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Case Report

First Report of Psoriatic-Like Dermatitis and Arthritis in a 4-Year-Old Female Spayed Pug Mix

Stephanie A. Regan,[1] Rosanna Marsella,[1,2] and Ibrahim Ozmen[3]

[1]*Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, 2015 SW 16th Avenue, Gainesville, FL 32610, USA*
[2]*Department of Dermatology, Springhill UF Health, 4037 NW 86th Terrace, College of Medicine, University of Florida, Gainesville, FL 32606, USA*
[3]*Department of Dermatology, Corlu Military Hospital, Corlu, 59850 Tekirdag, Turkey*

Correspondence should be addressed to Rosanna Marsella; marsella@ufl.edu

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Psoriasis manifests as chronic dermatitis and arthritis (PsA) in people. Psoriasis with concurrent PsA is characterized by erythematous, silvery, scaly plaques, especially on the extremities, and concurrent arthritis with enthesitis, tenosynovitis, and dactylitis. To date, no such disease has spontaneously occurred in domestic animals. This case report aims to describe the clinical, radiographic, and histologic appearance of a psoriasis-like dermatitis and psoriatic-like arthritis in a dog. A 4-year-old female spayed pug mix presented for the evaluation of chronic history of hyperkeratotic footpads and deforming arthritis. After ruling out other differential diagnoses and based on the similarity of clinical, radiographic, and histologic findings to human psoriasis and PsA, a tentative diagnosis of psoriasis-like disease was made. Treatment was begun to control pain (tramadol, gabapentin, and carprofen) and psoriatic dermatitis (clobetasol propionate 0.05%, calcipotriene 0.005%, and urea 40% ointment twice daily). Dramatic positive response to treatment was achieved confirming the tentative diagnosis. This case may provide preliminary evidence for the existence of a psoriasis-like condition in dogs and may elucidate treatment options in otherwise refractory cases of chronic dermatitis and polyarthropathy in dogs.

1. Introduction

Psoriasis is a very common and frustrating disease in people that can have both cutaneous and bone manifestations. Interestingly there has been no report, so far, of spontaneously occurring psoriasis-like disease in domestic animals. The reasons for this difference are not known. In this report we describe the first case of a psoriasis-like disease in a dog that presented with both cutaneous and bone signs. The dog of this case report had not responded to treatments prescribed for the various conditions known in veterinary medicine attempting to make her fit in what is known in animals. Thus she had been unsuccessfully managed for a long time as it did not fit in any previously described diseases of dogs. To the dog's benefit, a human dermatologist happens to be available for assessment and a diagnosis of psoriasis-like disease was made as the changes found in this dog appeared to be classic for how the disease presents in people. The purpose of this report is to make practitioners aware that although this psoriasis-like condition may be very rare in dogs, it can develop and it seems to respond to the same treatments reported in human medicine.

2. Case Presentation

A 4-year-old female spayed pug mix weighing 8.7 kg presented for a two-year history of chronic, hyperplastic, crusting, parakeratotic pododermatitis, intermittent episodes of lethargy and minimal weight bearing on all four limbs. The dog had ability to ambulate but was reluctant to do so especially on hard surfaces. There was soft tissue swelling associated with multiple digits of every foot. The dog had

been adopted at age 2 with the above symptoms already present; thus the exact age of onset of clinical signs was not known.

When presented to the referring veterinarian (rDVM) at 2 years old, the original diagnosis was interdigital pododermatitis and cellulitis on all four limbs with almost all digits involved. Clinical differentials by rDVM included necrolytic migratory erythema (NME), pemphigus foliaceus, and chronic footpad hyperkeratosis, but the joint changes and soft tissue swelling did not fit any of these differentials. Radiographs confirmed soft tissue swelling and revealed periosteal proliferations suggesting chronic periosteitis. Blood work did not reveal any abnormalities. Oral enrofloxacin and cephalexin were begun as well as debridement, flush, topical antibiotic ointment, and bandaging of the footpads. Pain was controlled with metacam liquid. At the one-month recheck, there was no response to treatment and worsening in condition had occurred despite oral antibiotics. Therapy was changed to tetracycline, prednisone, and niacinamide as well as cold laser therapy. Skin biopsy was performed and showed severe hyperplastic parakeratotic hyperkeratosis with infiltration of lymphocytes and plasma cells and a smaller population of neutrophils, mast cells, and macrophages.

