Short Report: Ceftriaxone for cat and dog bites

Simple outpatient treatment

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Wounds inflicted by cats and dogs are reported to account for 1% yearly of all visits to emergency departments (EDs).[1] Although dogs cause most animal-inflicted wounds (95%), infections occur more commonly after cat bites (50% incidence) than dog bites (10% to 15% incidence).[2] Cats' teeth cause deep punctures and seed tissues with their oral bacteria. *Pasteurella* species, the pathogen isolated most commonly from infected animal bites, is recovered from 50% of infected dog bites and 75% of infected cat bites. Other important pathogens include Streptococci, *Staphylococcus aureus*, *Capnocytophaga*, and assorted anaerobic bacteria.[3]

Erythromycin, clarithromycin, and first-generation cephalosporins are ineffective against *Pasteurella* species.[4,5] Amoxicillin-clavulanate, other β-lactamase inhibitor combinations, and certain second- and third-generation cephalosporins provide good to excellent activity against most animal-bite pathogens.[4,5] Published recommendations cite oral amoxicillin-clavulanate as the drug of choice for mild infections caused by animal bites,[6] and hospitalization and intravenous (IV) antibiotics for moderate and severe infections.[6-8] The latter treatment is expensive and inconvenient.

For moderate-to-severe wound infections, you could choose the antibiotic ceftriaxone, a third-generation cephalosporin. Although never directly assessed for clinical efficacy in animal-wound infections, it is effective against common bite pathogens.[9] Its serum half-life of 8 hours permits once-daily dosing and eliminates need for hospitalization merely for drug administration.[10] Intramuscular (IM) administration of ceftriaxone is technically simple, rapidly done, and nearly painless, and it eliminates the cost and inconvenience of establishing IV access. Ceftriaxone is covered by most drug plans.

This paper describes our experience with an ED protocol that used ceftriaxone in the initial phase of outpatient management of seriously infected wounds from animal bites.

METHODS

Consecutive ED patients with moderate-to-severe acute infections inflicted by dogs or cats were included if they had impaired function in the affected limb and swelling, erythema, or purulent discharge in the bite or scratch area. Patients were placed on a protocol that called for an injection of 1 g of ceftriaxone (IV or IM), discharge home, and return the next day for follow up in the Cellulitis Clinic attached to the ED and staffed by infectious

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This article has been peer reviewed.
Cet article a fait l'objet d'une évaluation externe.
Can Fam Physician 2004;50:577-579.

disease physicians. For IM administration, ceftriaxone was reconstituted with 2.2 mL of 1% plain lidocaine per 1g vial and injected into the gluteus maximus muscle 5 cm below the posterior iliac crest.

Ceftriaxone was continued daily at the Cellulitis Clinic until the infection improved sufficiently (no systemic symptoms; increased range of motion of local joints; decreased pain, erythema, and swelling) for step-down to oral antibiotics. The choice of oral antibiotic was not standardized but left to the discretion of physicians.

RESULTS

From October 1999 to November 2000, 23 consecutive patients with moderate-to-severe infected wounds from cat or dog bites were managed according to the protocol. Characteristics of the population are shown in **Table 1**. Most of the infected wounds were inflicted by cats: 83% from bites, 17% from scratches. Average length of time between injury and initial presentation to the ED was 2 days. No patients sought medical care on the day of the injury or received prophylactic antibiotics.

All patients went directly to the ED without first seeing a family physician. At the first visit, 48% were treated with ceftriaxone alone or in combination with another antibiotic. All were seen the next day in the Cellulitis Clinic and all were given ceftriaxone by injection (65% IV, 35% IM). Median number of hospital visits (ED and Cellulitis Clinic) in the initial stages of infection was three (range two to seven). In the step-down phase, 74% were given amoxicillin, and the remainder were given levofloxacin, cephalexin, and doxycycline. Mean duration of oral step-down antibiotic therapy was 7 days (range 5 to 14).

