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Case Report

Color-dilution alopecia in dogs

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Color-dilution alopecia is a relatively uncommon hereditary skin disease seen in "blue" and other color-diluted dogs. This syndrome is associated with a color-dilution gene. The initial clinical signs are the gradual onset of a dry, dull and poor hair coat quality. Hair shafts and hair regrowth are poor, and follicular papules may develop and progress to frank comedones. Hair loss and comedo formation are usually most severe on the trunk, especially color-diluted area on the skin. Six cases of color-dilution alopecia are reported in 3 months to 10 years old dogs. The breeds of dogs are blue Doberman Pinscher, Miniature Pinscher, Dachshund, and Schnauzer. Grossly, extensive partial hair loss was seen on the skin. Histopathologically, the epidermis is relatively normal but may be hyperplastic. Hair follicles are characterized by atrophy and distortion. Heavily clumped melanin is present in the epidermis, dermis and hair follicles.

Key words: color-dilution alopecia, dog, hair follicles, melanin

Color-dilution alopecia known as color-mutant alopecia is an uncommon and inherited dermatological condition, which has been described in blue, red and fawn Doberman Pinschers, fawn Irish Setters, and blue Dachshunds, blue Chow Chows, blue standard Poodles, blue Great Danes, blue Italian Greyhounds and blue Whippets [8]. In addition, this follicular disease has been seen in Chihuahuas, Shetland sheepdogs, Yorkshire terriers, and Kelpie x Border Collie dog [2,3]. Color mutants are thought to have an ectodermal defect, which is not usually manifest at birth, but abnormal hair and slowly progressive alopecia develop at a young age in affected dogs [8,9]. This condition was previously known as blue balding syndrome, blue doberman syndrome, color dilution alopecia, congenital alopecia, and blue dog disease. References to Doberman Pinschers or blue hair coats arose because the condition is common in blue individuals of this breed, but it is not limited to either blue dogs or Dobermans. The condition may affect any dilutely pigmented dog, regardless of coat color.

The skin biopsies of 3 months to 10 years old dogs, three males and three females, were submitted to the National Veterinary Research & Quarantine Service (NVRQS) because of coat abnormalities, in particular alopecia. Hair loss and comedo formation were usually seen on the dorsal or ventral trunk (Table 1). The hair tended to be dry and lustreless and the integument somewhat scaly (Fig. 1). One dog (3-year-old Schnauzer) showed a generalized seborrhea. In all cases a general and a dermatological examination were performed. Routine dermatological methods such as skin scraping, dermatophytes test media (DTM) test, and wood lamp test were undertaken in all cases. Samples for mycological and bacteriological culture were taken in alopecic area as previously described [6]. In the bacterial medium grew a *Staphylococcus* species, catalase positive and coagulase negative, that was considered as nonpathogenic bacteria. Skin scraping, DTM test and wood Lamp test did not demonstrated any evidence of pathogenic agents. All of the cases were failed for anti-fungal treatment, antibiotic therapy, and thyroid hormones supplementation. Skin biopsies from the alopecic areas were submitted for histopathological examination.

Histologically, the epidermis presented hyperplasia and the superficial dermis was edematous. Numerous keratinocytes were scattered through the basal cell layer. Most of the hair follicles showed atrophy and distortion (Fig. 2). And those regions were filled with large granules of melanin and cell detritus (Fig. 3). An abnormal clumping of melanin was also observed in the epidermis, dermis, epithelia of hair follicles and around hair bulbs (Fig. 4). Mild lymphocyte and macrophage infiltrates were existed in dermis and periadnexal area. In some dogs, polymorphonuclear cells infiltration was

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Table 1. Clinical summary for dogs with color mutant alopecia

No. of cases	Breed	Age	Sex	Site of alopecia
1	Doberman Pinscher	10 yr	M	Dorsal trunk
2	Dachshund	4 yr	M	Dorsal trunk
3	Dachshund	1 yr	M	Ventral trunk
4	Miniature Pinscher	8 mo	F	Hip area
5	Miniature Schnauzer	3 mo	F	Feet & axillae
6	Schnauzer	3 yr	F	Dorsal trunk

Fig. 1. Color-dilution alopecia in a Dachshund dog with a partial loss of hair in ventral trunk.

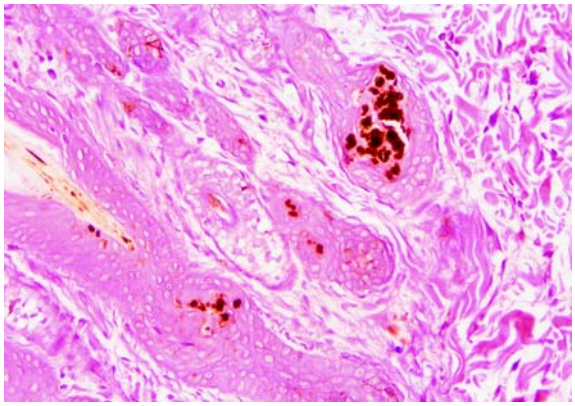

Fig. 2. Skin from a dog. Note heavily clumped melanin in distorted hair follicles. H & E. ×100.

