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PODODERMATITIS

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Skin diseases prominently involving the feet, footpads, and nails are a challenge to diagnose and treat. These conditions typically fall into four categories: (1) diseases mostly involving the footpads; (2) diseases mostly involving the interdigital areas; (3) diseases mostly involving the claw or nailbed; and (4) diseases mostly involving pedal pruritus.

PROBLEM: DISEASE INVOLVES MOSTLY THE FOOTPADS

Pemphigus is a group of autoimmune skin diseases in which autoantibodies are present, directed against intercellular "glue" between epidermal cells. In pemphigus foliaceus, the primary lesion is a superficial pustule or bulla. The primary lesions develop and burst rapidly, leaving behind circular areas of scaling, crusting, and hair loss. The lesions typically are found on the bridge of the nose, face, ears, mucocutaneous junctions, and trunk. Many animals have affected footpads, with peeling, scaling, and crusting lesions in layers.

Hepatocutaneous syndrome is a rare syndrome where distinctive skin lesions are present along with one of several types of liver disease. This syndrome is a metabolic disease of uncertain pathogenesis. ANY liver disease can be associated with hepatocutaneous syndrome. Many dogs with this syndrome are diabetic. The skin lesions consist of erosions, ulcerations, and fissuring of the skin of the muzzle, mucocutaneous areas of the face, distal limbs, and footpads. There is sometimes pain and difficulty walking.

Differential diagnoses for footpad diseases include other uncommon skin diseases such as canine distemper. Zinc responsive dermatosis frequently produces hyperkeratosis of the footpads and face; usually this is in younger dogs of the Arctic breeds. Metatarsal fistulation of German Shepherd Dogs involves the metatarsal pads, but typically not the digital pads.

Laboratory and radiographic evaluations are useful in differentiating these syndromes. In pemphigus, the results are generally quite normal; in hepatocutaneous syndrome, liver enzymes are usually elevated, and there may be anemia, hyperglycemia, hypoalbuminemia, and increased serum bile acid levels. Radiographic or abdominal ultrasound examinations are normal in pemphigus.

In hepatocutaneous syndrome, they may be normal or abnormal, depending on the nature of the liver disease.

The key to obtaining a diagnostic skin biopsy is to take samples of early lesions. In pemphigus, it is difficult to obtain good samples from the footpads. If the animal has ONLY footpad lesions, try to obtain a specimen from the edge of a pad that looks like it is just starting to peel off. If there are lesions on the face or trunk, find a lesion that looks like a small pustule. If you cannot find a pustule, take a small crusted lesion that looks recent. In suspected hepatocutaneous syndrome take early, mild lesions (not chronic ulceration).

Treatment of pemphigus foliaceus consists of immunosuppressive drugs. One common protocol consists of a combination of 2 drugs, prednisone plus azathioprine. Treatment of hepatocutaneous syndrome depends entirely

on resolution of the liver disease. If the liver disease is resolved, the skin lesions are reversible. If the liver disease cannot be treated, the skin lesions will progress. Treatment with corticosteroids may improve the skin lesions, but eventually makes the disease worse due to exacerbation of diabetes mellitus. If the liver disease is not treatable, some dogs' skin will improve if their diet is supplemented with egg yolks

(1 yolk/10kg/day). Recent success has been seen with supplementation of dogs with intravenous amino acid solutions. Typically, a dog would be treated with 500 ml. of 8-10% amino acid solution intravenously by slow infusion over 12-24 hours. The solution must be mixed in with a saline or 5% dextrose solution; follow package directions. The treatment is repeated every 2-4 weeks, and is only palliative.

PROBLEM: DISEASE INVOLVES MOSTLY THE INTERDIGITAL AREA

Interdigital pyoderma is a deep folliculitis and furunculosis caused by *Staphylococcus intermedius* bacteria. In addition to bacterial infection, hair shaft material trapped in the furuncles acts as a foreign body. If the condition becomes chronic, scar tissue may form and entrap hair material or foci of infection, worsening the prognosis for eventual cure.

