Treatment of canine sarcoptic mange using milbemycin oxime

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A 5-year-old, castrated male, Border collie and a 1-year-old, castrated male, Siberian husky from the same household were presented for examination of severe generalized pruritus of 1 mo duration. The dogs were fed a commercial dry dog food (Science Diet Dry Maintenance, Hill's, Topeka, Kansas, USA) exclusively. The only other household pet was a cat. Neither the cat nor human members of the household had signs of pruritus or skin problems. The dogs slept in a wood-floored, outdoor dog house, bedded with blankets. Both dogs were permitted to roam and had contact with neighbors' dogs.

Clinical signs observed on physical examination included erythema, excoriations, crusts, papules and pustules on the ventral abdomen, hocks, elbows, and the pinnas of both dogs. Skin lesions were more severe on the Border collie. Fleas were not observed on either dog. Both animals scratched continuously during examination and had positive pinnal/pedal reflexes when their pinnal margins were folded. The Border collie had mild peripheral lymphadenopathy. The differential diagnoses in these cases included sarcoptic mange (scabies), food allergy, atopic dermatitis, pruritic pyoderma, and dermatophytosis.

Dermatophytes were not observed on microscopic examination of hair samples from both dogs. Superficial skin scrapings from the Border collie revealed one *Sarcoptes scabiei* ovum. Cytological examination of pustular contents recovered from each dog showed many degenerated neutrophils with intracytoplasmic cocci-shaped bacteria, eosinophils, and macrophages, consistent with secondary bacterial pyoderma.

The Siberian husky was treated with ivermectin (Ivomec, MSD-AgVet, Merck & Co Inc, Rahway, New Jersey, USA) (250 µg/kg BW, diluted 1:10 with propylene glycol, PO, q10d, for 30 d). Ivermectin may cause adverse reactions in collies or collie-crosses(1–3). Furthermore, the owner was reluctant to have the collie shaved to permit treatment with topical dips. Consequently, investigational treatment with milbemycin oxime (Interceptor, Ciba-Geigy Corporation, Greensboro, North Carolina, USA) (0.75 mg/kg BW, PO, q10d for 30 d) was undertaken. A 30 d treatment regimen was subjectively adopted, relying upon the efficacy of the ivermectin administration protocol. The superficial pyoderma in both dogs was treated with a combination of clavulanate and amoxicillin (Clavamox, SmithKline Beecham Animal Health, Exton, Pennsylvania, USA) (13 mg/kg BW, PO, q12h for 3 wk).

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Five days after initiation of treatment, the owner reported that the pruritus was greatly decreased in the Siberian husky treated with ivermectin. In most cases of canine scabies treated with ivermectin, a positive response is seen a few days after the first dose is administered. No improvement in the clinical signs of the Border collie treated with milbemycin oxime was reported. Therefore, a treatment protocol utilizing milbemycin oxime q5d for 30 d, rather than q10d for 30 d, was initiated. Three days after the second milbemycin dose, the owner reported very little improvement in the clinical signs of the Border collie. Therefore, daily treatment with milbemycin oxime (0.75 mg/kg BW, PO, q24h for 30 d) was undertaken. Ten days later, the owner reported both animals to be nonpruritic.

Ten days after the initial diagnosis of *S. scabiei* dermatitis in the 2 dogs, the owner also developed clinical signs, including pruritic erythematous papular skin lesions in areas of tight-fitting clothing. Treatment was not initiated for the owners. Canine sarcoptic mange is a self-limiting disease in healthy humans. Lesions usually resolve once infested dogs are treated appropriately. Both dogs were treated for a total of 30 d. The dogs were reevaluated 3 mo later, and both were free of lesions.

