

Equine Pastern Dermatitis

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Take Home Messages:

1) Equine pastern dermatitis is a syndrome and not a diagnosis. The identification of primary, perpetuating, and predisposing factors is key to determining an appropriate and successful treatment course.

2) Pastern leukocytoclastic vasculitis is an immune-mediated condition that requires glucocorticoids as part of the initial treatment regimen while addressing secondary antimicrobial infections. Pentoxifylline is often used concurrently to aid with microvascular blood flow and act as a steroid-sparing agent.

3) Acetate tape impressions are minimally invasive and can provide diagnostic information regarding ectoparasites, bacteria, yeast, and dermatophyte infections. The use of clear packing tape and Diff Quik stains (omitting the alcohol dip) allows better differentiation of infectious organisms.

4) Eprinomectin is a topical parasiticide with known activity against psoroptic mange and anecdotal efficacy against chorioptic mange in horses. As chorioptic mites are surface feeders, eprinomectin may provide better efficacy than systemically administered macrocyclic lactones.

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I. INTRODUCTION

Equine pastern dermatitis (EPD) is not a single disease, but a cutaneous reaction pattern of the horse. Equine pastern dermatitis should be considered a syndrome rather than a diagnosis.^{1,1a,2} Uncovering the underlying etiology prior to treatment is key to minimizing treatment failures and frustration. To achieve a positive therapeutic outcome, treating the predisposing and perpetuating factors is just as important as addressing the primary cause of EPD.^{1a,2}

II. CLINICAL SIGNS AND PATHOGENESIS

EPD can affect any breed of horse, but is most commonly seen in draft horses.^{1,2} Feathering over the pasterns is a predisposing factor.^{1,1a,3} EPD occurs without a sex predilection and is seen

mostly in adult horses.¹⁻⁴ The dermatitis usually affects the caudal aspect of the pasterns, with the hind limbs most commonly affected.^{2,5} If not addressed, the lesions can spread anteriorly and proximally to involve the front of the pastern and the fetlock, respectively.^{1,2} Lesions are typically bilaterally symmetric; however, they can affect just one limb. They are more often detected on, but not limited to, the non-pigmented areas of the pasterns.⁵ Clinical signs will vary depending on the etiology, duration, and previous therapy. Initially, there is edema, erythema, and scaling, which rapidly progresses to exudation, matting of the hair, and crusting.^{1,2,5} If the underlying cause is vasculitis, ulcers may be noted.^{2,5} Secondary bacterial infection is a common complication and perpetuating factor.^{1,2} With chronicity, the skin may become thickened and fissured due to the constant movement and flexion in this area.⁵ The lesions are often painful and can result in lameness.⁵

There are three different presentations:

(1) Mild Form (Scratches, Mud Fever, Mud Rash). This is the mildest and most prevalent form of EPD. Alopecia, dry scales, and crusts are present. The skin can be thickened, and pruritus and pain are variable.

(2) Exudative Form (Grease Heel, Dew Poisoning). This type is a more exudative form of EPD. There may be erythema, erosion, alopecia, and serous to purulent crusting dermatitis. Accompanying epidermolysis and vasculitis are often present.

(3) Chronic Proliferative Form (Grapes, Verrucous Pododermatitis).^{2,7,7a} This form is characterized by excessive granulation tissue (fibroblastic proliferation) that becomes cornified. Nodular proliferations of hyperkeratosis and lichenification can be seen. Fissures and papillomatous areas may develop and their formation is a common sequela in draft breeds.^{2,6,7}

Chronic Progressive Lymphedema (CPL) often presents with Grapes characterized by progressive swelling, hyperkeratosis, and fibrosis of the distal limbs in Shires, Clydesdales, and Belgian draft horses. Based on research at the University of California, Davis, CPL has been found to have clinical signs and pathological changes are similar to a condition in humans known as chronic lymphedema or elephantiasis.⁸ Factors that have been proposed to contribute to this disease include an abnormally functioning lymphatic system in the skin, which causes severe swelling and fibrosis; a compromised immune system; and secondary skin infections.⁹ The lesions do not