The dog was then referred to a local dermatologist who performed a toe amputation for additional biopsy and culture and sensitivity. Biopsy showed marked acanthosis with formation of papillae, parakeratosis, and multiple pustules and parakeratotic microabscesses and crust formation. The crust was composed by necrotic cellular debris and neutrophils. No acantholysis and no primary etiologic agents were detected. In the biopsy a moderate amount of chronic active neutrophilic, superficial perivascular pododermatitis was present. Bacterial culture showed scant growth of *Staphylococcus pseudintermedius* sensitive to cephalosporins. While some of these features were consistent with metabolic epidermal necrosis (e.g., severe parakeratotic hyperkeratosis), there was no inter- or intracellular edema. Blood work was repeated (CBC, chemistry panel, and TT4) and was within normal limit. Diagnosis was again presumptive NME or zinc responsive dermatitis although many of the features of this disease were not found in the patient. This dog had no evidence of other liver or pancreatic diseases and was fed a well-balanced commercial diet. Other differential diagnoses included idiopathic chronic hyperkeratosis of footpads but no explanation was provided for the combination of dermatitis and deforming arthritis and bone changes. Medications and therapy were modified to a one-month course of Cefpodoxime proxetil (Simplicef), amino blend dietary supplement, zinc methionine, omega 3 fatty acids, egg yolk supplement, and a high protein diet to address any dermatitis linked to amino acid or zinc deficiency and carprofen (Rimadyl) and tramadol for pain management. This therapy did not lead to any clinical improvement after one month; thus the dog was then referred to UF.

On presentation to UF Dermatology at the veterinary school, the patient was quiet, alert, and responsive but reluctant to ambulate. Her cardiothoracic auscultation and physical exam parameters were within normal limits. Dermatologic examination revealed severe hyperkeratosis on footpads (Figure 1) on all four limbs. All four feet palpated with a positive pain response. The rDVM provided radiographs which showed proliferative joint disease in the interphalangeal joints of forelimbs (Figure 2). Major differentials based on history and previous diagnostics were again NME, possibly due to liver disease, glucagonoma, and GI malabsorption. However, these differentials still failed to explain the arthritis component, intermittent lethargy, solely digital distribution of lesions, and the early onset of symptoms (age 2 or potentially earlier) and were not consistent with any previous blood work which had all been within normal limits.

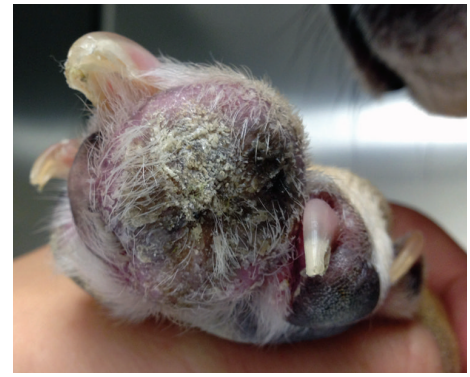

Figure 1: Photograph before treatment of worst affected digit, featuring soft tissue swelling, proliferative arthritis, and hyperkeratosis.

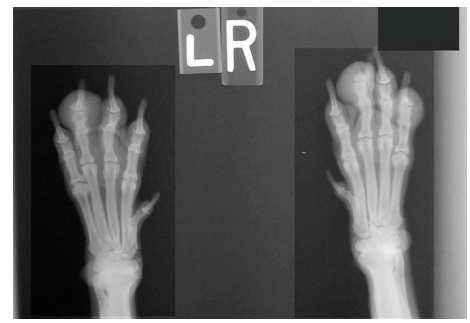

Figure 2: Radiographs of forelimbs before treatment, showing proliferative joint disease in the interphalangeal joint, ankylosis, dactylitis, and enthesitis.