Canine scabies, also referred to as sarcoptic mange, is caused by the mite *S. scabiei*. This disease should be considered in any dog with a nonseasonal, intensely pruritic dermatitis. The index of suspicion should increase if more than one dog in the household is affected, or if family members show pruritic erythematous papules. Adult mites live approximately 4 to 5 wk, with the egg-larva-nymph-adult cycle lasting 17 to 21 d. The entire life cycle is completed on the skin of the host. Canine sarcoptic mites can survive as long as 19 d in the environment(4), under appropriate climatic conditions, but mites typically remain infective for only 24 to 36 h(5,6). Therefore, a thorough treatment of the environment is not emphasized. Many of the clinical signs of scabies in pigs(7), humans(4), and dogs(5,6) are believed to result from hypersensitivity reactions. Historically, the most consistent finding in cases of scabies is pruritus. There is no age, breed, or sex predilection. The pattern of pruritus tends to include the extremities, ventrum, and face, especially the pinnas(5,8), as observed in these cases. Chronic cases of scabies may show hyperpigmentation or lichenification. Secondary superficial pyoderma is common and should be treated with appropriate antibiotic therapy. Peripheral lymphadenopathy is present in 50% of cases, and a positive pinnal/pedal reflex is seen in more than 75% of cases (9). However, a positive pinnal/pedal reflex is not specific for scabies; other pruritic ear diseases may cause a positive reflex.

Definitive diagnosis of scabies is reached by positive skin scrapings demonstrating mites, eggs, or feces of *S. scabiei*. A definitive diagnosis may also be made by complete cure following scabicidal therapy, since

negative skin scrapings do not rule out the diagnosis of scabies.

A search for the source is recommended in dogs with scabies. Kennels, grooming facilities, veterinary hospitals, obedience classes, or any possible contact with other dogs could be a source of infection. In this case, both dogs were allowed to roam freely in the surrounding fields and the owners were aware of some contacts with the neighbors' dogs, making the exact source of exposure difficult to determine. The neighbors were contacted at the time of initial diagnosis, but none of their animals showed signs of infestation. Clinical signs of infestation may take from 10 d to 8 wk to develop after transmission of the mite. Transmission usually occurs through direct contact with an infected dog(6). This could explain the delayed appearance of clinical signs of infestation in the owner.

Topical treatments for canine scabies include lime sulfur (5% dilution, q5 to 7d for 5 to 6 dips), organophosphates, or amitraz dips (0.025% dilution, q2wk for 3 dips). Amitraz has been reported effective but is not approved for this use in dogs(5,6). The major drawbacks to topical therapy are time, effort, and expense. Additionally, many owners find the total body clip, which is advised for proper application of the dips in long or thick-coated breeds, objectionable.

Ivermectin, used as systemic therapy, is an excellent option in dogs other than collies, Border collies, collie-crosses, or dogs less than 16-wk old (5). Ivermectin at a dosage of 250 µg/kg BW, administered SC or PO, q10 to 14d for 2 to 4 treatments, is efficacious against scabies in dogs (3,5). Administration is inexpensive and relatively easy. Ivermectin is not approved for the treatment of scabies in dogs and it should not be administered without warning clients of the potential, but rare, adverse reactions. Adverse reactions include ataxia, weakness of hindlimbs, seizures, coma, and death. Gastrointestinal disturbances, including vomiting and diarrhea, that usually resolve within 48 h after administration are occasionally observed (9).

The oral antiparasitic agent, milbemycin oxime, is a macrolide antibiotic made from the fermentation of *Streptomyces hygroscopicus* spp. *aureolacrimosis*. Structurally, milbemycin is closely related to the avermectins produced by *S. avermitilis*. Interceptor, an approved once-a-month heartworm preventative, is a mixture of milbemycin A_3 oxime and milbemycin A_4 oxime with potent, broad spectrum anthelmintic insecticidal and acaricidal activity(10–11). This activity is believed to result from disruption of invertebrate gamma amino butyric acid (GABA) neurotransmission (12). It has also been used recently in the treatment of generalized demodecosis at dosages ranging from 0.5 mg/kg to 3.8 mg/kg BW, q24h, for 2 to 4 mo (13–14). Adverse clinical signs consisting of reversible neurological signs have been observed rarely, and only at higher dosages (3.8 mg/kg BW, q24h)(13).