All 23 patients had excellent outcomes with no relapses or local, systemic, acute, or long-term complications. Mean number of days of ceftriaxone was 3 (median 2, range 1 to 4); 11 of 23 patients required only 2 days of ceftriaxone. No patient required more than 4 days of ceftriaxone before being switched to oral antibiotic therapy. Mean total duration of antibiotic treatment was 11 days (median 10, range 7 to 21).

Table 1. Characteristics of patients presenting to the emergency department with acute infections of wounds inflicted by cats or dogs: *Patients ranged in age from 17 years to 81 years (mean 52 years).*

CHARACTERISTICS	N (%)
Sex	
• Male	10 (43)
• Female	13 (57)
Animal inflicting wound	
• Cat	19 (83)
• Dog	4 (17)
Type of wound	
• Bite	19 (83)
• Scratch	4 (17)
Relationship to animal	
• Pet	16 (70)
• Stray	4 (17)
• Unknown	3 (13)
Site of wound	
• Hand	19 (83)
• Forearm or upper arm	3 (13)
• Leg	1 (4)
Wound sites cultured	4 (17)
Culture result	2 *Pasteurella multocida*, 1 skin flora, 1 no growth

DISCUSSION

In this protocol, ceftriaxone brought about excellent outcomes for all patients. None required hospitalization. In previous studies, the rate of hospitalization was 0 to 35%, with mean length of stay from 2 to 16 days.[5,11]

Patients can develop complications related to infection, such as osteomyelitis, bacteremia, abscess, and tenosynovitis, that occur at rates ranging from 0 to 48%.[7,12] No patient on this protocol developed local, systemic, or long-term complications related to infection.

Average number of doses of parenteral antibiotic was three (range one to four). Total duration

of antibiotic (oral and parenteral) treatment was 11 days (range 7 to 21). This is comparable with results of a study of infected cat bites by Westling et al[12] in which average duration of antibiotic treatment was 13 days (range 3 days to 3 months).

Ceftriaxone is costly compared with most oral antibiotics; a 1g dose costs approximately $35. Initial therapy with ceftriaxone provides a substantial economic benefit, however, when its short course and the reduced rate of hospitalizations are considered.

CONCLUSION

In the initial phase (first 3 or 4 days) of treatment of moderately to severely infected animal bites, ceftriaxone by injection (1g once daily) is convenient and effective. Intramuscular injection eliminates the equipment and time necessary for IV infusion and is therefore suitable for busy EDs and family practice offices. Patients with infected animal bites can be managed in family practice clinics where the only equipment necessary for IM injection is the ceftriaxone, plain lidocaine, a needle, and a syringe.

Contributors

Dr Pennie, *principal investigator, conceived and executed the study, was involved in data analysis, and was principal author of the article.* **Dr Szakacs** *analyzed the data and wrote the first draft of the article.* **Dr Smaill, Mr McTaggart,** *and* **Dr McCallum** *helped design the study protocol, gather the data, and refine the article.* **Dr Smieja** *gathered and analyzed the data, provided statistical expertise, and helped refine the article.* **Dr Yamamura** *gathered data and helped refine the article.*

Competing interests

None declared

EDITOR'S KEY POINTS

- Outpatient treatment of moderate-to-severe cat and dog bites was successful with 1 g of ceftriaxone (intravenous or intramuscular) for 2 to 4 days initially, followed by oral antibiotics, usually amoxicillin.
- The intramuscular protocol could be easily administered from a family doctor's office and would avoid hospitalization or intravenous access problems.

POINTS DE REPÈRE DU RÉDACTEUR

- Dans les morsures de chat ou de chien modérées à sévères, l'administration intraveineuse ou intramusculaire de 1 g de ceftriaxone pendant 2 à 4 jours, suivie d'un antibiotique par voie orale, habituellement l'amoxicilline, s'est avérée efficace.
- Les injections intramusculaires peuvent facilement être données dans un cabinet de médecine familiale, ce qui permet d'éviter l'hospitalisation et les difficultés d'accès à la voie intraveineuse.

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