CANINE AND FELINE PODODERMATITIS – ACCEPTING THE CHALLENGE : PART 1

ALLERGIC PODODERMATITIS

Both atopy and food sensitivity in the dog are commonly associated with pododermatitis. In atopy, the initiation and perpetuation of the allergic response may be through transcutaneous absorption of allergens. This transcutaneous absorption of allergens may result in the development of diffuse inflammation in contact areas. Lesions are otherwise caused by licking. Salivary staining is common. The dermatitis produced is often diffuse in the interdigital spaces. The dorsal and/or ventral spaces or both may be involved. A further area of predilection for allergy induced pododermatitis is the area just proximal to the carpal and tarsal pads. Nail fold inflammation (paronychia) may be present and may predominate. Allergic pododermatitis is commonly complicated by secondary bacterial and *Malassezia* overgrowth (interdigital spaces, nail folds) and superficial and deep bacterial infection which may contribute significantly to pruritus. Secondary infections should be delineated (impression smears, swabs, acetate tape preparations) and treated (see below for *Malassezia* and elsewhere in these Proceedings for bacterial treatments). Chronic, maintenance germicidal therapy should be considered to help control recurrent infections.

Diagnosis of food sensitivities will require the feeding of a restrictive diet for at least 8-12 weeks. Every effort should be made to resolve secondary infections and hyperplastic skin changes early in the course of the restrictive diet. Anti-pruritic medications are then discontinued in the later phases of the diet trial to assess the effects of the diet. Documentation of the food sensitivity is then established by challenge with the previous diet.

Atopic pododermatitis is perhaps best treated by managing the underlying allergy (e.g. fatty acids, antihistamines, glucocorticoids, cyclosporine, hyposensitization). Avoidance from allergens may be achieved by washing the feet down with water at the end of the day, to remove allergen from the surface of the skin. A topical anti-inflammatory spray can be used to help reduce hyperplastic changes (e.g. Genesis spray, Virbac; 2 times daily for one week, then once daily for one week, then once every other day until desired effect is achieved). Products such as this can be valuable for treating “flares” of allergic pododermatitis (e.g. application once or twice daily for 1-2 days; no more frequently than every 1-2 weeks – i.e.

minimize the use of topical steroids if they are to be used long term. 0.1% tacrolimus (Protopic; Fugisawa) is a reasonably effective, non steroidal product that may significantly reduce pedal inflammation and irritation. It is initiated as a twice daily treatment. The product is very expensive, but "a little does go a long way"

MALASSEZIA PODODERMATITIS

Malassezia pachydermatitis is most commonly seen as a secondary infection in canine allergic patients. The interdigital spaces and nail folds of the feet are predilection sites for Malassezia because these areas are more humid and exposed to less UV light, all of which favor Malassezia proliferation. Inflammation and pruritus associated with Malassezia may be related to colonization and/or the development of hypersensitivities to Malassezia and their byproducts. For this reason, numbers of Malassezia may not correlate well with the degree of inflammation and pruritus seen. Malassezia paronychia (nail fold inflammation) is the most common cause of brownish discoloration of the nail plate. The diagnosis of a Malassezia pododermatitis is by impression smears, tape preparations, swabs or scrapings.

Malassezia pododermatitis may be effectively treated with topical therapy alone, but this may be labor intensive. Consideration should be given to using a germicidal shampoo such as Malaseb (2% miconazole/ 2%chlorhexidine; DVM) every 2-3 days for 2-4 weeks. In between baths, the feet can be treated with a germicidal spray, wipe or rinse (e.g. Mal-A-Ket wipes, ketoconazole, chlorhexidine; Dechra); apply to affected areas once or twice daily and leave on. Consideration should be given to the establishment of prophylactic , maintenance therapy for patients with underlying diseases that may predispose to recurrent Malassezia infection (i.e. can have their feet bathed with a germicidal shampoo once weekly and treated with a topical germicidal wipe or rinse twice weekly. Alternatively, for widespread problems or to circumvent the need for more aggressive topical treatments, consideration should be given to treatment with oral ketoconazole (5 – 10 mg/kg once daily), fluconazole (2.5 to 5 mg/kg once daily), terbinifine (30 mg/kg once daily for two consecutive days of each week) or itraconazole (5 mg/kg once daily). Duration of systemic therapy is usually 2-4 weeks. Maintenance therapy (to minimize the need for topical maintenance therapy) would involve utilizing these drugs, at these dosages, for 2 or 3 consecutive days of each week.