NME is frequently linked to liver changes; thus, in the attempt to further pursue NME, ultrasound was performed but findings were unremarkable. Pancreatic Lipase Immunoreactivity (PLI) and Trypsin-Like Immunoreactivity (TLI) were discussed as diagnostic options to further investigate other possible cases of NME but not pursued at first visit in light of the complete absence of clinical signs to support this differential diagnosis.

Upon further examination of the confluence of clinical signs, biopsy results, and radiographic changes noted and in consultation with a human dermatologist, it was determined that plaque psoriasis with psoriatic arthritis, although neither was ever previously documented in canines, could actually provide a comprehensive explanation for the condition of this dog. Thus, a tentative diagnosis of psoriatic-like disease

Figure 3: Occlusion therapy with Pawz dog boots.

was made and it was decided to attempt first line of defense therapy for psoriasis as it would be done in human medicine.

Treatment was begun based on a presumptive diagnosis of psoriatic-like arthritis and consisted of tramadol (25 mg q6-8hr PRN for pain), gabapentin (100 mg q8hr for pain), and carprofen (25 mg q24hr for pain, arthritis, and inflammation). To control the dermatologic symptoms clobetasol propionate 0.05% ointment (topical steroid), calcipotriene 0.005% ointment (topical Vitamin D), and urea 40% ointment (topical keratolytic) were prescribed to be used twice daily, with one of the daily administrations to be performed under occlusion. To properly perform occlusion therapy, Pawz dog boots (Figure 3) were given to provide a soft, water-vapor impermeable membrane that would be easily applicable to the paws. Topical therapy was prescribed until reexamination with the possibility of adding systemic therapy with oral steroids (prednisone) or oral disease modifying antirheumatic drugs (methotrexate, also classified as an antimetabolite immunosuppressant) later on, if needed. Follow-up care was performed at the rDVM with consultation by UF Dermatology. rDVM noted on follow-up communication that the patient responded beautifully to topical treatment; crusting of footpads was reduced and the patient's comfort and activity level had dramatically increased. While she was reluctant to ambulate at all previously, she was now comfortable and even observed to initiate play several times. At two-month follow-up some muscle wasting was noticed, and topical treatment was reduced in frequency. Muscle wasting resolved following these changes. Owners were very satisfied with improvement in quality of life, and no systemic treatments were needed. One year later she is currently being maintained with carprofen and tramadol if needed, 1 capsule of Omega Tri-V PO q24hr, clobetasol propionate 0.05% ointment, calcipotriene 0.005% ointment, and urea 40% ointment two times per week, alternating and without occlusion.

3. Discussion

Psoriasis is a chronic inflammatory skin and joint disease affecting 2-3% of humans [1–3]. While psoriasis-like conditions have been described in mice [4], this disease has not been described as spontaneously occurring in domestic animals. In humans, the most frequent clinical presentation of psoriasis includes erythematous, silvery, scaly plaques especially on the extremities and scalp [3]. Patients may also suffer from itch, pain, nail-related disease, and arthritis [1–3]. Up to 20–30% of psoriasis patients will also have psoriatic arthritis (PsA), with joint disease typically occurring several years after the original onset of skin conditions [2]. PsA has several patterns, including distal interphalangeal, asymmetric oligoarthritis, symmetric polyarthritis, arthritis mutilans, and spondyloarthritis. Clinically, PsA may also involve enthesitis, tenosynovitis, and dactylitis [2]. Both psoriasis and PsA may have varying degrees of severity, and in humans they have been associated with comorbidities such as cardiovascular disease, stroke, inflammatory bowel disease, depression, and potentially cancer [5, 6].