respond well to therapy. As the disease progresses and becomes more chronic, the enlargement of the lower extremity becomes permanent and the swelling becomes firm on palpation.⁹ There are progressive skin folds and nodule formation consistent with Grapes that are first noted on the posterior aspect of the pastern. With chronicity, the nodules and folds occupy the entire lower extremity. Over time, the affected limb(s) will cause mobility problems and can often be traumatized during normal exercise. The prognosis is poor due to the development of secondary infections, poor response to therapy, systemic illness, and debilitation. Recently however, the group at UC Davis studied combined decongestive therapy (CDT), which included MLD and subsequent bandaging with short stretch bandages.^{9a} With CDT, a mean volume reduction of 4.75–21.74% was achieved, resulting in increased mobility and purposeful movement. As CDT is not readily available in Canada at this time, the author has used an oral medication combining low-dose dexamethasone with the diuretic trichlormethiazide. This combination of medications has been licensed for treatment of udder edema in cattle and is sold as in an injectable or bolus form. When formulated into an oral paste, it offers cost-effective palliative therapy for the CPL equine owner.

Pastern leukocytoclastic vasculitis (PLV) is an additional clinical cause of EPD. This disease is poorly understood and affects mature horses. It is unique to the horse and affects primarily unpigmented distal extremities.^{5,10} It is believed to be an immune-complex disease.⁵ Clinical signs suggest it is a photo-aggravated condition; hence, it is seen mainly in the summer. Lesions are multiple, consisting of well-demarcated, circular, painful, erythematous, exudative, tightly adherent crusts. Patients often present to orthopedic surgeons with a suspicion of a muscle tear or skeletal injury due to the level of discomfort associated with PLV.^{10a} The lesions appear painful rather than pruritic. The medial and lateral aspects of the pasterns are the most commonly affected areas. Common sequelae include limb edema of limb and lameness. Chronic cases may develop a rough or warty surface.⁵ Differential diagnoses for dermatitis of the distal limbs that is not restricted to non-pigmented skin include, but are not limited to, primary irritant or allergic contact dermatitis, pastern folliculitis/pyoderma (e.g. staphylococcus infection, dermatophilosis), chorioptic mange, dermatophytosis, *Malassezia* infection, immune-mediated dermatitis (e.g., pemphigus foliaceus), and neoplastic conditions (e.g., sarcoids). Obtaining a complete history and performing a thorough physical examination, skin scrapings, skin cytology, and biopsy of primary skin lesions early in the course of disease development may increase the likelihood of reaching a definitive diagnosis.

III. DIAGNOSIS

A detailed history is very important in the dermatologic work-up of EPD.^{5,6} Important pieces of information include the age of onset, month that the problem was noted, and whether the EPD has been seasonal/non-seasonal and pruritic/non-pruritic. Additional questioning should regard the possibility of overzealous use of topical medications or home remedies prior

to examination. Details should include what topical and systemic medications have been used and if lesions improved or worsened with each treatment. Environmental conditions can be a predisposing or primary factor in EPD and, when possible, a detailed description or personal inspection of the environment (including bedding, pasture, sand, insect burden, and moisture) should be done. Primary irritant and allergic contact dermatitis may involve the pastern region.^{1,5,6,11} Chronic exposure to moisture, such as wet bedding or muddy pastures, appears to be the most common cause for irritant contact dermatitis. The long hair in the fetlock and pastern region of draft horses increases the retention of moisture and contributes to the maceration of the skin.^{1,5,6,7}

Usually, in cases of contact irritant or allergic dermatitis, all four pasterns are affected. Be sure to ask whether or not any other animals or humans in contact with the affected horse are affected as well (i.e., suggestive of infectious or zoonotic causes such as dermatophytes). Recurrences may also be related to the conformation of the food and pastern.^{7a}

Pastern folliculitis/pyoderma is caused by two main types of bacterial infections in the horse: *Staphylococcus aureus* and *Dermatophilus congolensis*.^{1,6,7,11,11a} Initially, papules and/or pustules (rare) are typically noted with a staph infection; however, they may not be seen with chronicity. A biopsy for culture would be needed for a definitive diagnosis. The area should be surgically scrubbed and the biopsy taken with sterile precautions. Culture results based on a swab can be misleading due to surface contamination. The lesions seen with *D. congolensis* infection typically are crusting and exudative and when crusts are removed the skin is ulcerative.^{12,13} This organism requires chronic moisture and trauma to cause infection.^{11a,12,13} A genetic susceptibility may exist. Immuno-compromised and malnourished horses are far more susceptible, but serious infections can occur in almost any horse.^{11a} Immunity is short-lived, so recurrent infections may occur. Please see below for recommendations regarding the collection, staining, and microscopic examination of this organism.