CANINE DEMODECTIC PODODERMATITIS

Demodex is a mandatory differential diagnosis for any canine pododermatitis. Demodex infections may be restricted to only the feet. With juvenile onset demodicosis, the problem

would be considered generalized, even if much of the skin of only one foot were involved. For adult onset demodicosis, the majority of patients will have an underlying immunocompromising disease as a predisposition to the development of the problem. However, there will be no demonstrable underlying disease in 30% - 40% of cases. Demodectic pododermatitis is commonly complicated by secondary bacterial infections that require documentation (cytology; culture) and therapy. Demodectic pododermatitis may also be comparatively refractory to therapy. Diagnosis is by hair plucking or deep skin scraping. When inflammation is severe and/or chronic, plucking is often the diagnostic of choice, facilitating retrieval of mites from deep within the inflammatory tissue. With very chronic foot changes (great deal of tissue hyperplasia), biopsies may be necessary to rule out this diagnosis (although hair plucking has served to circumvent the need for this diagnostic in many patients). In that it may be more difficult to keep topical medications in this area (i.e. amitraz), consideration is often given to oral therapy:

1. Oral ivermectin - 0.3 – 0.6 mg/kg daily or every other day; author starts with 0.4 mg/kg once daily. If poor response after one month of therapy, increase to 0.6 mg/kg daily. Not to be used in hearding breeds or crosses. Screening for genetic propensity to develop ivermectin toxicity is available through Washington State University.
2. milbemycin oxime, 1-2 mg/kg daily; author starts with 1 mg/kg once daily; if poor response in one month, increase to 2 mg/kg/day.
3. Moxidectin – 0.4 – 0.6 mg/kg/day (oral formulation for sheep).
4. Doramectin – 0.6 mg/kg subQ once weekly or 0.6 mg/kg/day PO once weekly or 0.3 mg/kg every other day.
5. Moxidectin and imidicloprid (Advantage Multi, Bayer) – weekly or every other week – we have not found this to be effective in treating moderate to severe demodectic pododermatitis.
6. Certifect (fipronil, amitraz, methoprine) – every two weeks.

For either of the above drugs, treat for 2 months beyond remission.

If amitraz (Mitaban) is being used and the demodectic pododermatitis appears relatively refractory, consideration can be given to making up a solution of 1 ml amitraz (not diluted) in 30 ml of propylene glycol or mineral oil and applying this to the affected areas of the feet on a once daily basis. This solution should be made up new on a weekly basis.

INTERDIGITAL GRANULOMAS (“CYSTS”)

The list of the most common differential diagnoses for interdigital granulomas (often incorrectly called “cysts”) in the dog include foreign body, bacterial infection, fungal infection, conformational pododermatitis and sterile granuloma/pyogranuloma syndrome.

Bacterial Interdigital Pododermatitis

Bacterial pododermatitis in the canine is usually associated with *Staphylococcus pseudintermedius.* Lesions are usually more focal, crusty, and inflamed, papular or pustular. There may be focal swellings that are fluid/exudate filled; there may be draining tracts. These soft, often fluid filled swellings are incorrectly referred to as "interdigital cysts". They are really focal areas of pyogranulomatous inflammation with variable degrees of exudation/necrosis. The most common diseases noted to predispose to recurrent bacterial infections of the foot are foreign bodies, allergies (atopy and/or food sensitivity) and less commonly endocrinopathies (hypothyroidism, hyperadrenocorticism) and demodex. Diagnosis is by cytology, exploration of the lesions (for foreign body) +/- culture and response to an appropriate systemic antibiotic. Because these are often deep bacterial pyodermas, antibiotic therapy is usually maintained until at least 1-2 weeks beyond apparent clinical remission. When bacterial infections are very deep seated, systemic therapy may be facilitated by the use of pentoxifylline (10 – 20 mg/kg BID to TID) to enhance perfusion, reduce fibrosis and reduce inflammation. Some routinely use metronidazole (10 mg/kg BID) as an adjunctive therapy to help reduce inflammation. Exudative lesions may be dried with the use of a chlorhexidine and aluminum acetate formulation (10 cc of chlorhexidine to 8 Fl oz. of Domeboro or Bluboro astringent) applied 2-3 times per day. Others have used a combination of this amount of chlorhexidine mixed with Epsome salts.

