

Management of Canine Pyodermatitis

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Introduction

The common, non-contagious, inflammatory parasitic dermatosis known as canine demodicosis is caused by host-specific follicular mites of the *Demodex* species. It is also known as demodectic mange, red mange (erythema or reddish discoloration of the skin), or follicular mange (presence of mites in the hair follicle and sebaceous gland). *Demodex* mites are the normal inhabitants of healthy canine skin; whenever disturbances occur in the cutaneous environment or texture, it leads to an overpopulation of demodex mites, and clinical signs will appear. German shepherds are particularly susceptible to clinical demodicosis, and it primarily affects purebred dogs. A serious pyogenic infection can result from hair follicle rupture, which can allow free mites to enter the dermis and cause secondary bacterial infections of the hair follicles.

The life cycle of demodex mites has four stages: 1) Eggs: fufiform, lemon, or spindle shape, which hatch into larvae in favorable environmental conditions. 2) Larvae: 3 pairs of short legs that moult into nymphs 3) Nymph: 4 pairs of short legs 4) Adult: well-developed mouth parts, head, thorax, 4 pairs of jointed legs, striated thoracic abdomen. Adult males are 40–250 μm , whereas females are slightly larger, around 40–300 μm . Mites get nutrients from the keratin layer of the skin. The whole life cycle requires 20–35 days. *Demodex* mites are cigar-shaped.

Demodex mites are of three types: 1) *Demodex canis*: inhabiting mainly the hair follicle and 180–210 μm long 2) *Demodex injai*: inhabiting mainly the sebaceous gland and 330–370 μm long 3) *Demodex cornei*: inhabits mainly the superficial layer of the epidermis and is 90–140 μm long.

Demodicosis is of two types based on age of onset: 1) Juvenile demodicosis: It is observed in younger age groups of dogs below 18 months because of their immunocompromised state due to endoparasitism and malnutrition. 2) Adult demodicosis: It is observed in dogs above 18 months of age due to immunosuppression with drugs like cyclosporin, glucocorticoids, or chemotherapy, or in dogs with systemic diseases like neoplasia, hypothyroidism, hyperadrenocorticism, malnutrition, or parasitism.

Demodicosis is of two types based on the extent and location of the lesions: 1) Localized form: mostly observed in 3-6-month-old dogs, and 4 or a few lesions observed on the head and neck region, which include seborrhea, dandruff, alopecia, and hyperkeratosis. Pruritus is observed when there is a secondary bacterial infection. Lesions are < 2.5 cm in diameter, resolve spontaneously, and have a good prognosis. 2) Generalized form: mostly observed above 4 years of age and more than 5 lesions, which are erythematous, crusting, ulceration, lichenification, hyperpigmentation, alopecia, and disagreeable odor. Pruritus is observed when there is a secondary bacterial infection. Lesions are >2.5 cm in diameter. It affects any part of the body, and the prognosis of the disease is guarded.

A specific definition of pyoderma is a bacterial skin disorder. Impetigo is a substitute for pyoderma. The term "pyoderma" originates from the Greek "pyo" which means "pus" and "derma" which means "skin". The majority of instances are caused by bacterial infections, which are frequently a side effect of other illnesses including allergies or parasites. In susceptible areas, hair loss results in very little bald patches. Redness and welts may appear at the edges of the hair loss; however shorthaired breeds frequently lack these

symptoms. Dogs with severe pyoderma may exhibit pain, crusting, foul smell, pus and blood discharges.

There are 2 types of Pyodermas in Dogs:

- 1) **Superficial Pyoderma** - In dogs, superficial pyoderma is a skin disorder which leads to red, irritated skin and shallow, pus-filled lesions. The bacterial infection responsible for the condition is typically *Staphylococcus* spp. like *S. aureus* and *S. pseudintermedius*. Hair loss, itching, alopecia and pustules are typical manifestations. Moderate infections can be managed at one's residence with antibiotics either topical or systemic depending on severity and area cleansing. Common antibiotics include cephalexin, amoxicillin-clavulanate, or topical mupirocin.
- 2) **Deep Pyoderma** - Pyoderma gangrenosum, or deep pyoderma in dogs, is a rare and severe form of skin disorder affects the skin's deeper layers causing abscesses or cellulitis, which might end up in painful open sores or ulcers. The main contributory factor is bacterial infection, specifically associated with *Staphylococcus intermedius*. Red, painful nodules or pus-filled abscesses, frequently on the legs, trunk, or neck, constitute some of the warning signs. The skin underlying lesions could be sensitive and inflamed. Dogs who suffer from allergies, immune system abnormalities, or underlying ailments tend to be particularly vulnerable. Poor hygiene practices, wounds to the skin, underlying health conditions like diabetes, immunosuppression, or history of taking steroids are risk factors. It is more prevalent in older and middle-aged adults. Deep pyoderma can be challenging to treat and has to be examined by a veterinarian as quickly as possible. Antibiotics, systemic prescription drugs, and occasionally surgical procedures for getting rid of contaminated material are all possible forms of intervention. In order minimize challenges and encourage recovery, early diagnosis and appropriate treatment are critically important.

