

Clinical Management of Alopecia X in a German Spitz Dog Using Deslorelin Implant

Manejo clínico da alopecia X em um cão da raça Spitz Alemão utilizando implante de deslorelina

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ABSTRACT

Alopecia X is a non-inflammatory dermatopathy characterized by progressive and symmetrical hair loss, frequently associated with cutaneous hyperpigmentation, and is commonly observed in Nordic dog breeds with double coats. Its etiology is not fully understood, which makes diagnosis and treatment challenging in veterinary clinical

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practice. The present study aimed to describe the clinical management of a German Spitz dog diagnosed with alopecia X and treated using a deslorelin implant. A male dog, aged 1 year and 4 months, was presented with progressive hair loss that had been evolving for approximately six months. Dermatological examination revealed alopecic areas in the lumbosacral, pericaudal, abdominal and hind limb regions, associated with cutaneous hyperpigmentation and absence of pruritus. Parasitological and cytological examinations did not reveal significant abnormalities. The diagnosis was established based on clinical presentation and exclusion of other dermatological conditions. Treatment consisted of the subcutaneous implantation of deslorelin, and the patient was periodically monitored to evaluate the therapeutic response. Progressive hair regrowth was observed, with complete restoration of the hair coat approximately 230 days after treatment initiation, with no evidence of recurrence during the follow-up period. The findings observed in this case suggest that hormonal modulation induced by deslorelin may represent an effective therapeutic alternative for the management of this dermatological condition.

Keywords: Dermatopathy. Hair follicle. Hyperpigmentation. Repilation.

RESUMO

A alopecia X é uma dermatopatia não inflamatória caracterizada por alopecia progressiva e simétrica, frequentemente associada à hiperpigmentação cutânea, sendo observada principalmente em cães de raças nórdicas com pelagem dupla. Sua etiologia ainda não é completamente compreendida, o que torna o diagnóstico e o tratamento desafiadores na prática clínica veterinária. O presente trabalho teve como objetivo descrever o manejo clínico de um cão da raça Spitz Alemão diagnosticado com alopecia X e tratado com implante de deslorelina. Um cão macho, com 1 ano e 4 meses de idade, foi atendido apresentando perda progressiva de pelos há aproximadamente seis meses. Ao exame dermatológico, observaram-se áreas de alopecia nas regiões lombo-sacral, pericaudal, abdominal e membros posteriores, associadas à hiperpigmentação cutânea e ausência de prurido. Exames parasitológicos e citológicos não evidenciaram alterações significativas. O diagnóstico foi estabelecido com base na apresentação clínica e na exclusão de outras dermatopatias. O tratamento consistiu na implantação subcutânea de deslorelina, sendo o paciente acompanhado periodicamente para avaliação da resposta terapêutica. Observou-se repilação progressiva, com recuperação completa da pelagem aproximadamente 230 dias após o início do tratamento, sem evidência de recidiva durante o período de acompanhamento. Os resultados observados neste caso sugerem que a modulação hormonal promovida pela deslorelina pode representar uma alternativa terapêutica eficaz no manejo dessa dermatopatia.

Palavras-chave: Dermatopatia. Folículo piloso. Melanodermia. Repilação.

1 INTRODUCTION

Alopecia in dogs may result from a variety of dermatological and systemic conditions and is considered a common complaint in veterinary dermatology (GONDIM; ARAÚJO, 2020). Among these conditions, alopecia X, also referred to as hair follicle entrapment, is characterized by bilateral, symmetrical, non-inflammatory, and generally non-pruritic alopecia. Affected dogs may present with a fragile and dull hair coat, melanoderma, and other nonspecific alterations, without systemic manifestations, which makes this condition similar to several endocrinopathies that also lead to alopecia (PARADIS, 2012).

Historically, alopecia X has been described using different terms, such as “pseudo-Cushing,” congenital adrenal hyperplasia syndrome, and “black skin disease,” and it is more commonly observed in Nordic double-coated breeds, especially the German Spitz (MILLER et al., 2013). Although its pathogenesis has not yet been fully elucidated, hereditary factors and hormonal alterations involving the hair follicles have been suggested (FRANK, 2013).

The limited understanding of the pathophysiology of alopecia X makes it difficult to establish a standardized and effective therapeutic protocol. Nevertheless, different therapeutic approaches, such as neutering, melatonin administration, trilostane, and microneedling, have shown satisfactory results in promoting hair regrowth in some cases (BAPTISTA, 2018). Although it is often considered an aesthetic condition, alopecia X may compromise the animal’s quality of life, since the hair coat plays essential roles in protection and thermoregulation.

