Demodex spp.

Demodex spp. for Dog Last updated:
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Synopsis

CAPC Recommends

Most Demodex spp. are considered normal mammalian fauna with disease resulting from an overgrowth due to an underlying condition.

Demodicosis due to D. canis and D. injai is diagnosed by microscopic examination of deep skin scrapes from affected areas of alopecia.

Most cases of localized demodicosis resolve spontaneously without treatment.

Species

Demodex canis

Demodex injai

Demodex sp. "cornei"

Overview of Life Cycle

Most Demodex spp. are considered normal mammalian fauna.

Neonates are thought to typically acquire mites from the dam via direct skin-to-skin contact, but most individual animals do not develop clinical disease.

All stages of the life cycle (eggs, larvae, nymphs [protonymph, deutonymph], adults) reside within the lumen of hair follicles and within sebaceous gland ducts; some species are more commonly found in the stratum corneum (Demodexsp. “cornei”).

Development from egg to adult takes approximately 20 to 35 days and is completed entirely on the host.

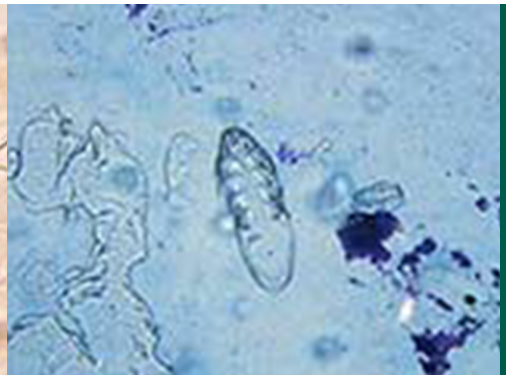
Stages

Six-legged larvae hatch from fusiform-shaped eggs and undergo several molts to become eight-legged nymphs and ultimately adults.

Adults are eight-legged, slender, and elongated mites; their appearance is often described as cigar-shaped.

In the canine Demodex species, the length of adult mites ranges from 180 to 210 µm for D. canis, 330 to 370 µm for D. injai, and 90 to 140 µm for Demodex sp. “cornei”.

Demodex canis



Demodex sp.

Demodex injai

Disease

Although most Demodex spp. are considered normal mammalian fauna, overgrowth of mites may be associated with development of patchy hair loss or mild to severe dermatitis in dogs and (less commonly) in cats.

Canine demodicosis may be localized or generalized and both forms may present in either juvenile or adult dogs.

Pruritus does not occur in uncomplicated infestations; however, pruritus may be present with concurrent secondary bacterial pyoderma.

In dogs, localized demodicosis—characterized by a mild, nonpruritic, patchy alopecia on the head or limbs—usually develops in puppies less than 6 months of age. Most cases of juvenile-onset localized demodicosis resolve spontaneously without treatment. For that reason, the remainder of this recommendation in regards to dogs will focus on generalized demodicosis as localized demodicosis is not considered severe nor does it require treatment.

Generalized demodicosis in dogs is a moderate to severe disease that in most cases is attributable to an overgrowth of mites believed to occur because of an underlying systemic disease or immune defect. With Demodex sp. “cornei”, however, the infestation itself is thought to cause disease.

Physical examination findings include alopecia (which may involve several large to coalescing areas of affected skin), erythema, and often secondary superficial or deep pyoderma. Lymph nodes may be enlarged, and when pyoderma is present, pruritus may develop.

Prevalence

Canine demodicosis (demodectic mange) due to D. canis is a common skin disease in the dog; disease due to D. injai or Demodex sp. “cornei” in dogs appears to be rare.

Host Associations and Transmission Between Hosts

Demodex spp. are host-adapted mites of mammals. Mites have not been shown to cross-infest between dogs and cats, nor are they transmitted to people. Neonates are thought to acquire mites from their dam via direct skin-to-skin contact during nursing.

Transmission of mites may also occur during direct contact between older animals, but demodectic mange is not contagious as most animals that develop generalized demodicosis are thought to have an underlying immune defect (see **Disease**).

Demodexsp. “cornei” of dogs may be contagious.

Site of Infestation

Demodex canis and D. injai infest hair follicles and sebaceous glands.