Transmission

Demodex is transmitted from bitches to puppies during the first 2–3 days of life due to close contact during lactation. Mites are present in deeper parts of the skin, so they require a prolonged contact

period for transmission. Predisposing factors are: 1) alkaline shampoo and soap, which favor the rapid multiplication of demodex mite. 2) Excessive bathing causes the adsorption of water in the keratin layer of the skin, which leads to alopecia, itching, and irritation. 3) Immuno-exhaustion 4) Chemotherapy; 5) Certain drugs 5) Cellular immunocompetence.

Pathogenesis

The pathogenesis of demodicosis is quite complex. Mostly due to hereditary predisposition (from mother to puppies) and acquired immunosuppression (endocrinopathies, chemotherapies, glucocorticoids) are predisposing factors that lead to the secretion of cytokines secreted by lymphocytes, monocytes, macrophages, mast cells, fibroblasts, and endothelial cells and cause inflammation and irritation. This leads to the secretion of interleukin-5, interleukin-10, TNF- β , and TNF- γ , which suppress T lymphocytes and flare up the spread of demodex mites, which are commensals of the dog skin.

Clinical Signs

The most prevalent clinical signs of pyodermatitis includes papule, pustules, folliculitis, cellulitis, lesions have a raised, red center filled with white pus, circular crusts, dry or flaky skin areas, hair loss, itching, patches of hair loss that cause their hair to stick up or protrude, resembling hives, or their coats may have a mottled appearance, hyperpigmentation, a damp layer or a musty smell on facial region, forelimbs, ear pinna, spaces between toes or skin folds exhibited the majority of lesions, but in cases of generalized form, lesions were present all over the body.

Diagnosis

Based on the physical and clinical examination of the animal, it revealed a mild increase in body temperature and the presence of generalized erythematous, papular, and pustular lesions all over the body, with blood oozing from deep lesions. Pododermatitis was observed along with an inflamed foot mucosa.

Deep skin scrapings from lesions were collected and examined under a 10X microscope after digestion with 10% KOH, which showed cigar-shaped demodex mites. Skin swabs for bacterial culture and antibiotic sensitivity. Leukocytosis and eosinophilia

were observed during the hematological examination.

Treatment

Systemic therapy: Miticidal drug: tablet ivermectin @ 0.3 mg/kg BW, PO, OID on every alternate day for 15 days, Antibiotics like Cefpodoxime @ 5-10 mg/kg BW, PO, OID or cefalexin @ 22-33mg/kg BW, PO, BID, clindamycin @ 11-22mg/kg BW, PO, SID or enrofloxacin @ 5-7mg/kg BW, PO, OID or amoxicillin @ 10mg/kg BW, PO, BID or marbofloxacin @ 2.5-5 mg/kg BW, PO, OID or amikacin @ 15-20mg/kg BW, PO, OID for 15 days, Antihistaminic: Pantoprazole @ 1mg/kg BW, PO, OID 30 minutes before food for 15 days and hydroxyzine hydrochloride @ 2mg/kg BW, PO, OID for a week.

Topical therapy: Bath with Benzoyl peroxide and salicylic acid containing shampoo twice a week, after healing of pyoderma lesion use 12.5% Amitraz lotion 3-4ml/liter of water and apply all over the body once a week after shampoo bath and allow it to dry and prevent licking, Chlorhexidine containing ointment BID for 3 months depending upon the lesion.

Supportive therapy: Omega 3 and omega 6 fatty acid containing syrup at 1 tsp/10 kg BW, PO, BID for a month and immunity booster syrup at 1 tsp/10 kg BW, PO, BID for a month.

Avoid use of corticosteroid because it causes immune suppression.

Conclusion

A significant part of the etiology of generalized demodicosis in young dogs is probably a transient immunological change. In young dogs, demodicosis has a genetic basis, and most likely multiple genes are involved. Most of the time demodicosis is not itchy, but if itching is present, then it is always pyodermatitis. Juvenile pyodermatitis is the most difficult one to treat, so as early as you treat the cases to avoid further spread of disease.



Figure 1: Dog having alopecia, lichenification and blood oozing lesion on head



Figure 2: Dog having erythematous, shallow pus containing lesion on neck region



Figure 3: Dog having erythematous, crusty lesion and alopecia on neck and forelimb



Figure 4: Demodex mite under microscope (40 X)