Demodicosis in Dogs - What’s New?

Canine Demodicosis

- 2 species of demodex mites reported:
  - Demodex canis-most common
  - Demodex injai-large-bodied mite—sometimes presents as a greasy seborrhea in Westies, Shih tzu's.
  - Demodex cornei-recently named short-bodied mite that is found with D. canis—now found to be a variant of D. canis.
Canine Demodicosis
D.canis-adult mite

Canine Demodicosis
Immunology

- The immune system plays a role in the development of juvenile and adult-onset demodicosis.
- Juvenile onset---hereditary defect in mechanism of control of Demodex populations.
- Adult-onset—natural decline in nonspecific immunity, underlying internal medicine disease, steroid use.

Canine Demodicosis
Immunology-juvenile onset

- Humoral immunity: develop antibody titers just fine! Have normal to higher numbers of plasma cells. HYPERcellular spleen and lymph nodes.
- Humoral HYPERactivity seems to be present rather than hypoactivity.
Canine Demodicosis
Immunology-juvenile onset

- Cellular immunity: severely depressed lymphocyte blastogenesis. Lymphopenia and hypocellular lymph nodes/spleen.
- Normal dog L's cultured w/ serum from gen. demodicosis dogs—depressed L's.
- Bacterial pyoderma correlates with degree of immunosuppression.

Canine Demodicosis
Immunology

- Restoration of T-cell function after eradication of large numbers of mites.
- Dogs with generalized demodicosis have lower percentage of IL-2 receptors/production. (TH 1 cells make IL-2—used as autocrine growth factor to drive immune response toward cell-mediated pathways).

Canine Demodicosis
Immunology-Summary

- Generalized juvenile demodicosis is hereditary resulting in a T-cell defect causing mites to multiply to large #’s.
- Secondary bacterial pyoderma further causes T-cell suppression.
- T-cell suppression leads to further increase in #’s of mites.
Canine Demodicosis
normal in healthy dogs?

- 2013 Vet Derm, Ravera I, et.al--
- Small Demodex populations colonize most parts of healthy dogs using PCR found to be normal inhabitants of haired areas of skin of healthy dogs albeit very low numbers.
- If easily found on scrapings has or will be developing generalized demodicosis.

Canine Demodicosis
Localized demodex

- Face and extremities of immature dogs.
- Underlying parasitism, poor quality diet, concurrent steroid use?
- Treatment: benign neglect, benzoyl peroxide gel, mupirocin oint., Goodwinol-irritant, Mitaban--controversial
- Best is to treat locally and recheck patient, avoid steroids--systemic or topical!

Canine Demodicosis
Localized Demodex
**Canine Demodicosis Localized**

- Moral of the story—
- SCRAPE OR PLUCK OR TAPE any alopecic area in a young dog!!
- Most often the explanation for any alopecic lesions of the face is that “they've been playing with the other dog”!

**Canine Demodicosis Generalized**

- Definition: >5 localized lesions, 2 or more feet involved, entire body region.
- Squamous or pustular appearance.
- Predisposing factors in adult onset: unidentified, allergic dermatitis-steroid use, Cushing’s disease, hypothyroidism, neoplasia.
- Prelude to an impending disease if found in adult dogs-assuming no steroid use!

**Canine Demodicosis Generalized Demodex**

- Image of a dog
Generalized Demodicosis

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Generalized Demodicosis

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Adult-Onset Demodicosis

- Study of 41 dogs with adult-onset demodicosis by D. Duclos DACVD found 29% with unidentified underlying condition, 24% with allergic dermatitis (steroid use), 20% with Cushing’s disease, 15% on chemotherapy, and 12% hypothyroid.

- Need to rule out above DDx as well as underlying neoplasia & prior steroid use.
Canine Demodicosis
Generalized

DIFFERENTIAL DIAGNOSES:

- bacterial and yeast pyoderma
- superficial pyoderma
- allergic dermatitis
- hypothyroidism
- keratinization defect
- "puppy strangles"

Canine Demodicosis
Generalized-Juvenile onset

Predisposing factors in juvenile-onset include:

- certain breeds at risk
- possible autosomal recessive trait
- Contagious? Not normally but possible if older, compromised immunity dogs in household.