Dermatophytosis (*Trichophyton equinum*) rarely causes pastern folliculitis; however, it is important to rule out.^{1,6,7,11} A definitive diagnosis requires a positive DTM culture in conjunction with positive microscopic identification of macroconidia.

Chorioptic mange may also be an underlying cause of pastern dermatitis and must be excluded as a diagnosis.^{1,6,7,11,13,14} Draft horses are predisposed to this infection due to the long hairs over their pasterns.⁵ This condition is intensely pruritic. Affected horses may constantly rub the area and often are observed stamping their feet.⁵ *Chorioptes* should be highly suspected if other in-contact horses are affected and have clinical signs of pruritus. Mites are easily identified if the horse is infested.

Both systemic and contact forms of photosensitization may involve the pastern regions of horses with white extremities.¹⁵ When contact is involved usually just the muzzle and

extremities are involved. Primary photosensitization is due to a preformed or metabolically derived photosensitizing agent reaching the skin by ingestion, contact, or injection. Hepatogenous photosensitization is due to blood phyloerythrin levels that are elevated in association with liver abnormalities and a photodynamic agent.^{5,15,16} Both types will cause dermatitis in the presence of UV light. The most common cause of equine contact photosensitization is exposure to clover pastures.⁵ Other causes of primary photosensitization include Saint John's wort (*Hypericum perforatum*), buckwheat (*Polygonum fagopyrum*), and perennial rye grass (*Lolium perenne*).^{15,16}

IV. DIAGNOSTIC TESTS

Superficial Skin Scrape

A superficial skin scraping should be performed to rule out superficial mites, especially *Chorioptes* spp. Use a dull #10 blade to superficially scrape crusts and debris onto a slide. Others have recommended using a stiff scrubbing brush or denture type tooth brush to sweep dander, crusts, and debris into a container.^{4,14} Examine the slide immediately under the microscope 10X objective, placing debris in mineral oil and using a cover slip. Some authors suggest applying a small amount of insecticide to the slide because these mites are very fast.¹⁷

Adhesive Tape Impression + Diff Quik

This should be performed to evaluate for secondary bacterial and *Malassezia* spp. infections, which are often perpetuating factors. Scotch 3M Clear Packing Tape Pad is recommended as its adhesive properties are stronger than the routine office tape and it is more rigid, hence avoiding curling of the tape and making the dipping process more efficient. Collect the sample and then stain the tape with Diff Quik (omitting the alcohol dip), press onto a glass slide, and read using a microscope. Observe under a microscope at 100X for cocci-shaped bacteria with or without degenerative neutrophils with intracellular and extracellular cocci and/or peanut shaped purple shaped yeast organisms.⁷ Acetate tape preps can also be used to identify *Chorioptes bovis*.^{6,7,14}

Direct Examination of Hairs

Hair sampling to evaluate for dermatophytes is performed by plucking affected hairs with hemostats, placing them on a slide, applying 1-2 drops of a clearing agent, (10% potassium hydroxide solution), and applying a cover slip. Warm the slide for 15-20 minutes, then evaluate the hair shafts. First, search for infected hairs that appear pale and swollen under the 4X objective. Second, examine under 40X for arthrospores within the hair shaft; these will appear as small clear bubbles in the hair shaft.^{4,18} This is difficult as well as time-consuming, and it takes a while to become experienced with this technique.

