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Olgu Sunumu / Case Report

Canine chronic inflammatory pododermatitis complicated with resistant bacteria: clinical case series

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ABSTRACT:

Pododermatitis is defined as the inflammation of the paw skin of nails, interdigital space, base pads, and nail folds. Complex conditions known as pedal folliculitis and furunculosis often need complicated diagnosis and treatment because of their multifactorial nature. Four dogs with symptoms of chronic and progressive pododermatitis were admitted to the Ondokuzmayis University Animal Hospital. Bacteriological examination of exudates revealed Methicillin Resistant Staphylococcus aureus (MRSA) infection in German Shepherd, Labrador Retriever and Setter dogs. The MRSA isolate was sensitive only to teicoplanin, gentamicin and enrofloxacin, respectively. From the infection of the mixed-breed dog, ampicillin/sulbactam susceptible Vancomycin-Resistant Enterococcus spp. was isolated. Antinuclear Antibody Tests revealed high positive titers. The use of antibiotics sensitive for each dog together with the combination of prednisolone treatment resulted in significant recovery. In conclusion, antibiotic-resistant bacteria and immunomodulatory responsive etiology should be considered together in cases of chronic pododermatitis in dogs.

Dirençli bakterilerle komplike köpek kronik yangısal pododermatit: klinik vaka serileri

ÖZET:

Pododermatit, tırnak derisinin, interdigital boşluğun, taban pedlerinin ve tırnak kıvrımlarının yangısı olarak tanımlanır. Pedal foliküliti ve furunküloz olarak bilinen karmaşık durumlar, çok faktörlü yapıları nedeniyle sıklıkla karmaşık tanı ve tedavi gerektirir. Kronik ve ilerleyici pododermatit semptomları gösteren dört köpek, Ondokuzmayıs Üniversitesi Hayvan Hastanesi'ne getirildi. Eksüdatların bakteriyolojik incelemesi, Alman Çoban, Labrador Retriever ve Setter ırkı köpeklerde Metisiline Dirençli Staphylococcus aureus (MRSA) enfeksiyonu ortaya konuldu. MRSA izolatı sırasıyla sadece teikoplanin, gentamisin ve enrofloksasine duyarlı olark bulundu. Melez ırk köpekte, ampisilin/sulbaktama duyarlı Vankomisin Dirençli Enterococcus spp. izole edildi. Antinükleer Antikor Testleri yüksek pozitif titreler ortaya çıkardı. Her bir köpeğe duyarlı antibiyotikler prednizolon tedavisi kombinasyonu ile birlikte kullanılması önemli bir iyileşme sağladı. Sonuç olarak, köpeklerde kronik pododermatit vakalarında antibiyotiğe dirençli bakteriler ve immünomodülatör yanıt veren etiyoloji birlikte değerlendirilmelidir.

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1. Introduction

Pododermatitis is defined as the inflammation of the paw skin of nails, interdigital space, base pads, and nail folds. Pododermatitis is a common clinical condition, and it can affect one or more feet. Although the lesions may heal in some cases spontaneously, persistent infection is experienced in others (1). Complex conditions are known as pedal folliculitis and furunculosis often need complicated diagnosis and treatment because of their multifactorial nature (2).

Pododermatitis is not a disease but a clinical finding that results from a local trauma or a systemic infection. Pruritus, erythema, edema, nodule formations, paronychia, alopecia, ulceration, comedones, serosanguineous or seropurulent discharge may occur in the affected feet swollen and painful (3-5). The etiology includes parasitic diseases, foreign body stings, allergies, systemic infections, and hormonal diseases (3,5). Various bacterial species such as Methicillin-Resistant Staphylococcus aureus (MRSA) and Escherichia coli can be isolated with culture. Deep pyoderma and exudate may occur as a result of these infections (6).

Antinuclear antibody (ANA) is a general name given to antibodies developed against the nuclear and cytoplasmic structures of the cell. Human epithelial tumor cell lines called Hep-2 are used as the antigen source (7). Specific cell patterns are DNA, nucleoprotein, histone, nuclear ribonucleoprotein, and other nuclear structures. The most common measurement method used today is fluorescence microscopy (8). A titer of ≥1:100 is considered positive in the immunofluorescence ANA test (9).

The aim of this case report is to evaluate the presence of resistant bacteria and immune etiology within the scope of differential diagnosis and to contribute to the therapeutic success potential by emphasizing the antibiogram indication in persistent chronic pododermatitis cases with ineffectual treatment attempts.

2. Case Story

Four dogs, a Labrador Retriever, a German Shepherd dog, a Setter, and a mixed breed dog with symptoms of chronic and progressive pododermatitis, referred to Ondokuz Mayıs University Animal Hospital. The German Shepherd had been treated previously for five months at another veterinary clinic without any recovery and was reluctant to move. Lesions progressed in the mixed-breed dog despite long-term antibiotic and antifungal treatment. Lameness and malodorous exudate were recorded in the Golden Retriever. Apparent foot swelling and seropurulent discharge was observed in the Setter dog, who presented with the complaint of straining on the ground and wounds on the feet.