Short coated breeds (e.g. Doberman, Great Dane,.Mastiff) appear to be prone to idiopathic, recurrent bacterial pododermatitis. Affected individuals respond well to systemic antibiotic therapy but have frequent re-exacerbations. Regular germicidal shampoos and wipes/sprays/rinses may be used to help reduce the incidence of recurrences. Early re-exacerbations may be treated with topical mupirocin BID. Very recurrent problems may be treated with immunomodulators (oral interferon, 1,000 units/dog/day – 4-6 month trial period) or staphylococcal bacterin therapy (Staphage Lysate, Delmont Laboratories; 0.5 cc sub Q twice weekly or 1.0 cc once weekly; 4-6 month trial therapy).

CONFORMATINAL PODODERMATITIS (*follicular cysts predisposing to recurrent interdigital pyogranulomatous dermatitis - inflammatory nodules in the dorsal interdigital spaces)*

Affected individuals (most commonly Labrador Retrievers, English Bulldogs; can be seen in any breed), throw their weight laterally on their feet due to arthritic disease or other ligamentous or musculoskeletal disorders. As a result of abnormal pressure on the carpal or tarsal pads, the pad enlarges. A deep groove is produce in the ventral 4-5 and/or 2-3 interdigital space. Abnormal pressure and friction produces inflammation, thickening and follicle plugging (comedo formation) on the walls of this "groove". Epithelial /waxy debris is noted to accumulate within this deep groove. Debris from the severely filled follicles breaks out of the follicles to produce a severe inflammatory response in the subcutis. Debris accumulated in the depths of the deep grove may also work its way in to the subcutis. These inflammatory processes are often complicated by secondary bacterial infection. Extension of the inflammation/infection is seen as a swelling/draining tract in the dorsal interdigital space overlying this area. The lesion often breaks and drains; heals and then again breaks and drains. The diagnosis is usually made on a clinical basis. Work-up should involve cytology (looking for secondary bacteria, Malassezia). Bacterial /Malassezia infections should be treated with a systemic antibiotic/anti-fungal. Antimicrobial shampoos are used to remove debris from the ventral interdigital space (e.g. twice weekly). Between shampoos consider using a germicidal wipe (e.g. chlorhexidine and ketoconazole; Mal-A-Ket , Dechra) once daily or every other day. These therapies are usually used at a lesser frequency (e.g. twice weekly) for long term maintenance therapy. Even with appropriate management of secondary infections, significant inflammation often persists. Management options for this would include a topical anti-inflammatory (Tacrolimus, Protopic, 0.1%, starting BID, then gradually reducing frequency of use to SID and then every other day) or systemic anti-inflammatory therapy (tetracycline or doxycycline and niacinamide; doxycycline 5 mg/kg BID; niacinamide – 500 mg TID if > 10 kg, 250 mg/kg TID if < 10 kg). Topical or systemic steroids may be used to control inflammation, but may be problematic because of the need for long term use. The definitive / curative therapy for this problem requires removal of the affected follicles/deep groove. This can best be achieved with Laser therapy, approaching from the ventral interdigital space (see Duclos D et al, Pathogenesis of canine interdigital palmar and plantar comedones and follicular cysts and their response to laser therapy, in Vet Dermatology, 19(3), 2008). All affected tissue must be removed. Alternatively, fusion podoplasty can be considered for the affected interdigital space/s.