Dermatophyte Test Media (DTM Culture)

When obtaining hair and crusts samples for a dermatophyte culture, one must add a few drops of niacin (Vitamin B complex) to all DTMs to satisfy the growth requirements of *T. equinum*, regardless of whether the culture is being performed in-house or is sent to an external laboratory. When preparing the site to take a culture, use isopropyl alcohol to cleanse the hairs of saprophytic (clinically irrelevant) fungi. It is very important to allow the alcohol to dry prior to collection or there may be a false negative result. DTM will suppress growth of saprophytes and contaminant bacteria because it contains chlorotetracycline, gentamycin, and cyclo-hexamide.^{4,18,19} There is a phenol red pH indicator also included within the media. Dermatophytes use protein first, creating alkaline metabolites, resulting in a red color change concurrent with colony growth. False-positive color changes occur when saprophytes have exhausted the carbohydrate source on the plate, then utilizing protein that causes a late red color change.¹⁸ Once the red color change concurrent with colony growth has been identified, microscopic examination is important to confirm the diagnosis. The procedure is as follows: typically, 7-10 days of growth on the media is required before macroconidia are visualized. Press clear cellophane tape lightly onto the colony within the DTM. Then apply 1-2 drops of lactophenol cotton blue¹⁹ and examine it immediately under the microscope at 40X. If no macroconidia are visible, wait a few days for the colony to mature and re-examine.

Dermatophilosis congolensis Preparation

Place 1-2 drops of saline on a clean slide. Clip off excess hair from the crust sample and place crust into saline. Allow the sample to macerate/soften for 15 minutes and then remove the larger pieces. Crush the remaining material on the slide, allow to air dry and then heat fix it for a few seconds. Stain with Diff Quik or methylene blue. Once dry, examine the slide under the microscope at 100X with oil immersion and cocci-shaped bacteria in a "railroad track" orientation should be visualized.^{4,19}

Biopsy for Histopathology

Biopsy should be considered if immune-mediated disorders or neoplastic conditions are suspected. Consideration of these differentials is also recommended when treatment has been pursued and failures or relapses have occurred.¹⁹ In most cases, especially a suspected PLV, skin biopsies should be read out by a dermatohistopathologist with an interest in equine skin diseases.⁷ Acute changes, including leukocytoclastic vasculitis, thrombosis, and vessel wall necrosis, are often scarce and can easily be overlooked, but their presence may provide a diagnosis.^{5,7} Vessel wall thickening and hyalinization, along with epidermal hyperplasia or papillomatous change, may be detected in chronic lesions. If secondary bacterial infection is severe, it is recommended to treat and clear it before taking a biopsy.¹⁹ For hyperplastic and nodular lesions, such as seen in the skin of severe CPL patients, a "double punch" biopsy is recommended, whereby a 6-mm punch biopsy is introduced into an opening previously created by sampling the skin using an 8-mm biopsy. This technique allows the practitioner to reach the deep dermis and subcutis to better diagnose conditions such

as CPL and panniculitis, respectively.

Biopsy for Culture

This may be necessary if bacterial or fungal infection is suspected or the patient is not responding to appropriate therapy.¹⁴ When collecting a biopsy for culture it is important to clip the hair and scrub the superficial area as if you were going to perform a surgical procedure. The biopsy is taken as sterile precautions are maintained and the sample is placed in a sterile cup or sterile media.^{1a} This should be sent to the lab as soon as possible. Otherwise, superficial contamination will compromise the results.

Complete Blood Count and Chemistry Panel

This may be useful in helping to rule out hepatogenous photosensitization disorders or other metabolic conditions.⁷

Future Genetic Screening Tests

Mittman et al have identified quantitative trait loci (QTL) for CPL in 917 German draft horses. Thirty-one paternal half-sibling families comprising 378 horses from the breeds Rhenish German, Schleswig, Saxon-Thuringian (ECA 9,16,17), and South German (ECA1,7) were recorded.^{19a} This was an important step towards the generation of a screening test.

V. TREATMENTS

Choosing the appropriate therapy involves the recognition and identification of all predisposing, perpetuating, and primary factors.⁷

Environmental Management

Recommendations include considering if the environment is contributing to a primary underlying problem. For example:

- (1) Pastures and paddocks with mud, water, or sand can predispose horses to, or worsen, the condition.^{1,6,7}
- (2) Keep horses in clean dry stalls during wet weather.
- (3) Do not release horses into pasture until the morning dew has dried.^{6,7}
- (4) If contact allergy (affecting all pasterns) is suspected, suggest alternate sources of bedding because the treated or aromatic types of wood shavings contain chemicals that can cause contact hypersensitivity.^{1,6,7,11}
- (5) If a horse has heavy feathers or involvement around the ergot and at the back of the fetlock joint, clip feathers over the pasterns to decrease moisture retention.^{1,6,7}
- (6) If PLV is suspected avoid UV light exposure by stabling during the day or using wraps.^{6,7,15,16}
- (7) Daily cleansing of the affected skin immediately after exercise while the sweat is still present using an antiseptic shampoo (e.g. chlorhexidine) should be performed.^{16a}
- (8) If lesions are located beneath the saddle, barrier creams prior to exercise or clean towels between the horse and saddle may prevent further exacerbation of lesions.^{16a}

- (9) Lesions on the shoulders, blanket, and saddle pad contact zones should have a clean cotton or synthetic sheet as a barrier between the horse and cover or pad that can be washed on a regular basis.

Clinical Management – Topical Therapies

Antibacterial Therapy

In EPD secondary bacterial infections with *Staphylococcus* spp. are often a common problem that often complicates the diagnosis.^{1,2,5,7} The antibacterial shampoos available are 2% benzoyl peroxide, ethyl lactate, and 2% chlorhexidine. Shampoo the area 1-2 times daily, leaving the lather on for 10 minutes, then rinsing and drying well.^{2,4,5,7} This should initially be done for 7–10 days, then to 2–3 times weekly. Another topical agent gaining increased use in both the human and veterinary fields is accelerated hydrogen peroxide. This product can be applied to horses as a fungal wash/rinse or sprayed on and left to drip dry. It has an excellent spectrum of activity against various bacterial, fungal, and viral pathogens (www.anivacfirst.com; www.virox.com) and is safe for use on all horses and surfaces.

Regardless of which topical agent is chosen, protection of the affected pastern(s) is imperative. A dry environment without bandaging is the most effective treatment. Some dermatologists recommend using a padded, water-repellent bandage (changed every 24–48 hours.) A liquid bandage containing hydroxyethylated amylopectin has been used successfully when applied every 1–3 days after cleansing.^{2,7} If lesions are exudative, astringent solutions, such as lime sulfur or aluminum acetate solution can be used. These agents will cause drying of the area and less exudation. Topical ointments are available for treating localized bacterial infections. Silver sulfadiazine and 2% mupirocin ointment both have excellent penetration into the epidermis and can be used for both dermatophilosis or staphylococcal bacterial infections.² Clipping and cleansing is paramount to success with any ointment.

A recently studied addition to the topical armamentarium includes kunzea ambigua oil. In a randomized double-blinded placebo controlled study, 7 days of kunzea oil applied topically resulted in complete resolution in 7/11 treated patients. Kunzea oil contains various active constituents such as pinene, 1-8-cineole (eucalyptol), and sesquiterpene alcohols. It is supplied as a 20% ointment combined with salicylic acid (50 g/kg) and reported to kill *S. aureus* and various other gram-positive organisms, as well as yeasts and dermatophytes.^{16b}

Antifungal Therapy

Lime sulfur dips and sprays can be used for localized treatment of the pastern for dermatophytes and mites. Enilconazole is labeled for use in horses in many countries other than the United States and is used to treat fungal infections with good success.^{2,7} Two percent miconazole shampoo or shampoos that contain a

mixture of 2% miconazole and chlorhexidine can also be used.

Steroid Therapy

Topical steroids can be used for immune-mediated conditions such as PLV. Either 0.015% triamcinolone spray or 1% hydrocortisone leave on conditioner can be used in conjunction with systemic immunomodulators to treat this disease. In addition, good success has been noted with topical 1% betamethasone or 0.05% aclofmetasone applied to the lesion.² The author has recently had good success using a veterinary product containing mometasone to treat PLV patients as part of a study protocol.

Clinical Management - Systemic Therapies

Antibiotic Medications

The most common antibiotic used for dermatologic infections in the horse is trimethoprim sulfamethoxazole (15–30 mg/kg per os (PO) q 12 hours). If the bacterial infection is severe, a 3 week course may be necessary, often in conjunction with topical antibacterial shampoos.^{2,4,7,14} Monitor the patient closely for signs of colitis/diarrhea and discontinue immediately if noted. Enrofloxacin (7.5 mg/kg of the injectable formulation PO q 24 hours) has been used with success.^{2,7} Duration of activity depends on the severity of clinical signs and response to therapy. This drug should never be used in foals and growing horses. Procaine penicillin G (22,000 IU/kg IM q 12 hours) and is typically given for 7–10 days, and, if needed, repeated based on clinical response. Procaine penicillin G continues to be a reasonably priced injectable option for dermatophilosis.

