have advanced liver disease or who have pre-existing edema to the affected area are considered to have a potentially impaired immune response and should receive prophylaxis.³

Although the term “prophylaxis” is commonly employed, in some cases antibiotic administration may represent early treatment, given that bite wounds inoculate the site with microorganisms that may immediately establish an infection. Antibiotic selection requires coverage



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Figure 1: River otter (*Lontra canadensis*). Licensed under the Creative Commons Attribution-Share Alike 3.0 unported licence (<https://creativecommons.org/licenses/by-sa/3.0/deed.en>). Image available at https://commons.wikimedia.org/wiki/File:LutraCanadensis_fullres.jpg.



Figure 2: Appearance of infected wounds on both legs, eight days after the original incident.

for β -hemolytic streptococci, *Staphylococcus aureus* and the predicted antimicrobial susceptibilities of the animal's typical oral flora. Amoxicillin–clavulanate is often used in this situation.³

Importance of vaccination

In addition to chemoprophylaxis, consideration must be given to administering tetanus toxoid and rabies prophylaxis (Box 1). In general, tetanus toxoid should be administered for any bite wound that breaks the skin if the patient has not received previous doses of the tetanus toxoid, if the vaccination history is unknown, if the most recent dose was administered more than 10 years ago, or if the most recent dose was administered more than 5 years ago and the wound is severe.⁵ Human tetanus immune globulin should be added for severe wounds in patients who have not received three prior doses of the tetanus vaccine and in those who have a humoral immunodeficiency.⁵

The rabies virus is transmitted only by mammals, with transmission occurring through bites, scratches, abrasions or contact with an infected animal's saliva.¹ In Canada, animal reservoirs include foxes, skunks, raccoons and bats, which may transmit the virus to dogs, cats and humans.⁶ Unless previously immunized, patients should receive a combination of rabies immune globulin administered subcutaneously around the site of the wound within seven days of exposure, as well as the rabies vaccine intramuscularly. The vaccine must be given at a different body site from the immune globulin.⁴ In the setting of high-risk exposure, there are no absolute contraindications to the vaccine.^{1,4} The schedules for postexposure prophylactic vaccination vary in accordance with the product used, prior exposure to rabies vaccine and immunocompetence.⁴ When used according to current guidelines,¹ postexposure prophylaxis is highly efficacious. However, failure to infiltrate wounds with rabies immune globulin and primary closure of wounds before infiltration of the immune globulin have both been associated with the development of human rabies despite otherwise adequate postexposure prophylaxis.⁷ Moreover, the vaccine itself should be administered in the deltoid muscle whenever possible; gluteal injections have been associated with a decreased immune response.⁶

Box 1: Resources — Canadian Immunization Guide (Public Health Agency of Canada)

- Tetanus: www.phac-aspc.gc.ca/publicat/cig-gci/p04-tet-eng.php
- Rabies: www.phac-aspc.gc.ca/publicat/cig-gci/p04-rabi-rage-eng.php

River otter bites

Despite appropriate wound irrigation in this patient, a skin and soft-tissue infection developed within one week of the otter-inflicted lesions. There are several potential reasons for this infection. Primary closure of the wound was performed without initial antibiotic prophylaxis. In addition, although the patient subsequently received ciprofloxacin and clindamycin, this combination may have provided inadequate antimicrobial coverage if there was antimicrobial resistance. A patient's skin flora may include β -hemolytic streptococci and *Staphylococcus aureus*, both of which can be resistant to clindamycin. The river otter's oral flora may have included gram-negative organisms such as *Escherichia coli*, *Salmonella* sp. and *Pasteurella multocida*,⁸ all of which could be resistant to ciprofloxacin. In a freshwater injury, consideration must also be given to *Aeromonas* sp., which may cause severe invasive infections and can carry ciprofloxacin resistance. Given the range of possible pathogens, the patient's severe penicillin allergy and the disease progression on highly bioavailable oral therapy, the antibiotics were changed to carbapenem monotherapy, with the first dose administered under observation in the emergency department. The patient also received appropriate prophylaxis against tetanus and rabies.

The North American river otter (*L. canadensis*) tends to avoid areas of dense population and human interaction; thus, aggressive human–otter encounters are exceptional. Only 44 cases of otter attacks have been published worldwide since 1875.⁹ Such encounters are often the consequence of human encroachment upon otter territory, and the resulting injuries may be quite severe, because river otters have sharp canines and carnassials.⁹ Although uncommon, rabies in these aquatic mammals has been described.¹⁰ Untreated rabies is invariably fatal, so postexposure prophylaxis with vaccination and administration of immune globulin must be considered, especially if the animal demonstrated bizarre or aggressive behaviour, as in this case. Unfortunately, it was not possible to capture the animal in question for definitive testing.

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The section Cases presents brief case reports that convey clear, practical lessons. Preference is given to common presentations of important rare conditions, and important unusual presentations of common problems. Articles start with a case presentation (500 words maximum), and a discussion of the underlying condition follows (1000 words maximum). Visual elements (e.g., tables of the differential diagnosis, clinical features or diagnostic approach) are encouraged. Consent from patients for publication of their story is a necessity. See information for authors at www.cmaj.ca.