Mites may occasionally be reported from other tissues (e.g., lymph node, intestinal wall, kidney, thyroid gland) following dissemination via blood or lymphatic drainage.

Early studies of nursing neonatal puppies have found D. canis mites initially within the skin of the face, and then over time mites are transferred throughout the skin of the entire body. Mites are not found in the skin of stillborn puppies or puppies born by Caesarian that are not allowed to nurse.

Localized demodicosis in dogs most commonly develops on the head or limbs; the lesions of generalized canine demodicosis may develop anywhere on the body.

Pathogenesis

The immunopathogenesis of demodicosis is not fully understood, and in most cases an underlying cause is not identified. Although a responsible condition is not always identified, many cases of generalized demodicosis appear to be the direct result of underlying diseases that compromise the immune system. Excessive cortisone, poor nutrition, chemotherapy, estrous cycles, and underlying cancer or diabetes have all been associated with the development of generalized demodicosis in individual animals. Accordingly, dogs with generalized demodicosis should be carefully evaluated for potential underlying disease states.

No specific deficits in innate or humoral immunity have been identified in dogs with generalized demodicosis. However, some studies suggest that cellular immunity may be compromised in some individuals that go on to develop generalized demodicosis.

Diagnosis

Demodicosis due to D. canis and D. injai is diagnosed by microscopic examination of deep skin scrapes from affected areas of alopecia.

Technique

Place a drop of mineral oil or microscopic immersion oil onto a rounded scalpel blade (#10 or #20).

Pinch the skin together at the area of interest and scrape the skin firmly to remove the superficial epidermis. The area should turn red (not bloody) if the scraping is done correctly.

It is important to sample from several areas to get a representative sample from the patient.

Deposit the oil/scraping mixture onto a microscope slide and examine at 10x magnification. Mites and their eggs will be clearly visible at low power, but accurate identification of the mite will require 40x magnification.

You may have to tease apart the scrapings on the microscope slide with needles, especially when significant hyperkeratosis is present.

Alternatively, in uncooperative dogs or sensitive areas in which skin scrape is difficult (e.g., feet, interdigital region, periorbital), a trichogram may be performed by plucking hairs from an affected area and placing them in mineral oil on a slide for microscopic examination.

Because Demodex sp. “cornei” reside within the stratum corneum, superficial skin scraping or tape impression offers a better method for detecting these mites.

In rare cases of “occult demodicosis,” i.e., no mites are observed with either the skin-scraping or hair-pluck techniques, a skin biopsy may demonstrate Demodex mites. The mites (or mite fragments) can be seen within the lumen of the hair follicles or (rarely) within the sebaceous glands/ducts, depending on the type of mite. This technique may be necessary in Demodex cases involving the feet and in the Chinese Shar Pei.

Fecal flotation should be performed in conjunction with the clinical work-up for a suspect Demodex patient. Due to the grooming behavior of dogs, mites may be groomed from the skin and will transit through the gastrointestinal system to be recovered during routine fecal flotation procedures. A fecal flotation is also a non-invasive method to attempt to obtain a diagnosis and may yield information regarding other potential endoparasites which could be playing a role in the immune-compromise of the patient. This methodology of diagnosis may prove particularly helpful with an aggressive patient. A negative fecal flotation for Demodex spp. mites does not, however, rule out demodicosis.

Molecular methods are now available for speciation of the different Demodex spp. mites present in dogs if a morphological diagnosis cannot be determined.

Treatment

There are no products that are label-approved for the treatment or prevention of Demodex spp. in dogs in the United States. All of the following treatments discussed constitute an extra-label use of available products. Veterinarians should consult relevant package inserts for information regarding approved usage, safety, and efficacy.

Dogs- Localized Demodicosis

Most cases of localized demodicosis resolve spontaneously without treatment.

A rotenone-based insecticide ointment (Goodwinol) has been used with some success. Although the ointment is miticidal, localized irritation may occur.

For patients experiencing localized demodicosis, placement of those patients on a flea & tick preventive product with documented extra-label efficacy against Demodex mites (when used at a dose and dosing regimen consistent with product labeling) may facilitate clinical resolution and potentially prevent the local infestation from progressing to the generalized form.

Dogs- Generalized Demodicosis

Generalized demodicosis may require extended, aggressive therapy to resolve disease.