Antifungal Medications

Systemic antifungal therapy is often unnecessary in the horse. Griseofulvin powder is available for use in horses; however, there has been no pharmacokinetic data published and the efficacy is questionable.^{6,18} Ketoconazole, itraconazole, and fluconazole are effective for the systemic treatment of dermatophytosis in humans, cats, and dogs. These agents are not currently approved for use in horses in the United States.¹⁸ Ketoconazole (30 mg/kg PO q 24 hours) has very low absorption (23%) from the gastrointestinal tract in horses and can be very expensive.²⁰ Itraconazole (5–10 mg/kg PO q 24 hours) and fluconazole (loading dose of 14 mg/kg PO q 24 hours, then 5 mg/kg PO q 24 hours) can also be used safely in horses.^{2,7,18,21,22} The cost of the latter two medications often limits their use. Terbinafine, an allylamine fungicidal agent, that interferes with squalene epoxidase and subsequent cell wall formation is being used to treat feline and canine dermatophytosis and has been effective in treating human patients with *Trichophyton equinum* infections.²³ Although the bioavailability in horses is very poor in comparison to dogs, there is clinical evidence to support its use in equids.^{24, 25}

Immunosuppressive/Immunomodulatory Therapy

Immune-mediated conditions such as PLV may need to be treated with immunosuppressive doses of steroids in addition to

decreasing the patient's exposure to UV light.^{2,5,7} Typically, prednisolone (1.5–2.5 mg/kg PO q 24 hours) is used for 7–14 days and tapered over several weeks (0.5–1mg/kg PO q 48 hours). Dexamethasone (0.02–0.1 mg/kg PO q 24 hours) for 7–14 days then tapered slowly over the next 4–6 weeks (0.01–0.02 mg/kg PO q 48 hours) can be used as well.^{2,7,26} Pentoxifylline (8–15 mg/kg PO q 12 hours) has immunomodulating properties such as inhibition of TNF- α , IL-1, and IL-6 and increased rheologic activities resulting in a steroid-sparing effect. Long-term control can often be achieved using topical steroids and/or oral pentoxifylline once the lesions are under control. A RDBPC study looking at the efficacy of pentoxifylline for the treatment of PLV along with topical mometasone-containing product is yielding promising results (personal data).

Anti-Parasitic Therapy

One percent ivermectin (300 mcg/kg PO) should be given weekly for 4 doses.^{2,7,4,17} This regimen may need to be repeated and treatment failures can occur as these mites are surface feeders. A recent study in 19 horses looking at oral moxidectin (0.4 mg/kg given twice, q 3 weeks) in combination with environmental treatment with 4-chloro-3-methylphenol and propoxur failed to yield positive results.²⁷ A prospective, double-blinded, placebo-controlled clinical trial found topical eprinomectin pour-on solution (500 μ g/kg q 1 week for 4 applications) to be an effective and safe therapy against psoroptic mange infestation in hunter/jumper and dressage horses.²⁸ The author has used off-label eprinomectin with success to treat *Chorioptes* spp. without any associated adverse event.

Although topical treatments are labor-intensive, they are currently the most effective. All contact animals as well as affected horses should be treated. Topical organophosphates such as 0.5% malathion and 0.06% coumaphos or topical permethrin can also be effective. Some authors suggest that selenium sulfide shampoo followed by lime sulfur (6 ounces/gallon) should be sponged on every 5 days for 1 month.^{4,7,17} One study found that 0.25% fipronil spray was effective against *C. bovis*.¹⁴ These mites can live off the host up to 70 days, so environmental decontamination is important, including the barn, stalls, bedding, tack, and grooming equipment.

VI. CONCLUSIONS

The prognosis for EPD depends on the underlying cause, our capability to identify it, and the chronicity of the condition. It is important to ensure that predisposing, primary, and perpetuating factors are taken into consideration during the diagnostic work-up and treatment plan in order to optimize a positive outcome.

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