Therefore, the present study reviews the current literature on alopecia X in dogs, addressing its etiology, clinical signs, diagnosis, and treatment options, in addition to evaluating the use of deslorelin through the presentation of a successful clinical case in a German Spitz dog.

2 LITERATURE REVIEW

2.1 Hair and the Hair Cycle

Hair in mammals consists of keratinized structures produced by hair follicles and is composed of a free shaft and an intradermal root. At the distal end of the root, the hair bulb attaches to the dermis (FAVARETO, 2006).

Hair growth occurs in a cyclical pattern, consisting of phases of active growth, transition, and rest, which are regulated by intrinsic factors such as cytokines and hormones, as well as extrinsic factors including temperature and friction. The hair cycle includes the anagen phase (active growth), catagen phase (regression), telogen phase (rest), and exogen phase (shedding). The duration of these phases varies among breeds and body regions, influencing the final hair length (FAVARETO, 2006). Breeds such as Poodles and Bichon Frisés present predominantly anagen hair cycles, whereas breeds such as Chow Chows and German Spitz exhibit predominantly telogen cycles (PATEL; FORSYTHE, 2011).

In dogs, the hair cycle is normally well balanced, allowing the animal to remain continuously covered with hair. Hair replacement occurs in a mosaic pattern, with follicles in different stages of the cycle within the same cutaneous region (PATEL; FORSYTHE, 2011). Hormones, particularly those related to photoperiod, influence the hair cycle and are responsible for seasonal shedding patterns (BAPTISTA, 2017; FAVARETO, 2006).

With advancing age, the telogen phase tends to become prolonged, and environmental factors such as photoperiod and nutrition may influence the hair cycle (MÜNTENER et al., 2012). In alopecia X, there is a failure in the transition from the puppy coat to the adult coat, suggesting an early disturbance in the hair cycle, which is also observed in endocrine diseases such as hyperadrenocorticism and hypothyroidism (BAPTISTA, 2017).

2.2 Etiology and Epidemiology

Breeders of Nordic dog breeds in English-speaking countries often refer to this condition as “black skin disease” due to the melanoderma commonly associated with it. In veterinary literature, alopecia X has been described using several terms, including adult-onset growth hormone deficiency and neuter-responsive alopecia (FRANK, 2013).

Alopecia X mainly affects young to adult dogs, typically between one and two years of age, although cases have been reported in animals ranging from nine months to eleven years old. Although it is more commonly observed in intact males, both sexes may be affected (PARADIS, 2012). The disease occurs more frequently in breeds with dense double coats, such as the German Spitz and Siberian Husky, although it may occur in any breed (FRANK, 2013).

Clinically, the condition is characterized by bilateral and symmetrical alopecia without inflammation, commonly affecting the dorsal cervical, dorsolumbar, and caudal regions, often accompanied by cutaneous hyperpigmentation. Alopecia may extend to the trunk and may recur even after treatment (PATEL; FORSYTHE, 2011).

The pathogenesis of alopecia X remains uncertain; however, it is believed that hereditary factors and alterations in hormone receptors within hair follicles may lead to prolonged retention in the telogen phase of the hair cycle (SANTOS et al., 2018). Breed predisposition and early disease onset further support this hypothesis (GONDIM; ARAÚJO, 2020).

Genetic studies have not identified specific mutations but have revealed hypoexpression of genes associated with the Wnt and Shh signaling pathways, which are important for inducing the anagen phase. Alterations in genes related to sex hormones and melatonin metabolism also suggest a possible local hormonal imbalance (BAPTISTA, 2017; BRUNNER et al., 2017).

Some theories suggest that the disease may result from abnormal adrenal steroidogenesis or growth hormone deficiency (CUNHA, 2015). Although the administration of growth hormone has induced hair regrowth in some cases, the

exact etiology remains unknown (ADAMO, 2018). Research has also revealed elevated levels of sex hormones in many dogs with alopecia X; however, therapeutic responses to mitotane and melatonin have not been consistently associated with normalization of these levels, suggesting that local hormonal dysregulation may play a relevant endocrine role (BRUNNER et al., 2017).

2.3 Clinical Signs

The first sign of alopecia X frequently reported by owners is the failure of the puppy coat to transition to the adult coat, observed in approximately 93.46% of affected dogs. These animals either do not undergo or present only a minimal coat change, which typically occurs around four months of age in the German Spitz. Failure of coat transition may indicate an early disturbance in the hair cycle and may serve as an important diagnostic indicator of alopecia X (BAPTISTA, 2017).