Demodicosis-Juvenile Onset
Canine Demodicosis
Diagnosis

- Deep skin scrapings/hair plucks/tapings—squeeze skin lst!
- Skin biopsies
- Cbc/serum profile, fecal, heartworm test, thyroid panel, tests for Cushing’s disease, radiographs—in cases of adult onset where underlying systemic disease is suspected.

Canine Demodicosis-Egg

Canine Demodicosis Diagnosis-Adult mite
Canine Demodicosis
Diagnosis-Adult mite

Canine Demodicosis
Diagnosis

- Remember--any pododermatitis in the dog or bacterial pododermatitis that responds to antibiotics or steroids but continues to flare when off--check skin scrapings for demodex mites of the feet!!

Canine Demodicosis
General treatment options

- STEROID AVOIDANCE including topicals!
- Treat concurrent bacterial pyoderma, possible culture/sensitivity.
- Total body clipping may be necessary if dips are chosen.
- Follicular flushing shampoo such as benzoyl peroxide or 4% Chlorhexidine before dips.
- Vitamin E 20iu/kg sid orally
Canine Demodicosis—always scrape the feet!

Demodex otitis-don’t forget to check ear smears in oil!

- Sometimes the last area to clear and often missed!
- TREATMENTS:
  - Tresaderm
  - Topical Ivermectin-1.15cc 1% Ivermectin
  - Milbemite
  - Ivermectin 1% 0.1cc in 15cc Tresaderm, using 1-5 drops sid x 2-3 wks.
  - 1cc Amitraz in 29cc mineral oil made up fresh q wk-few drops sid in ear.

Canine Demodicosis Mitaban

- Dilute to mfg.’s recommendation i.e. 1 bottle/2 gallons water. Weekly 78% cure vs. biweekly 22% cure rate.
- No “set” amount of dips, go at least 2 beyond a negative scraping.
- Do not save the dip!
- No bathing or swimming between dips.
- Precede each dip with shampooing.
Canine Demodicosis
Mitaban

- Side effects: sedation, v/d, personality change, hyperglycemia, hypotension.
- Do not use with doxepin or antihypertensives.
- Treat reactions supportively, premedicate with yohimbine.
- Pruritus usually due to mites dying off.
- Fecal-may find demodex mites.

Canine Demodicosis
Mitaban

- Owner advice: do not allow owners to dip the dog if pregnant, diabetic, on antihypertensives/cardiac meds, or antidepressants.
- Wear gloves and dip in well-ventilated area.
- Mitaban is an Alpha-2 agonist, monoamine oxidase inhibitor (MAOI), prostaglandin inhibitor-don’t mix w/ SSRI

Canine Demodicosis
Milbemycin (Interceptor)

- Drs. Reedy & Scott: 0.5-lmg/kg bid--60% cure rate.
- Use from 30-90 days past a negative scrape.
- Must be heartworm negative.
- Useful in dogs with foot involvement, a lot of skin folds, swimmers.
- Herding breeds-use low end of dose range.
**Canine Demodicosis - Milbemycin (Interceptor)**

- Head tremors (reversible)-Sheltie on 1.7mg/kg/day. 2 dogs had reversible ataxia at 3.4mg/kg/day.

- Sherman, JG-no signs of toxicosis using milbemycin 10mg/kg with spinosad (Comfortis) at 300mg/kg in dogs with MDR1 gene mutation.

**Canine Demodicosis - Ivermectin**

- Daily NOT weekly administration.
- Action: stimulates GABA, enhances immunity (mice). Metabolized in the liver, excreted in the feces. T ½=2 days.
- Do not use in herding breeds-“white feet, do not treat”!
- Caution in elderly patients of ANY breed.
- Dose: 200ug/kg/day-800ug/kg/day orally DO NOT INCREASE DOSE WEEKLY!

**Canine Demodicosis - Ivermectin**

- How long to continue after a negative skin scraping?
- Adverse effects: neurologic including drooling, ataxia, mydriasis--may not occur until 2-3 days after dosing or as soon as 4 hrs post dose (usually more severe if occurs early).
- Chronic toxicity-may occur weeks later.
Canine Demodicosis
Ivermectin

z Dispensing
z When used with Ketoconazole, Spinosad (Comfortis) or quinolones some patients experienced neurological side effects.
z Washington University p-glycoprotein deficiency test-MDR1 (now called ABCB1 gene) gene mutation
www.waddl@vetmed.wsu.edu

Canine Demodicosis
Ivermectin

z However…26 out of 27 non-Collie dogs with chronic Ivermectin toxicity had a NORMAL ABCB1 gene!