The toxicity of milbemycin oxime is reportedly low (Stansfield DG, Hepler DI, personal communication). Eight-week-old puppies showed transient trembling and ataxia when administered 9 mg/kg or 15 mg/kg BW, q24h, for 3 d. Adverse reactions were not observed in collies known to be sensitive to ivermectin (macrocyclic lactone sensitive) that were treated with milbemycin, 10 mg or less/kg BW, PO(15). The oral LD_{50} for the adult canine is >200 mg/kg BW (12). Potential risks of treatment of canine scabies with milbemycin are not known at this point. Further studies are required to determine clinical efficacy, toxicity, and optimal dosage and dose intervals.

In this case, the dog treated with milbemycin did not show any clinical toxic effects, and 30 d of treatment at a dosage of 0.75 mg/kg BW, PO, q24h, resolved his condition. The use of milbemycin oxime to treat canine scabies has not previously been reported. Milbemycin is promising as a systemic treatment for collies or collie-crosses, when clients are reluctant to use topical therapy. Milbemycin is not licensed for use in the treatment of canine scabies and is expensive. Therefore, its use will likely be limited to a restricted group of well-informed clients. CVJ

References

1. Paul AJ, Tranquilli WS, Seward RL, Todd KS Jr, DiPietro JA. Clinical observation in collies given ivermectin orally. Am J Vet Res 1987; 48: 684–685.
2. Pulliam JD, Seward RL, Henry RT, Steinberg SA. Investigating ivermectin toxicity in collies. Vet Med 1985; 80: 33–40.
3. Paradis M. Ivermectin in small animal dermatology. In: Kirk RW, Bonagura JD, eds. Current Veterinary Therapy X. Philadelphia: WB Saunders, 1989: 560–563.
4. Arlian LG, Runyan RA, Achar S, Estes SA. Survival and infestivity of sarcoptes scabiei var. canis and var. hominis. J Am Acad Dermatol 1984; 11: 210–215.
5. Griffin CE. Scabies. In: Griffin CE, Kwochka KW, McDonald JM, eds. Current Veterinary Dermatology. St. Louis: Mosby Yearbook 1993: 85–89.
6. Bevier DE. Parasitic dermatoses in the dog and cat II. Proc 57th Annu Meet Am Anim Hosp Assoc 1990: 87–89.
7. Martineau GP, Van Neste DJJ, Charette R. Pathophysiology of sarcoptic mange in swine II. Compend Contin Educ Pract Vet 1987; 9: F93–98.
8. Muller GH, Kirk RW, Scott DW. Small Animal Dermatology, 4th ed. Philadelphia: WB Saunders 1989: 396–404.
9. Plumb DC. Veterinary Drug Handbook. White Bear Lake, Minnesota: PharmaVet 1991: 401–405.
10. Bowman DD, Parsons JC, Grieve RB, Hepler DI. Effects of milbemycin on adult *Toxocara canis* in dogs with experimentally induced infection. Am J Vet Res 1988; 49: 1986–1989.
11. Bowman DD, Johnson RC, Hepler DI. Effects of milbemycin oxime on adult hookworms in dogs with naturally acquired infections. Am J Vet Res 1990; 51: 487–490.
12. Talbot RB. Veterinary Pharmaceuticals and Biologicals, 7th ed. Lenexa, Kansas: Veterinary Medicine Publishing 1990: 441–442.
13. Miller WH Jr, Scott DW, Wellington JR, Panic R. Clinical efficacy of milbemycin oxime in the treatment of generalized demodecosis in adult dogs. J Am Vet Med Assoc 1993; 203: 1426–1429.
14. Garfield RA, Reedy LM. The use of oral milbemycin oxime (Interceptor) in the treatment of chronic generalized canine demodecosis. Vet Dermatol 1992: 231–235.
15. Blagburn BL, Hendrix CM, Lindsay DS, Vaughn JL, Mysinger RH, Hepler DI. Milbemycin: Efficacy and toxicity in beagle and collie dogs. Proc Am Heartworm Soc 1989: 109–113.