



Generalized Canine Demodicosis due to Iatrogenic Immunosuppression

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INTRODUCTION

Canine demodicosis is a parasitic skin disease caused by mites of the genus *Demodex*, which normally inhabit the skin of healthy dogs in small quantities (Trotta, 2019). This condition, common in dogs, is a type of mange that is generally non-contagious and observed in immunosuppressed animals. Clinically, it is characterized by non-pruritic erythema, greasy seborrhea, thickening of the skin, and a peculiar foul smell, as well as liquefaction in chronic cases. Since *Demodex* mites spend their entire lives on a single host, the disease is referred to as follicular mange or red mange due to the widespread redness it causes in adult dogs.

These mites, typically commensal inhabitants of the hair follicles and sebaceous glands of dog skin, feed on waste products. However, in situations where the host's immune system is compromised, these mites can overpopulate, leading to dermatitis. Particularly in cases of T lymphocyte deficiency, the proliferation of these organisms can cause dysfunctions in effector T cells with specific responses to *Demodex spp.*, further weakening the host's immunological control over these mites (Chandu *et al.*, 2024).

Demodicosis is classified into two main clinical forms: localized and generalized. The localized form is characterized by the presence of one or a few alopecic spots on the skin, while the generalized form involves extensive skin lesions, hair loss, erythema, papules, and crusts (Ekinci *et al.*, 2023). Generalized demodicosis is usually associated with predisposing factors such as underlying diseases, stress, or immunosuppression (Trotta, 2019).

Demodicosis is commonly observed in animals with low or suppressed immunity, which can stem from hormonal imbalances such as hypothyroidism or hyperadrenocorticism, as well as

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other causes such as parasitic infections, poor nutrition, tumors, or corticosteroid therapy (Ekinci *et al.*, 2023; Chandu *et al.*, 2024). One of the most important risk factors for developing generalized demodicosis is iatrogenic immunosuppression, which is caused by inappropriate or prolonged use of immunosuppressive drugs like corticosteroids. These medications, especially in high doses or prolonged use, can weaken the animal's immune system, allowing *Demodex* mites to proliferate unchecked.

Chandu, Uday, and Rajesh (2024) note that when generalized demodicosis is complicated by secondary bacterial infections such as deep pyoderma, the clinical presentation can worsen significantly. Pyoderma, a skin infection caused by bacteria (*Staphylococcus sp.*, *Pseudomonas sp.*, etc.), may occur as a result of the disruption of the skin barrier and immune response caused by demodicosis, requiring meticulous therapeutic management.

The combination of generalized demodicosis and secondary bacterial infections poses a significant challenge for veterinarians, as it requires a comprehensive therapeutic approach and careful management of predisposing factors (Trotta, 2019). Understanding the mechanisms underlying this complex clinical presentation is essential for optimizing treatment and preventing complications.

DEVELOPMENT

Anamnesis

This case involves a canine of the Pekingese breed, a 5-year-old male weighing 3.7 kg. At the time of the consultation, the owners stated that due to the intense itching, they had empirically started treatment with Dexamethasone at a dose of 0.15 mg/kg for more than 15 consecutive days. Additionally, they used solutions recommended by friends and neighbors, such as methylene blue, among others.

Clinical Presentation

During the physical examination, multiple skin lesions were observed, including generalized alopecia, papules, pustules, crusts, and excoriations caused by severe itching (Figure 1). Furthermore, localized pyoderma was identified in the chest region.

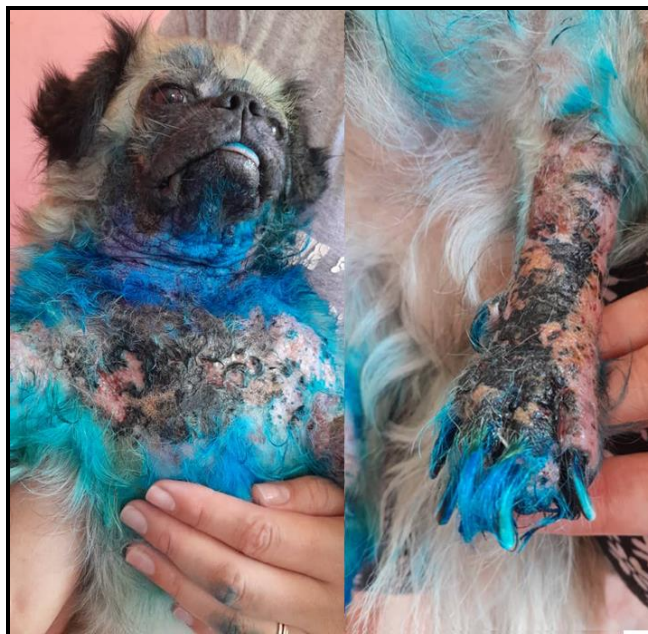


Figure 1 Generalized alopecia and associated lesions of the condition

Complementary Examinations

Complementary tests were advised to determine the cause of these lesions:

Results of the complete blood count (CBC) with leukocyte differential

Hematocrit 0.41 % Hemoglobin: 135.3 g/L Platelets: $256 \times 10^9/L$

Total leukocytes $4.6 \times 10^9/L$

Leukocyte count differential: Lymphocytes: 23 Neutrophils: 71; Monocytes: 6; Eosinophils: 0; Basophils: 0 Stab 0.

Despite the predominance of neutrophils in the leukocyte formula, indicating an inflammatory response, the blood count with leukocyte differential revealed irregular behavior due to leukopenia, with values of $4.6 \times 10^9/L$. The cause of immunosuppression was attributed to the prolonged high doses of a potent glucocorticoid like Dexamethasone (for more than 15 days) administered to a dog weighing less than 10 kg. Excessive and prolonged administration of such drugs, even under medical prescription, suppresses plasma circulating corticotropin concentrations, leading to adrenal disorders. Considering these elements, the patient was clinically diagnosed with iatrogenic hyperadrenocorticism based on marked immunosuppression.