CANINE ACRAL LICK DERMATITIS
(LICK GRANULOMA, ACRAL PRURITIC NODULE)

Breed predispositions include the Doberman Pinscher, Labrador Retriever, Golden retriever, Great Dane, boxer, Weimaraner and Irish Setter.

The etiology of LG is multi-factorial. Primary factors are defined as those that initiate the licking. The most common is allergy, either atopy or food sensitivity. Although some Dermatologists find food sensitivity to be most commonly incriminated, in our experience, the overwhelming majority of patients are atopic. Other, more generalized signs of allergy may vary from severe to very subtle in a given individual. Other primary factors are uncommon to rare and include trauma, underlying bone or joint pain (fracture / arthritis), foreign body, peripheral neuropathy (e.g. secondary to cervical vertebral instability), parasthesia, fungal infection (dermatophytosis or deep fungal infection) and behavior problems. Having a lick granuloma as the only manifestation of a behavior abnormality is uncommon . Individuals with behavior problems that result in lick granulomas usually have other behavior problems, including separation anxieity, phobias, or other stereotypic behaviors including tail chasing, circling, fly biting or rhythmic barking. A 'behavioral' tendency to lick appears to be much more a perpetuating factor for an already existent LG. Perpetuating factors are those that amplify the tendency to lick affected areas. They may keep the 'lick cycle' going, even if the primary factor is transient (e.g. transient 'flare' of allergy). They include:

1. Deep bacterial infection (deep bacterial pyoderma); the most important and common perpetuating factor. Bacterial pyoderma may contribute very significantly to pruritus. In one study, 29/31 (94%) of dogs with lick granulomas had a deep bacterial component to their LG (Shumaker AK et al, Vet Dermatology, 2008). The most common bacteria isolated were Staphylococcus (60%), Pseudomonas (8%) and Enterobacter (8%). 50% of cases were multi-drug resistant and 25% were methicillin resistant. Cultures from the surfaces of the lesions did not correlate well with those taken by tissue biopsy. This appears to be a strong argument for culturing such lesions by biopsy or by swabbing the lesions after 'squeezing' them to bring exudates up from deep within the tissue.
2. Ruptured hair follicles (exposing free keratin to the dermis which is very irritating to these tissues) and hairs that are driven down in to the lesion by self trauma are capable of

causing significant inflammation which in turn serves as a significant perpetuator. In addition, apocrine glands also become very hyperptrophied, inspissated, dilated and may rupture. These secretions may illicit a significant inflammatory response.

3. Compulsive, behavioral component. Some of this compulsive behavior may be related to a transient release of 'feel good' endorphins associated with licking which, along with transient analgesia associated with licking are strong re-inforcements for the tendency to self traumatize. The release of proteases from damaged epidermal cells may also have a pruritogenic effect on naked nerve endings at the dermo-epidermal junctions. These factors all contribute to the development of a relentless itch-lick cycle. Environmental influences such as boredom or stress, confinement or interactive conflict may also be contributing factors.

Work-up

The work-up of a patient with one or more lick granulomas should always include a thorough history and physical examination, especially looking for other evidence of allergic disease (e.g. seasonality of signs, presence of otitis externa etc.). Questions should also include those directed at assessing environmental influences (e.g. boredom etc.). If the history contains evidence of other behavior abnormalities (e.g. other steryotypic behaviors), then greater emphasis can be placed upon the LG also having a strong behavior component. The data base should include cytology of exudates that have been 'squeezed' from the depths of the lesion, hair plucks or scrapes for demodex and a fungal culture. The histologic appearance of LG is relatively characteristic. Skin biopsy would be indicated if the lesion appears at all atypical (to rule out some other pathologic process, e.g neoplasia or deep fungal infection). Strong consideration should be given to the early performance of a bacterial culture. This is especially true if the patient has been on significant systemic antibiotic therapy in the past, or the lesion is persisting in the face of current antibiotic therapy or if the lesion is severe. Cultures are best taken by deep tissue biopsy, or by swab after 'squeezing' the lesion to bring up exudates from deep within. Radiographs may be of value to look for underlying bone or joint problems, neoplasia or deep mycotic infections. It is common to see secondary periosteal reaction beneath more severe, active lesions. This is a product of chronic irritation of the overlying skin. In itself it is not a significant finding, other than attesting to the severity of the lesion and possible prognosis for effective medical management.