Initial changes in the hair coat include gradual alterations in texture, making it dry and dull, while the hair on the head and extremities usually remains preserved (FRANK, 2013). Alopecia develops symmetrically on the dorsal region, caudal portions of the pelvic limbs, perineal region, and neck, accompanied by changes in hair color and quality (BRUNNER et al., 2017).

Initially, primary hairs are lost, followed by gradual loss of secondary hairs, resulting in extensive alopecic areas and cutaneous hyperpigmentation. The most affected areas include regions subject to friction, such as the caudomedial surfaces of the hind limbs and the trunk (ADAMO, 2018).

As the disease progresses, continuous hair loss and melanoderma develop, with preservation of the head and distal limbs in advanced stages (FRANK, 2013). Over time, alopecia may extend across the trunk and head while the extremities remain relatively unaffected (BAPTISTA, 2018). The alopecic skin may become thin, hypotonic, and hyperpigmented, and mild secondary seborrhea or superficial pyoderma may occur (PARADIS, 2012).

A notable feature is hair regrowth in traumatized areas or sites subjected to skin biopsy (GONDIM; ARAÚJO, 2020). Hair loss may result in a puppy-like appearance and may predispose the dog to secondary bacterial or fungal infections (TALARICO, 2020). Pruritus is generally absent unless secondary bacterial infection or keratinization disorders occur (CERUNDOLO et al., 2008). Although affected animals are usually systemically healthy, it is essential to rule out endocrinopathies due to the similarity of clinical manifestations (GONDIM; ARAÚJO, 2020).

2.4 Diagnosis

The diagnosis of alopecia X is based on clinical and laboratory criteria. Initially, it is essential to exclude other conditions based on the animal's clinical history and presenting signs. Alopecic areas typically spare the head, forelimbs, and distal

portions of the hind limbs, and the absence of pruritus is considered a distinctive feature (ADAMO, 2018).

The exclusion of diseases such as endocrine disorders, gonadal neoplasms, sebaceous adenitis, telogen effluvium, and follicular dysplasias is crucial. Factors such as breed (especially Nordic breeds such as the German Spitz), age (generally between one and six years), distribution of alopecic areas, and absence of systemic signs are important aspects in clinical evaluation (BAPTISTA, 2018).

Laboratory tests such as complete blood count, biochemical profile, thyroid function tests, and urinary cortisol-to-creatinine ratio should be performed. Skin biopsy is recommended to rule out other conditions such as parasitic, fungal, and bacterial dermatitis, although histopathological findings are not specific enough to confirm alopecia X, as many features are shared with other endocrine dermatoses (BAPTISTA, 2018; CERUNDOLO et al., 2008).

Microscopically, dogs with alopecia X commonly exhibit orthokeratotic hyperkeratosis, follicular keratosis, and so-called “flame follicles.” Although these changes may occur in other dermatological conditions, they are more prominent in alopecia X (GONDIM; ARAÚJO, 2020; MÜNTENER et al., 2012). Histopathological examination is therefore considered an important supportive diagnostic tool but does not definitively differentiate alopecia X from other endocrine diseases (BAPTISTA, 2018).

Evaluation of the response to treatment may also assist in diagnosis, as responses vary among animals (CERUNDOLO et al., 2008). Physical examination of the skin helps identify signs of inflammation or infection that may coexist with alopecia X (BAPTISTA, 2018). The trichogram is also useful for identifying the growth phase of hair follicles, aiding in distinguishing alopecia X from other dermatological conditions (PAIS, 2013).

2.4.1 Differential Diagnosis

The main differential diagnoses of alopecia X include hyperadrenocorticism, hypothyroidism, hyperestrogenism, gonadal neoplasia, telogen effluvium, follicular dysplasia, seasonal flank alopecia, and sebaceous adenitis (GONDIM; ARAÚJO, 2020). Hormonal tests are essential for excluding endocrinopathies with similar clinical presentations (ADAMO, 2018).

Inflammatory diseases such as generalized demodicosis can be differentiated through skin scraping and identification of mites (BAPTISTA, 2018). Sebaceous adenitis and follicular dysplasias are diagnosed primarily through histopathological examination (MÜNTENER et al., 2012).

Alopecia X should also be differentiated from seasonal or cyclic truncal alopecia, which suggests recurrent flank alopecia and is not commonly observed in the breeds typically affected by alopecia X (BAPTISTA, 2018). Telogen effluvium may occur following significant stress events such as illness or lactation, causing hair follicles to prematurely enter the telogen phase (MÜNTENER et al., 2012).