Typically, the initial lesion is a firm or fluid-filled nodule between the toes. The nodule ruptures, draining a purulent, bloody discharge and forming a deep, draining furuncle in the interdigital area. The feet are usually not pruritic, but sometimes are painful. This disease was sometimes called "interdigital cysts," but this is not a correct because histologically, the lesions are deep pyogranulomatous dermatitis, not cystic. Initial diagnosis is made by physical examination. Do skin scrapings of the interdigital area to check for demodicosis. Discharge from intact or freshly-draining lesions should be examined cytologically. The expected result is many neutrophils, a few macrophages, and occasional cocci. It is important to verify that rod-shaped bacteria are not present, which might suggest secondary invasion by *Pseudomonas* or other bacteria. Bacterial culture and sensitivity are indicated for recurrent or resistant cases, or for cases where rods are identified on cytology. Biopsy of the interdigital area is indicated in recurrent or resistant cases, to look for *Demodex* mites.

Treatment consists of oral antibiotic administration. For routine cases, cephalexin or amoxicillin-clavulanic acid are preferred; lincomycin, clindamycin, erythromycin, or trimethoprim-sulfa may be effective. Fluoroquinolone antibiotics should be reserved for use if *Pseudomonas* is involved. It is important that treatment is continued for at least 2 weeks past clinical resolution. This means 6 to 12 weeks of antibiotics! In cases where chronic scarring or suspected immunodeficiency is involved, relapse may occur rapidly after antibiotics are stopped. In this case, there may be no choice but to treat the dog with antibiotics long-term. "Pulsing" the antibiotics (the full dose given one week on, one week off) rather than a daily, lower dose is preferred. Immunostimulant preparations have met with little success in chronic interdigital pyoderma.

Pododemodiosis is an infestation and overgrowth of *Demodex canis* mites in the interdigital areas and skin of the toes and feet. In demodicosis, there is in theory always an underlying problem with the immune system. In a very young dog, an inherited immunologic defect is present. In adult-

onset demodicosis, any underlying systemic disease may be possible. Clinical signs include alopecia, furuncles and draining tracts on the distal limbs and interdigitally. Secondary bacterial infection is always present. One must distinguish this from interdigital pyoderma without mites; they often look very similar.

Skin scrapings of the interdigital area will usually reveal the mites. In some cases, scrapings are negative, but mites are found on skin biopsy specimens. Also remember to check scrapings from other areas of the body; frequently, the disease is more generalized. Perform cytology, and possibly culture, to identify the secondary infection. The prognosis for pododemodicosis is always somewhat worse than with other cases of demodicosis. Even if the mites are eventually gone, the chronic, scarring changes may leave the dog predisposed to chronic interdigital pyoderma.

Conventional treatment protocols for demodicosis can be used. Treat the entire animal, not only the feet! Possible treatments include: amitraz; milbemycin, 0.5 – 2.0 mg/kg orally once daily (4-7 months); or ivermectin, 0.6 mg/kg orally once daily (4-7 months). At the same time, treat the secondary infection as discussed above. Check skin scrapings once monthly, and continue treatment until two successive negative scrapings are obtained.

PROBLEM: DISEASE INVOLVES MOSTLY THE CLAW OR NAILBED

In bacterial paronychia, there is erythema and swelling of multiple nailbeds. Footpads and interdigital spaces are usually quite normal. There is purulent discharge around the nailbed, or coming out of the nail. The nails are often malformed, broken, or may come off. The disease is usually painful, rather than pruritic. Initial diagnosis is based on physical appearance. Carefully distinguish this condition from nail loss *without* swelling of the nailbed and exudate.

It is important to identify the organism involved using culture. The foot area has abundant environmental bacterial contamination, which can confound culture results. Do not take the sample from an open, draining area. The best sample comes from a freshly-removed nail under anesthesia. It is advisable to screen the patient for underlying systemic disease.