Therapy

The therapy of lick granuloma should always involve removal or control (if possible) of the primary factor, treatment for secondary bacterial infection and breaking the itch-lick cycle.

1. Because the primary factor is usually allergy (atopy and/or food sensitivity), symptomatic allergy medication can be very beneficial in reducing the tendency to lick (e.g. course of oral glucocorticoid such as prednisone / prednisolone, starting at 0.5 - 1.0 mg/kg/day for 1-2 weeks, then gradually tapering). Consideration could be given to the use of oclacitinib for this purpose (rapid onset of benefit; high success rate; may benefit all types of allergy problems).
2. Secondary bacterial infections are treated empirically with a good anti-staphylococcal antibiotic (e.g. cephalosporin, amoxicillin-clavulonate or clindamycin) or based on results of culture and sensitivity testing. Antibiotic therapy, if effective, should be maintained until at least a couple of weeks after resolution of the lesion (i.e. good hair regrowth noted on lesion).
3. Sock, or leggings or bandage (consider StopLik bandage) or wire muzzle or E-collar or a topical 'lick' deterrent to break the 'itch-lick' cycle. For topical therapy we currently use a mix of HEET (Pain killing linament; a capsaicin containing product available at Amazon.com) and bitter apple at a 1:2 ratio). This is applied directly on or around the granuloma three times daily.
4. +/- topical steroid to help resolve the inflammatory component of the problem more rapidly (e.g. Synotic, Zoetis; fluocinolone and DMSO; apply BID); use only if the patient is not able to lick at the lesion.
5. +/- Behavior Modification - if there is any suggestion that this could be a contributing factor, manipulating these behaviors would be in order (e.g. less confinement, more interaction with owner etc.).
6. Where a neuropathy is a potential primary factor, consideration can be given to gabapentin therapy (11- 15 mg/kg TID).

If the problem is responsive to the above medications, but is recurrent (with or without concurrent allergic signs)or if the problem persists in the face of oral steroids and an appropriate antibiotic regimen and 'less than ideal' attempts to keep the patient from licking, then a restrictive diet trial should be performed to rule out a food sensitivity component to the problem. The diet trial should be of at least 8 - 12 weeks duration. Secondary bacterial infections must be cleared up early in the course of the diet trial. For atopic individuals,

control of the underlying atopy will be required to keep the LGs from being recurrent (e.g. glucocorticoids, cyclosporine, oclacitinib, immunotherapy). **The best allergy control is associated with the best tendency towards resolving/preventing the recurrence of LGs.**

Where a behavioral component is strongly suggestive or for the management of otherwise refractory cases, consideration can be given to behavior modifying drugs. Those that are used most frequently by the author are:

1. amitriptyline - tricyclic anti-depressant; 2.2 mg/kg PO BID; side effects rare (lethargy, hyperactivity). Least expensive and best tolerated, but also less effective.
2. Clomipramine - tricyclic anti-depressant; started at 1 mg/kg/day; dose can be increased by 1 mg/kg/day every two to three weeks to maximum of 3 mg/kg/day; side effects include lethargy, anxiety, inappetance, dry mouth, vomiting and diarrhea. 30% success rate?
3. Fluoxetin - serotonin reuptake inhibitor; 1mg/kg/day; side effects - lethargy, wheals and polyuria / polydipsia. 30% success rate?
4. Hydrocodone - 0.25 mg/kg BID or TID. Improvement within 3 weeks in about 40% of cases? May take as long as 16 weeks to see maximal improvement. Some only partially respond.

Use hydrocodone/homatropine combination (Hycodan).

Clomipramine has been the author's 'go to' choice as a more dependably effective therapy. Trial period on any of these drug therapies is usually 6 - 8 weeks. Therapy is usually maintained until at least a couple of weeks beyond resolution of the LG.

Other therapies, including surgery, cryotherpay, laser ablation, radiation therapy, cold laser therapy and acupuncture have been reported to have variable success.