Post-clipping alopecia is another important differential diagnosis, particularly in double-coated breeds, in which hair regrowth fails after clipping due to prolonged telogen phase associated with loss of thermal insulation (MÜNTENER et al., 2012).

2.5 Treatment

The treatment of alopecia X primarily aims to improve the animal's appearance, with success rates ranging from 30% to 85%, although relapses may occur. The main therapeutic approaches include neutering, melatonin administration, trilostane therapy, deslorelin implants, and microneedling, each presenting varying degrees of benefits and risks (ADAMO, 2018; FRANK, 2013).

Neutering is generally considered the first-line treatment and may promote hair regrowth in approximately 75% of cases within three to six months, although relapse occurs in approximately 15% of affected dogs (ADAMO, 2018; CUNHA, 2015; TALARICO, 2020).

Melatonin therapy has demonstrated success in up to 40% of cases and acts by influencing estradiol production and blocking estrogen receptors. The recommended dose ranges from 3 to 12 mg per animal administered orally, with treatment discontinued after hair regrowth and resumed if relapse occurs (FRAZÃO, 2015; VENÂNCIO et al., 2016).

Trilostane, an inhibitor of adrenal steroidogenesis, has shown effectiveness in approximately 85% of cases, although responses may vary and adverse effects such as sudden death in dogs with cardiac disease have been reported. The recommended dose ranges from 30 to 60 mg per dog every 24 hours and should be adjusted based on ACTH stimulation test results (ADAMO, 2018; BAPTISTA, 2018; FRAZÃO, 2015; VENÂNCIO et al., 2016).

Deslorelin, a gonadotropin-releasing hormone agonist, may promote hair regrowth by suppressing the hypothalamic–pituitary–gonadal axis (SANTOS, 2018). Microneedling, which stimulates hair growth through microtrauma and activation of stem cells, has also emerged as a promising therapeutic approach (BAPTISTA, 2017).

Medroxyprogesterone acetate may induce hair regrowth in some dogs when administered at doses of 5–10 mg/kg subcutaneously on a monthly basis for four to six months. Clinical monitoring is recommended prior to initiating therapy, as alopecia X is primarily an aesthetic condition and affected animals are generally systemically healthy (FRANK, 2013).

2.6 Prognosis

The prognosis of alopecia X depends on whether the animal presents endocrine involvement, the degree of hair regrowth, the therapeutic methods employed, and the diagnostic and therapeutic approaches adopted for this dermatopathy. Animals without systemic alterations generally have a favorable prognosis, as the condition is

primarily aesthetic. In contrast, animals presenting metabolic disorders may have a more guarded prognosis (BAPTISTA, 2018; GONDIM; ARAÚJO, 2020).

Researchers believe that in the near future it may be possible to determine the genetic basis of alopecia X and develop genetic tests capable of identifying carrier animals, both clinically normal and affected individuals. Such advances may allow breeders to make informed decisions regarding selective breeding, potentially reducing the incidence of the disease (VENÂNCIO et al., 2016).

3 CASE REPORT AND DISCUSSION

On April 14, 2023, a male German Spitz dog aged 1 year and 4 months was presented with a history of progressive hair loss that had been evolving for approximately six months, without response to previous treatments. The patient weighed 3.6 kg and presented a rectal temperature of 38.5°C, heart rate of 115 beats per minute, and respiratory rate of 20 movements per minute. During the general physical examination, the animal was alert, with normal mucous membrane coloration and adequate body condition score, and no systemic abnormalities were identified.

Dermatological evaluation revealed alopecia affecting the lumbosacral, pericaudal and caudal regions, associated with marked hyperpigmentation and the presence of residual hair tufts, as well as mild erythema (Figure 1). Alopecic areas were also observed in the ventral abdominal region and in the lateral portions of the pelvic limbs (Figure 2). In the remaining regions of the body, the coat distribution appeared preserved; however, the hair exhibited a dull appearance and increased fragility. No pruritus was observed during the clinical examination.

The clinical presentation observed in this patient was consistent with the pattern commonly described for alopecia X, which typically affects double-coated breeds such as the German Spitz and is characterized by symmetrical, non-inflammatory alopecia involving the trunk and caudal regions, frequently accompanied by hyperpigmentation of the affected skin (FRANK, 2013; BRUNNER et al., 2017).



Figure 1: Alopecia in the lumbosacral, pericaudal, and caudal regions, with hyperpigmentation and the presence of a few remaining hair tufts in a 1-year-and-4-month-old German Spitz dog, examined on April 10, 2023.

Source: Personal archive.