Treatment of bacterial paronychia involves initial debridement of the nailbed areas. Under anesthesia, take a sample for culture; ideally, pull off a diseased nail with forceps and take swab from the freshly-exposed nailbed area. Take impression smears of any exudate for cytology: look for bacteria (and maybe occasionally fungal organisms?). Under anesthesia, pull off any diseased nails, and debride. Apply antibiotic ointment and soft bandages for a few days. Start systemic antibiotics and continue, based on culture results, for 8-12 weeks. After 3-5 days, when the pain is less, the owner can begin to use antiseptic foot soaks daily.

Any disease process that affects the nail and/or nail-forming cells will result in malformation, breakage, or loss of nails. Dermatophyte fungi occasionally cause nail infections; typically these cause malformation and breakage rather than paronychia. Nail loss (without paronychia) is a poorly-understood disease. In some cases, histologic examination has revealed a particular inflammatory pattern (for example, the reported "lupoid onychodystrophy"). However, the causes of the inflammation are unknown. In this syndrome,

there is malformation, breakage, and/or loss of nails with no inflammation around the nail fold area, no exudate, etc.

A fungal culture of a nail for dermatophytes should be done. Biopsy of the area for histologic analysis requires declaw (removal of 3rd phalanx), and has little chance of providing information useful for treatment.

For dermatophytosis, treatment consists of systemic antifungal drugs for 12-16 weeks or longer. Pulse treatment with itraconazole (treat for one week, then stop for one week) is effective in humans. In idiopathic cases, usually a series of medications are tried empirically. Medications to try include fatty acid (EPA/GLA) supplements; tetracycline plus niacinamide (500 mg of each, orally three times daily); pentoxifylline, 10 mg/kg orally 3 times daily; or oral corticosteroids.

PROBLEM: PROMINENT PEDAL PRURITUS

Malassezia dermatitis in the interdigital areas is common. The most common cause of *Malassezia* dermatitis in dogs is an underlying, chronic inflammatory disease that alters the skin microenvironment to favor growth of this normal yeast. This condition often exists as a part of atopic dermatitis. Pedal pruritus is usually all 4 feet, and can be quite severe. Typically, the pruritus is poorly responsive to corticosteroids. There is inflammation and self-trauma to the feet, and often, moist or greasy material in the interdigital areas. Diagnosis is via cytology: use a small spatula instrument to gently scrape between the toes (or around the nailbeds) to remove the moist material and some surface skin cells. Apply to a microscope slide, heat-fix, stain, and examine. Some dogs have some component of staphylococcal infection as well. At the same time, do a deeper skin scraping to check for demodicosis. If you see only one yeast, and compatible clinical signs are present, treat the animal! The number of yeast found on cytology is not well correlated with response to antifungal treatment.

Treatment in dogs consists of ketoconazole, 5-10 mg/kg orally, once daily, for an initial trial period of 5-10 days. Obtain followup information after this trial period: how much of the patient's discomfort is related to yeast overgrowth, and how much is related to other underlying causes? If there are many bacteria seen, also treat with antibiotics. Some patients may relapse after several days or a few weeks. In this case, first repeat brief ketoconazole treatment; then, prevent further relapses by topical treatment of feet by the owner, every 7-14 days, with antifungal products.

Atopic dermatitis is perhaps the most common cause of pedal pruritus. Clinical signs include pruritus, most commonly of the feet, face, ventrum, ears, or any combination. Some dogs have pedal pruritus only!

The pedal pruritus is most often a combination of the allergy itself, secondary interdigital yeast dermatitis, and secondary interdigital pyoderma. The initial goal is to identify how much of discomfort is caused by each element. This goal is achieved by a combination of cytology, response to antibiotics or antifungals, and an allergy evaluation. In some patients, more than 75% of the pruritus is related to secondary infection; the allergy itself is actually quite mild and intermittent use of antifungal or antibacterial medication may be the best treatment. In other patients, treatment of secondary infections helps only slightly; treatment of the underlying allergy (antihistamines, corticosteroids, immunotherapy, etc.) is necessary.