Skin scraping is considered the diagnostic test of choice for alopecic patients without clear signs of demodicosis. Scraping or epidermal scarification allows the collection of the maximum number of mites from the skin to confirm the disease (Ekinci *et al.*, 2023). Based on these

criteria, a skin scrape, hair trichography, skin cytology, and examination with a Wood lamp were performed.

The skin scraping reveals the presence of *Demodex canis* at a proportion of 19 per field, which is considered highly pathological. In addition to this, some inflammatory cells are present, which are precisely the white blood cells drawn to the inflamed area due to the activation of the phagocytic system.

The trichogram of the hair revealed 80% of fractured tips, with the root and sheath appearing normal. This demonstrates the presence of intense itching, which leads to hair breakage caused by scratching.

The examination with the Wood's lamp yielded results of limited diagnostic value, revealing the presence of dermatophytes in some areas near the main lesions observed in the animal in question. This coincided with the findings obtained from the hair trichogram.

In the cytology taken from the localized pyodermitis, the presence of coccoid-shaped cells arranged in clusters was reported, suggesting *Staphylococcus spp* as a concomitant infection in the pruritic process. This is attributed to excessive scratching and the colonization of saprophytic bacteria, such as certain species of *Staphylococcus*, which contribute to these conditions. These findings align with the arguments presented by authors like Ekinici *et al.* (2023) and Chandu *et al.* (2024).

Diagnostic discussion

The empirical use of Dexamethasone at a dose of 0.15 mg/kg for more than 15 days, without prior veterinary guidance, led to marked iatrogenic immunosuppression in the patient. Consequently, the body lost control of these opportunistic microscopic parasites, which normally coexist symbiotically but became primary pathogens in diseases like the one presented in this case. Additionally, secondary pyoderma developed due to self-inflicted injury from intense pruritus.

Therapeutic Management

Once the disease, management errors, and etiological agents involved in the clinical condition were confirmed, a therapeutic protocol was established to eliminate the primary agent (*D. canis*), address the secondary bacterial infection, and manage the lesions and symptoms.

The decision was made to suspend the empirical treatment with glucocorticoids, and a sensitive conversation was held with the owners, emphasizing the importance of not medicating animals without prior diagnosis and medical prescription. An Elizabethan collar was also placed on the canine in question, along with the appropriate guidance provided to ensure its proper use.

For the control of the opportunistic ectoparasite, a combined therapy was used involving Ivermectin at a dose of 600 mcg/kg of body weight, administered subcutaneously every 7 days for 3 months, and Amitraz baths at a concentration of 250 ppm diluted in water, performed every 7 days for 4 weeks. According to Ekinçi *et al.* (2023) and Chandu *et al.* (2024) There is solid evidence that weekly Amitraz baths and macrocyclic lactones, such as Ivermectin, are effective for treating canine demodicosis, provided the potential negative impact of Ivermectin neurotoxicity is considered in certain dog breeds and their crosses. In recent years, high doses have been reevaluated, including increasing the dosage to 400–600 mcg/kg and the frequency of application to intervals of every 3 days for a duration of 4 months, showing effectiveness without causing complications.

In addition to this, immunotherapy with Yatren® was initiated at a dosage of 2 mL every 7 days, with two treatment cycles. In this way, the effects of free yatraenic acid devoid of protoalbumins and pure casein were utilized to stimulate leukocytosis and the lymphatic system, which are responsible for the body's defenses. This approach increased the number of circulating monocytes and other active elements of the immune system.

For the management of localized secondary pyodermitis in the pectoral region, alternating-day treatments with 2% Chlorhexidine solution as an antiseptic and the topical application of 2% Povidone-iodine twice a day were prescribed until the lesions resolve. The use of parenteral antimicrobials, which could impose a physiological burden on the animal's body, was deliberately avoided. This approach is supported by studies, such as those by Mora *et al.*, 2024, which confirm that in most cases, these conditions resolve without the need for such medications.

To manage the intense itching, Loratadine was prescribed as an antihistamine at a dosage of 0.3 mg/kg orally every 24 hours for a duration of 3 months.

Case Progression

The patient showed gradual improvement, with reduced pyoderma, disappearance of primary skin lesions, and decline in pruritus by the second week of treatment. Additionally, three subsequent skin scrapings showed a marked decrease in *D. canis* populations. After four weeks, partial skin recovery and hair regrowth in alopecic areas were noted. By the end of the three-month treatment, full recovery was achieved.

CONCLUSIONS

The case of "Máximo" illustrates how inappropriate treatment without veterinary supervision can lead to significant health complications in an animal. Identifying demodicosis as the primary cause and bacterial infection as the secondary cause is crucial for developing an effective treatment plan and restoring the patient's health. Educating owners about the prudent use of immunosuppressive drugs and the importance of proper diagnosis in skin conditions is essential.

The combination of Ivermectin, Amitraz baths, and Yatren Bayer proved to be an effective strategy for controlling Demodex proliferation as the primary agent and resolving secondary pyoderma without the use of parenteral antimicrobials. This case highlights the importance of an integrated approach to managing generalized demodicosis in patients with iatrogenic immunosuppression, along with the role of clinical laboratories in confirming the origin and progression of skin diseases.

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AUTHOR CONTRIBUTION STATEMENT

Research conception and design: YMA, RRB, data analysis and interpretation: YMA, RRB, redaction of the manuscript: YMA, RRB.

CONFLICT OF INTEREST STATEMENT

The authors state there are no conflicts of interest whatsoever.