This case report aims to describe the clinical, radiographic, and histologic appearance of a psoriasis-like dermatitis and corresponding psoriatic-like arthritis in a dog. Dermatologic manifestations of psoriasis in humans can usually be diagnosed by visible appearance of the patient [1–3]. The most frequent type of psoriasis is chronic plaque psoriasis, or psoriasis vulgaris, and this is characterized by distinct, erythematous, scaly plaques, usually on the scalp or extremities [2, 3]. Psoriatic arthritis, however, can be a more difficult diagnosis. Diagnosis can be made using several factors including corresponding plaque psoriasis diagnosis, familial history, asymmetric arthritis of distal interphalangeal joints, dactylitis, enthesitis, axial involvement, extra-articular manifestations (i.e., uveitis), and laboratory tests (radiology, rheumatoid factor, ultrasonography, and MRI) [2, 3, 7].

Following the above criteria for clinical diagnosis of human psoriatic patients, this case report describes a dog with similar presentation to psoriasis vulgaris with PsA. Dermatologically, she had distinct, erythematous, scaly plaques located on her footpads or distal extremities. Concurrent with the psoriasis-like dermatitis, she also exhibited asymmetric arthritis of distal interphalangeal joints, dactylitis, and enthesitis and had radiographic evidence of soft tissue swelling, proliferative arthritis, and ankylosis. Her histological appearance was also similar to psoriatic patients. In human patients, histologic samples show hyperkeratosis, parakeratosis, Munro microabscesses (neutrophilic infiltrate), dilation of capillaries engorged with erythrocytes and leukocytes, tortuous blood vessels, and perivascular polymorphonuclear leukocytic infiltrate [8]. In this case study, the patient exhibited severe parakeratotic hyperkeratosis with moderate amount of chronic active neutrophilic, lymphocytic, and plasma cellular superficial perivascular pododermatitis. It is common in human patients for individual lesions to have variants in histologic findings and to have some indicators absent; therefore lack of certain histological features in the dog's samples does not preclude her from the diagnosis [8]. In fact, lesions often change in histologic appearance even throughout their own progression [8]. The dog in this case report did not have other signs of concurrent disease.

Treatment of psoriasis in human dermatology consists of topical agents, occlusion therapy, phototherapy, oral systemic agents, injectable biological therapies, and often a varying combination of treatment options. Topical agents are

considered first line treatment, and the addition of escalated treatments depends on the added benefits of mitigating the disease process weighed against the increasing side effects or invasiveness. Topical agents include Vitamin D analogues, corticosteroids, keratolytics, and retinoids; the combination of Vitamin D analogues and corticosteroids show the greatest efficacy in terms of multiple topical therapies [9]. Mild cases are commonly treated with topical therapies only, and it is sometimes difficult for the general practitioner to discern when patients require secondary care, especially when PsA may be concurrently involved [10].

In this case study, treatment with combined topical therapy of Vitamin D analogue, corticosteroid, and keratolytic was both therapeutic and diagnostic. Psoriasis had not been previously described in dogs, but based on the similarities of clinical appearance and radiographic and histologic findings, first line psoriatic treatment was attempted. Therapy under occlusion was recommended as it has been shown to greatly increase the response in psoriatic patients [11].

Response to treatment further supported the psoriatic-like dermatitis diagnosis as this dog had failed to respond to any other previous therapy. Future therapy with immune-modulating antimetabolites, such as methotrexate, was considered to address the joint disease but the owner elected to not pursue it as the quality of life of this dog was sufficiently controlled with the initial plan. Although this condition is extremely rare in dogs, it is important to consider the possibility for cases in which both joint and skin involvement is reported. In this case the consultation with a human dermatologist was crucial to provide proper treatment plan for this case which had not found relief with previous therapies that had attempted to treat diseases known in veterinary medicine.

Conflict of Interests

The authors declared no potential conflict of interests with respect to the research, authorship, and/or publication of this paper.

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