Figure 1: Paws of the German Shepherd dog and the Golden Retriever dog
Şekil 1: *Alman çoban köğeği ve Golden Retriever ırkı köpeklerin patileri*

Although the Labrador Retriever was in a better clinical condition, there was apparent lameness. Typical clinical findings were; edema, paronychia, ulceration, comedones, discharge, seropurulent exudate, and pruritus. In all cases,

both feet were affected. The mix-breed dog, who applied to our clinic with complaints of non-healing wounds and skin rash in various parts, had alopecia characterized by paronychia, broken nails, discharge, bad odor, and erythematous lesions in multiple areas, despite several previous treatment attempts. In all four cases, all feet were affected and despite antifungal, antimicrobial and scabies treatments for different durations, clinical success was not achieved in any of them. Microscopic examination of the samples collected from hair follicles and skin debris was performed in terms of a fungus with 20% KOH. In addition, both feet and skin were examined using Wood's lamp. For microbiological examination, 5% of exudate samples taken with sterile swab were planted and incubated on Sheep Blood Agar. Pure growth colonies were examined by Gram staining. Isolates were inoculated with Mannitol Salt Agara and Bile Esculin Agara by performing the produced catalase, coagulase, and CAMP tests for phenotypic identification. PCR was performed to verify the isolates genotypically (10, 11).

Table 1: Bacteria isolated from the cases and their susceptibility profiles
Tablo 1: *Olgulardan izole edilen bakteriler ve duyarlılık profilleri*

Breed	Age	Identified Bacteria	Antibiotic Sensitive
Labrador Retriever	8	Methicillin Resistant S. aureus (MRSA)	Gentamycin
German Shepherd	4	Methicillin Resistant S. aureus (MRSA)	Teicoplanin
Mix	2	Vancomycin Resistant Enterococcus (VRE)	Ampicillin / Sulbactam
Setter	5	Methicillin Resistant S. aureus (MRSA)	Enrofloxacin

Antibiotic susceptibility testing of the isolates was performed using the Kirby-Bauer disk diffusion method. For this purpose, methicillin, ampicillin/sulbactam, vancomycin, teicoplanin, enrofloxacin, amoxicillin / clavulanic acid, gentamicin, cefaperazone and fusidic acid discs were used. The resulting zone diameters were evaluated according to (The Clinical & Laboratory Standards Institute) (12). ANA test was performed using the IFA method in the private laboratory for the diagnosis of autoimmune diseases. No fungal agent was detected in the native fungus examination performed from hair. As a result of Gram staining performed from pure colonies grown on Blood Agar, the agents were found to be Gram-positive cocci. Catalase and coagulase tests of three of the isolates were positive for Staphylococcus spp. was determined. Isolates were inoculated on Mannitol Salt Agar for identification, and after incubation, bright yellow-opaque colonies surrounded by a yellow zone were identified as Staphylococcus auerus. As a result of the evaluation made with the Kirby-Bauer disk diffusion method, it was determined that all three S. aureus strains were methicillin-resistant and also had multiple antibiotic resistance. The bacteria isolated from the cases and their susceptibility profiles are presented in Table 1, and the resistance profile of the isolates to antibiotics is presented in Table 2. As a result of the catalase test performed for the identification of the agent isolated from the mixed breed dog, it was determined that the isolate was catalase-negative. CAMP test and esculin hydrolysis test were performed on the isolate. The isolate was found to be negative as a result of the CAMP test and positive as a result of the esculin hydrolysis test, and the isolate was phenotypically detected by Enterococcus spp. The molecular confirmation of the isolate was carried out by PCR. The isolate was identified as Enterococcus faecalis by PCR. As a result of the antibiotic susceptibility test, it was determined that the E. faecalis strain had multiple antibiotic resistances and was also resistant

to vancomycin. It was determined that the isolate was sensitive to the ampicillin/sulbactam combination. ANA test of all cases indicated a high titer positivity.

Table 2: Resistance profile of the isolates to antibiotics
Tablo 2: *İzole edilen türlerin antibiyotik direnç profilleri*

Breed	M	AMP/SUL	V	TLC	ENR	AMC	CN	CEP	FA
Labrador Retriver	R	R	R	R	R	R	S	R	R
German Shepherd	R	R	R	S	R	R	R	R	R
Mix	R	S	R	R	R	R	R	R	R
Setter	R	R	R	R	S	R	R	R	R

M: Methicillin, AMP / SUL: Ampicillin / Sulbactam, V: Vancomycin, TLC: teicoplanin, ENR:enrofloxacin, AMC: amoxicillin / clavulanic acid, CN: gentamicin, CEP: cefaperazone, FA: fusidic acid, R: Resistant, S:Sensitive.