Canine Demodicosis-Ivermectin

z Ketoconazole probably inhibits elimination of Ivermectin leading to an increase in systemic exposure to the drug and potential neurotoxicity.
Canine Demodicosis

Other therapies

- Taktic: 1cc/100cc water, dip 1/2 body sid.
- Preventic Collar: 9% amitraz
- Vitamin E 20iu/kg orally sid
- Immunostimulants-not helpful
- Lufenuron-not helpful
- Mitaban lcc/29cc mineral oil-make fresh
- Revolution-not helpful
- Lime sulfur dips-don’t rule this out!!
Canine Demodicosis--Other Therapies

- Advantage Multi spot-on at 0.1mg/kg in 63 dogs-30 treated q 4 wks for 2-4 applications and 33 treated w/ milbemycin alone sid for 4-8 wks showed similar improvement. Approved in Europe q wk.
- Early results show that success rate highest in dogs with low mite counts and less severe disease.

Canine Demodicosis--Other Therapies

- Monthly use of Advantage Multi (10% moxidectin/2.5% imidacloprid) may be used to prevent relapses of demodicosis.
- (Colombo S, et al, "Monthly use of 10% moxidectin and 2.5% imidacloprid spot on to prevent relapses in difficult cases of generalized demodicosis: a pilot study.")

Canine Demodicosis—Moxidectin

- Moxidectin-related to milbemycin. 200ug/kg/wk or q o wk for 1-4 doses successful in 33-100% of dogs.
- Dr. Carlotti-400ug/kg orally using the injectable form daily. 96% cured in 2-6 mos.
**Canine Demodicosis - Moxidectin**

- 1% Moxidectin inj for cattle given orally, 0.4mg/kg sid for demodicosis-14% stopped due to side effects. Mean duration of therapy-2.4mos. 72% cured.

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**Canine Demodicosis - Doramectin**

- Doramectin 0.6mg/kg/wk—effective in 10/23 patients when used for 5-23 wks. Longer T1/2 than Ivermectin.
- Shibata K, 2005. 9 dogs with gen. demodicosis rx’d w/ 0.6mg/kg/wk improved within 10 wks.

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**Sentinel for Demodicosis?**

- Novartis advises against it saying target organs for toxicity are liver, adrenals, thyroid, brain. High doses 30.8mg/kg--seizures.
Fluralaner (Bravecto) for Demodicosis

- Isoxazoline parasiticide-inhibits arthropod GABA & L-glutamate-gated Cl channels.
- After 12 weeks, when compared w/ moxidectin/imidacloprid-fewer mites found on Bravecto dogs after 1 dose.
- Bravecto dogs-no mites found day 56 and day 84 but moxi/imid dogs still harbored mites after 3 doses/28 day intervals.

Fluralaner study, continued

- According to US Patent-also effective against: flies, Sarcoptes scabei, Demodex equi, Cheyletiella spp., Notoedres cati, Trombicula spp, Otodectes, fleas, ticks.

Fluralaner-continued

- Dosing: minimum dose of 25mg/kg every 8 wks.
- Bravecto and Ivermectin together-no alteration of pharmacokinetics of either compound. No apparent risk of Ivermectin toxicity. Apparently the same with Bravecto and milbemycin.
Before and after Bravecto

Before and after...
Afoxolaner (Nexgard) for demodicosis

- Chavez, F. Case report of afoxolaner treatment for canine demodicosis in four dogs naturally infected with Demodex canis.
- 2.5mg/kg/dog on day 1, then 4 wks, 8 wks.
- Clinical improvement in all dogs and reduction of live mites by 4 wks. All 4 dogs negative for mites at 8 and 12 wks after treatment.

Afoxolaner (Nexgard) Sarolaner (Simparica)

- Caution in patients with seizures-NexGard.

Demodex injai

- Mostly seen in Westies, Scotties, Lhasa’s, or Shih tzu’s.
- Presents as greasy seborrhea/erythema dorsal trunk.
- Long, skinny mite.
Demodex injai-treatment

- Bravecto, NexGard
- Doramectin
- Ivermectin
- Milbemycin

Along with bathing, antibiotics, no steroids!

Thanks for being such a great audience!!