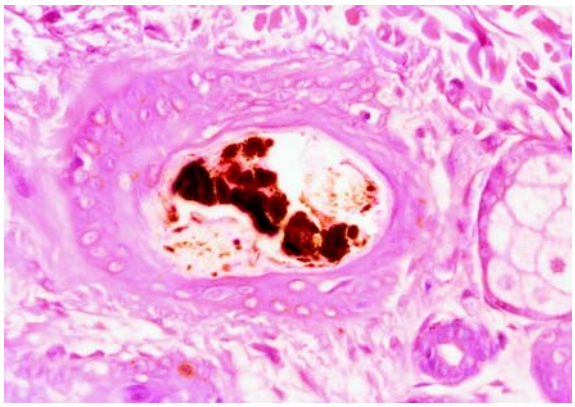

Fig. 3. Skin from a dog. Superficial distension of follicles by clumped melanin and cellular debris. Hair shafts are absent. H & E. ×400.

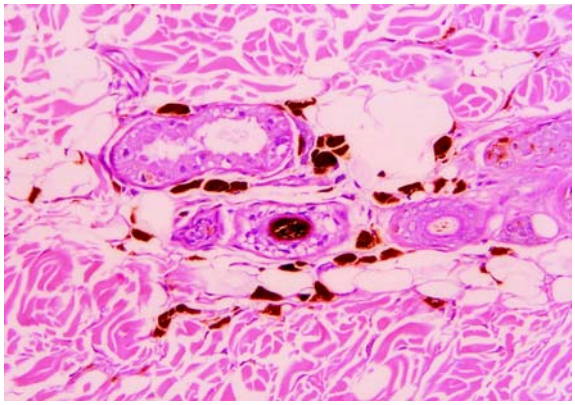

Fig. 4. Skin from a dog. Note the perifollicular pigmentary incontinence. H & E. ×200.

seen around blood vessels and some hair shafts were absent.

Color-dilution alopecia is characterized by loss of hair from dilutely pigmented areas. Coats are normal at birth, and onset of hair loss usually begins between 4 and 18 months of age [4]. Hair loss usually begins along the dorsal midline (middle of the back) and often spares the head, tail and limbs. The pattern seems to vary from breed to breed. The hair loss may be total or partial and any remaining hairs are usually sparse, rough and easily broken or removed. The skin in the affected areas is usually scaly and may occasionally develop bacterial infections. Pruritus is usually absent, unless a bacterial infection has set in. Sex predilections have not been noted [4].

The primary differential diagnosis for color-dilution alopecia is black-hair follicular dysplasia, which is virtually identical histopathologically [5]. Diagnosis of these two skin problems is based on a combination of clinical signs, hair microscopy and skin histopathology. Clinical signs consist of alopecia or progressive hypotrichosis in a young animal. Tan areas are spared in color-dilution alopecia and only black areas are affected in black hair follicular dysplasia. Hence latter condition is restricted to the dark-haired areas of white dogs with dark spots [1,4]. Diagnosis of color-mutant alopecia requires first ruling out other causes of hair loss. But, clinical history and characteristic presence of diluted pigment was

very significant and helpful in establishing the definitive diagnosis [2,3,4]. Diagnostic tests should include fungal cultures, skin scrapings to check for parasitic mites, etc. Color-dilution alopecia often closely resembles endocrine hair loss, in particular hypothyroidism and growth hormone deficiency dermatosis, and the dog should be carefully examined for other abnormalities, and tested for normal thyroid function. However, none of these dogs had any systemic or biochemical signs despite the chronicity of skin lesions. Presence of dilute pigment and a characteristic course of disease also aid in making the diagnosis. Microscopic examination of hairs and/or skin biopsies can be used to confirm the diagnosis [2,4].

The cause of color-dilution alopecia is not clearly understood. It is thought that color-dilution alopecia is based on autosomal recessive gene transmission [1]. The dilution gene -d^{17} especially the allele called -d1 may play an important role in the genetic transmission of color-mutant alopecia [7].

This report describes a color-dilution alopecia in two Schnauzers, a breed in which the disease has not been previously diagnosed. Both dogs were born with normal hair but over the first two months a slowly progressive, non-pruitic alopecia developed. Physical examination revealed a moderate alopecia which mainly affected gray regions of the animals. The dorsal trunk, axillae and distal part of the extremities were spared. The histopathologic lesions in Schnauzers were resembled that seen in blue Doberman pinscher with color-dilution alopecia. There is no cure for color-dilution alopecia. Treatment is limited to controlling the scaliness and any associated pruritus with various shampoos or topical treatments.

In conclusion, the clinicopathologic features of these cases were consistent with color-dilution alopecia, and the first report of this disease was in Schnauzer breed. Hence color-dilution alopecia should take into consideration in the differential diagnosis of generalized or partial, non-pruritic alopecias of young blue dogs, regardless of breed. Histopathology was not diagnostic by itself but very significant and helpful in establishing the definitive diagnosis.

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