Treatment including prednisolone (PREDNOL 16 mg Tablet / Mustafa Nevzat was used in the following order; 2 mg/kg/day for 14 days, 1 mg/kg/day for 14 days, 0,5 mg/kg/day for 14 days, 0,5 mg/kg/every other day for 14 days) and sensitive antibiotic resulted in clinical recovery in a week, and permanent recovery was achieved within four weeks in all of our cases. While antimicrobial treatments were ended in a controlled manner in the following weeks, prednisolone treatments were continued gradually.

3. Discussion and Conclusion

The treatment stages of pododermatitis in dogs can be difficult for the owner and the veterinarian (4,5). As a matter of fact, all four patients referred to our hospital had received long-term treatments in local veterinary clinics previously and were brought to our hospital as a last resort.

If pododermatitis is not treated quickly and correctly, it can become chronic and susceptible to other infections. This is due to permanent degeneration of tissue after scarring. Bacteria may become resistant to antibiotics because of the empirically used drugs. In a previous study conducted with 20 dogs with pododermatitis, Staphylococcus intermedius was isolated from at least one area of the lesions in all cases due to the bacteriological examination. At the same time, degenerated neutrophils and intracellular bacteria were found in 12 out of 20 dogs in the cytological examination of these patients. The patients were treated with systemic and topical antibiotics for eight weeks, but no response was obtained (13). Pododermatitis patients can recover with differential diagnosis, finding the underlying cause, and aggressive treatment with an appropriate antibiotic (5). In our cases, it seems that empirically used antibiotics, corticosteroid treatments that were terminated in a relatively short time, and cellular degeneration in the tissue due to time lost as a result of incorrect diagnosis were effective in unsatisfactory treatments, and the factors were resistant to antibiotics.

Deep bacterial pododermatitis cases may require a treatment lasting as long as 8-12 weeks (4). Therefore, it is of great importance to guide the treatment with conscious and correct antibiotics according to the results of the antibiogram.

During the treatment, affected feet should be closely monitored (5). Although clinical improvement was observed in our cases within the first week, sensitive antibiotic therapy was continued until microbiological analysis indicated bacterial eradication.

Some cases may be resistant to medical therapy, especially when the infection involves secondary Gram-negative organisms. Conventional surgical debridement or CO2 laser surgery of affected tissue can make medical treatment more efficient (4). Since there will be severe tissue destruction in chronic infectious pododermatitis, the fusion podoplasty technique can be considered according to the situation (14). Our cases have been resistant to various

antimicrobial treatments experienced and had only responded to the sensitive antibiotic we applied. No podoplastic approach has been considered since there was no level of degeneration to cause material tissue loss.

Physical, microscopic, and routine laboratory tests were performed in our hospital, and no accompanying diseases or fungal agents were determined that 53% of the swab samples taken from the nasal flora of healthy dogs and their owners are methicillin-resistant staphylococci (15). In addition, in the same study, it was determined that 80% of MRSA's had multiple antibiotic resistance. In our case report, it was revealed that isolates belonging to three patients with MRSA had multiple antibiotic resistance. It was also observed that VRE isolate, obtained from mixed-breed dog had multiple antibiotic resistance. Therefore, it is of great importance to guide the treatment with conscious and correct antibiotics according to the results of the antibiogram.

A hallmark of systemic autoimmune disease is the high titer of circulating ANA (16). A positive ANA test is generally associated with Systemic Lupus Erythematosus (SLE) in dogs, but studies demonstrated that this was not a useful diagnostic test in canine without any major clinical or clinicopathologic abnormalities suggestive of SLE, and ANA positivity may be detected in healthy individuals or in varying clinical conditions such as chronic diseases, so it is suggested that ANA assay are likely to be positive and compatible with an immune-mediated disease if at least two major clinical signs were evident (9, 17). In the present case series, only one of the four patients had dermal lesions in the body, and lesions were restricted with the paws in the rest. Therefore SLE was not suspected in any of the cases, due to the lack of one other major clinical sign.

Immunomodulatory-responsive pododermatitis is characterized by severe lymphocytic-plasmacytic pedal inflammation and secondary infection (18, 19). Some cases of pododermatitis do not respond to antibiotics. In such cases, drugs such as anti-inflammatory or immunomodulatory glucocorticoids are used. We attributed the positive ANA results to immunomodulatory-responsive pododermatitis, alas none of the patients were eager in the histopathologic examination due to invasive sampling procedure, but positive response to corticosteroids verified our presumption to a large extend. Still, it is unclear whether this is a primary problem or whether the inflammation is a chronic change (19). We obtained a successful clinical recovery in all the patients with prednisolone and sensitive antibiotic therapy.

Differential diagnosis protocol should be followed step by step in canine chronic pododermatitis cases in clinical practice, and resistant bacteria and immunomodulatory intervention should be considered in persistent cases for optimal therapeutic success.

Conflict of Interests

The authors declare that there was not any conflict of interest

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Ethical Statement

An ethical statement was received from the authors that the data, information and documents presented in this article were obtained within the framework of academic and ethical rules and that all information, documents, evaluations and results were presented in accordance with scientific ethics and moral rules.

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