Figure 2: Alopecia in the abdominal region and hind limbs, with hyperpigmentation, in a 1-year-and-4-month-old German Spitz dog examined on April 10, 2023.
Source: Personal archive.

Parasitological and cytological examinations were performed, and the results were analyzed on April 17, 2023. No clinically relevant abnormalities were identified, with only minimal presence of cocci observed in the cytological evaluation. Although hormonal tests would have been recommended as part of the diagnostic investigation, the animal's owner declined these examinations due to financial limitations. Therefore, the presumptive diagnosis of alopecia X was established based on the clinical findings, breed predisposition and absence of systemic alterations.

According to Adamo (2018), the diagnosis of alopecia X is frequently established by exclusion, since several endocrine disorders such as hypothyroidism and hyperadrenocorticism may present similar dermatological manifestations. For this

reason, the clinical history, distribution of alopecia and breed predisposition represent important elements in the diagnostic approach.

On April 24, 2023, treatment was initiated through the subcutaneous implantation of deslorelin (50 mg). The procedure was performed under aseptic conditions, with implantation in the interscapular region while avoiding areas of excessive adipose tissue in order to ensure adequate drug release. The implant remained palpable in situ after the procedure.

Deslorelin is a synthetic analogue of gonadotropin-releasing hormone (GnRH) that promotes suppression of the hypothalamic–pituitary–gonadal axis, resulting in reduced production of sex hormones. This hormonal modulation has been associated with reactivation of the hair follicle cycle and subsequent hair regrowth in dogs affected by alopecia X (SANTOS, 2018). The role of hormonal influences in the pathogenesis of alopecia X has been widely discussed in the literature, supporting the use of therapies that modulate endocrine pathways in affected animals (GONDIM; ARAÚJO, 2020).

The patient was monitored periodically in order to evaluate treatment response and detect possible secondary dermatological complications. On August 16, 2023, partial hair regrowth was observed, although areas of melanoderma were still evident (Figure 3). Due to this finding, a follow-up consultation was scheduled for December in order to evaluate the potential need for reapplication of the deslorelin implant.



Figure 3: Initial stage of hair regrowth with the appearance of hair tufts and persistent melanoderma in a 1-year-and-7-month-old German Spitz dog with alopecia X undergoing treatment with a 50 mg deslorelin implant for 110 days.

Source: Personal archive.

During the follow-up evaluation, however, the patient exhibited complete hair regrowth and satisfactory hair coat quality, and therefore a new implant was not required. The complete repilation occurred approximately 230 days after treatment initiation.

Similar therapeutic responses have been reported in previous studies. Santos (2018) described successful hair regrowth in German Spitz dogs affected by alopecia X following the use of deslorelin implants, highlighting the effectiveness of hormonal suppression in restoring normal hair follicle cycling.

The last follow-up examination was conducted on April 10, 2024, when the patient still presented a normal and healthy hair coat. Figure 7 illustrates a comparative evaluation of the patient's dermatological condition at the beginning of treatment, when alopecia and melanoderma were still present, and one year after diagnosis, demonstrating complete repilation and restoration of hair coat quality.



Figure 4: Comparison between the dermatological conditions of a German Spitz dog with alopecia X at the beginning and at the end of treatment with a 50 mg deslorelin implant. **A)** Dermatological condition of the patient in August 2023, at the beginning of treatment, showing alopecia and melanoderma. **B)** Healthy hair coat observed during the last follow-up, on April 10, 2024, one year after diagnosis and treatment with the 50 mg deslorelin implant.

Source: Personal archive.

Although the therapeutic response observed in this case was satisfactory, periodic monitoring every six months was recommended due to the possibility of recurrence. Alopecia X is considered a chronic dermatological condition with variable therapeutic responses, and relapses have been reported even after successful treatment (BAPTISTA, 2018; VENÂNCIO et al., 2016).

Additionally, neutering was recommended for the patient as a complementary therapeutic strategy. According to Frank (2013), surgical castration may contribute to the reduction of hormonal influences associated with the development of alopecia X and may improve long-term stability of the hair coat.

4 CONCLUSION

The diagnosis of alopecia X requires careful evaluation of clinical findings and laboratory data, with particular emphasis on the exclusion of endocrine diseases that present similar dermatological manifestations. Breed predisposition, age of onset, and the distribution of alopecic areas are important factors that assist in establishing a presumptive diagnosis.

The successful use of deslorelin observed in this case highlights the potential of hormonal modulation as an effective therapeutic option for dogs with alopecia X, particularly in cases refractory to other treatments. However, further studies are necessary to better understand the pathophysiology of the disease and to establish more consistent treatment protocols.

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