Comprehensive treatment should include (1) use of an effective miticide, (2) evaluation for any underlying disorders and appropriate treatment when found, (3) antibiotic therapy when pyoderma is present, and (4) spaying of female dogs to prevent recurrence during subsequent heat cycles.

Several months of treatment may be required to eliminate the mites. Selected treatment should be continued for 1 to 2 months after mites are no longer detected on skin scrape. If a flea & tick product or heartworm prevention product is selected as the treatment modality, it is recommended that the use of these products be continued for the life of the pet and subsequently used as labeled following resolution of the demodicosis.

Miticidal treatments not labeled in the United States include the use of isoxazoline-containing products in an extra-label manner (e.g. afoxolaner, fluralaner, lotilaner, or sarolaner) or macrocyclic lactone-containing products in an extra-label manner (e.g. high-dose oral ivermectin, oral milbemycin oxime, topical moxidectin, and injectable doramectin).

Isoxazoline-containing products:

Afoxolaner (NexGard®; 2.5 mg/kg), lotilaner (Credelio®; 20 mg/kg), and sarolaner (Simparica®; 2 mg/kg): These products are intended to be administered orally once a month to dogs for the treatment and control of fleas and ticks*; these products are labeled for use in dogs only in the United States.

Fluralaner (Bravecto®; 25 mg/kg) is intended to be administered orally or topically every 12 weeks to dogs or cats for the treatment and control of fleas and ticks*; Bravecto® chews are labeled for use in dogs only while Bravecto® topical is approved for both dogs and cats.

All four of the available isoxazoline compounds have been shown safe and effective at achieving clinical resolution in dogs experiencing generalized demodicosis when the product was administered consistently and according to label (monthly or every 12 weeks, respectively); oral fluralaner has been shown safe and effective at treating generalized demodicosis in cats.

The practitioner is advised to seek out up-to-date information regarding the extra-label and labeled use of these products as new information continues to emerge regarding this relatively new drug class and the projected inclusion of these compounds in future products.

*the species of ticks included on the label of these products varies by product; the practitioner is advised to read the package insert regarding label claims against different tick species.

Macrocyclic lactone-containing products:

Some dogs, particularly herding breeds such as Collies, Shetland Sheepdogs, Border Collies, Australian Shepherds, and Old English Sheepdogs, may have mutations in their MDR1 genes and thus have increased risk of toxicity to macrocyclic lactones. Treatment should be discontinued if any neurologic signs develop. Practitioners can determine whether a dog has the MDR1 mutation by sending a cheek scraping to the Washington State University at Pullman College of Veterinary Medicine Veterinary Clinical Pharmacology Lab for analysis (http://www.vetmed.wsu.edu/dept... may be given orally at escalating doses using 100 µg/kg increments. Begin with 100 µg/kg for 3 days followed by 200 µg/kg for 3 days followed by 300 µg/kg. Some practitioners recommend remaining at the 300-µg/kg dose whereas others recommend continuing to increase the dose every 3 days to 600 µg/kg.

Milbemycin oxime has also been used daily at doses ranging from 0.5 to 2 mg/kg. Doses are escalated gradually, building to a final dose of 1.5 to 2.0 mg/kg.

Moxidectin/imidacloprid topical carries a label claim in Europe for treatment of D. canis infestation at the standard labeled dose. Treatment is more effective when administered every two weeks.

Doramectin may be injected subcutaneously once a week at the dose of 600 µg/kg in dogs negative for the MDR1 gene mutation.

Control and Prevention

For intact female dogs that develop generalized demodicosis, spaying is recommended because they may experience relapse of disease in subsequent heat cycles.

The development of demodicosis was long believed to have a genetic predisposition, and as a result, some veterinarians discourage breeding affected animals. The propensity to develop localized demodicosis is hereditary, however, the hereditary nature of generalized demodicosis has not been clearly demonstrated.

Consistent, year-round use of an isoxazoline-containing flea/tick product according to label may prevent the development of generalized demodicosis in canine and feline patients, but use of any of these products for prevention of demodicosis has not been evaluated.

Public Health Considerations

Demodex mites are host-adapted; there is no zoonotic potential in canine demodicosis.

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