

Melanotrichia in Poodles : Clinical and Histopathological Findings

Ha-jung Kim, Chul-Park, Dong-in Jung, Ju-won Kim, Byeong-teck Kang,
Jung-hwayang Sur*, Chun-gun Kim** and Hee-myung Park¹

Department of Veterinary Internal Medicine, College of Veterinary Medicine

**Department of Veterinary Histopathology, College of Veterinary Medicine, Konkuk University*

***Tae-il animal hospital, Seoul, Korea*

Abstract : A 5-year-old, female Poodle and her daughter, 2-year-old, were referred to Konkuk University Veterinary Teaching Hospital (KVTH) due to discoloration of hair on dorsum, and generalized alopecia following clipping. Some papules and pustules are found on patch area. Complete blood counts and serum chemistry profiles were not remarkable. Trichogram revealed that melanin-granule was pigmented on hair bulb and shaft in affected area and no melanin pigmentation was noted in non-patch area. And skin biopsy showed mild epidermal hyperplasia and mild inflammation in dermis of the patch area. This case report indicates that melanotrichia can be occurred by postclipping inflammation. However, the mechanism of melanocyte proliferation and rates of melanogenesis in response to postclipping remains to be unclear in these cases.

Key words: Melanotrichia, Poodle.

Introduction

Epidermal and hair pigmentation result primarily from melanin, which is synthesized from melanocytes as a cell-specific product in a specialized organelle, the melanosom^{3,9}. In the hair, melanocytes are found in the hair bulb, and active only during anagen phase. Visible pigmentation depends on which stage of melanosomes is transferred, the size of the melanosomes, and how the melanosomes are dispersed within the keratinocyte³.

It is defined 'melanotrichia' as increased pigment of the hair. This is seen more commonly in certain breeds such as the Yorkshire terrier, Silky terrier, Old English sheepdog, and Poodle.

Especially, multifocal areas of melanotrichia may be seen in Poodles with sebaceous adenitis, intervertebral disk disease³. In addition, melanotrichia can occur in the post-inflammation, drug induced and hormonal disorders^{3,9,10}. In particular, Hyperpigmentation in inflammatory disease can be related to keratinocytes which locally stimulate melanogenesis by releasing melanocyte stimulating factors³. Melanocyte proliferation in response to injury, and rates of melanogenesis under basal and stimulated conditions remain very poorly understood⁹.

Hyperpigmentation due to adverse drug reactions is rare in dogs^{3,9}. O, p'-DDD, and some antibiotic drugs can be associated with hypermelanosis and melanotrichia³. In humans, pyridoxine (vitamine B₆) is reported that can induce melanotrichia, and metallic substances, for example, silver, gold, and mercury can cause cutaneous pigmentation changes^{1,10}.

Adrenocorticotrophic hormone (ACTH) and other pituitary lipotrophic hormones, can stimulate melanogenesis, and can be

associated with melanotrichia³. Especially, in sex hormone, hyperestrogenism can cause variable hyperpigmentation, vulvar enlargement, and not to regrow after clipping in dogs³. Estrogens increase skin pigmentation in the guinea pig by increasing both free melanin and melanin within melanocytes, whereas ovariectomy has the opposite effect³.

It has been reported that post-clipping syndrome may occur as the result of vascular perfusion changes in response to cutaneous temperature changes, and so it can cause fail to regrow hair⁶.

This case report showed clinical and histopathological characteristics of melanotrichia which may cause cosmetic problems in dogs.

Case report

A 5-year-old, female, Poodle and a 2-year-old, her daughter, were referred to the Konkuk University Veterinary Teaching Hospital (KVTH) with 1-month history of alopecia, and discoloration of the hair after clipping. Her hair was brown, but the color was changed to dark brown and in her daughter, the color was changed from beige to brown. According to the history obtained, two dogs were clipped and hair color was changed nearly at the same time.

On physical examination, papulopustular lesions were observed on the patch area, and melanotrichia was also noted on affected sites, primarily on dorsum (Fig 1). Complete blood counts (CBC), serum biochemistry profiles, radiographic findings and trichogram have been conducted initially to examine the generalized body conditions and abnormalities of hair. Results of CBC revealed unremarkable except for mild thrombocytosis, and serum chemistry profiles showed no remarkable findings except for mild elevated ALP.

On trichogram, melanin-granule pigmentation on hair bulb

¹Corresponding author.

E-mail : parkhee@konkuk.ac.kr



Fig 1. Discoloration of the hair on dorsum (left: mother, right: daughter). It shows melanotrichia on the patch area.

and shaft of patch area were found. However, there was no melanin pigmentation in non-patch area (Fig 2).

Histopathological findings showed mild epidermal hyperplasia and inflammation in dermis in skin biopsy sample. Thick melanin-pigmented granules were observed in dermal and subcutis hair shaft (Fig 3 and 4). Hormonal assay and abdominal ultrasonography were performed to rule out sex-hormonal imbalance. But there was no abnormalities noted. The result of estradiol concentration in serum was within reference range (10 pg/ml, reference value: less than 20 pg/ml in diestrus).

The dogs were given cephalexin (22 mg/kg, po tid) for the

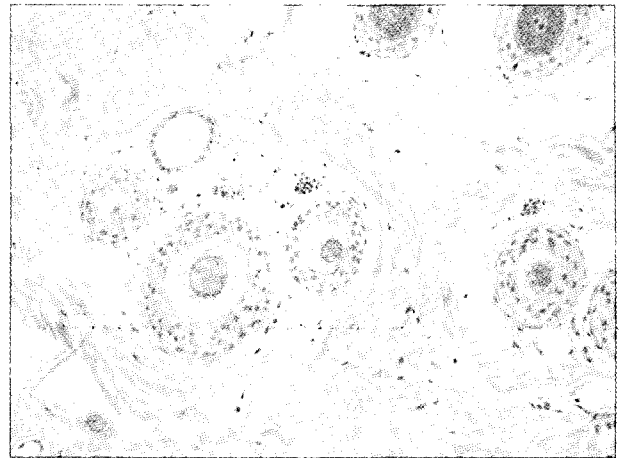


Fig 3. Melanotrichia in a dog. Hair shaft has slightly melanin-pigmented granules in dermis. H&E. $\times 100$.

treatment of dermal inflammation. And the inflammation was relieved after a few days. But melanotrichia is not recovered until recently.

Discussion

In human, a study reports pyridoxine hydrochloride (vitamin B₆) induced melanotrichia in a girl with homocystinuria¹⁰. In addition, some drugs have been reported to induce the cutaneous reactions, especially hyperpigmentation. O,p'-DDD, and

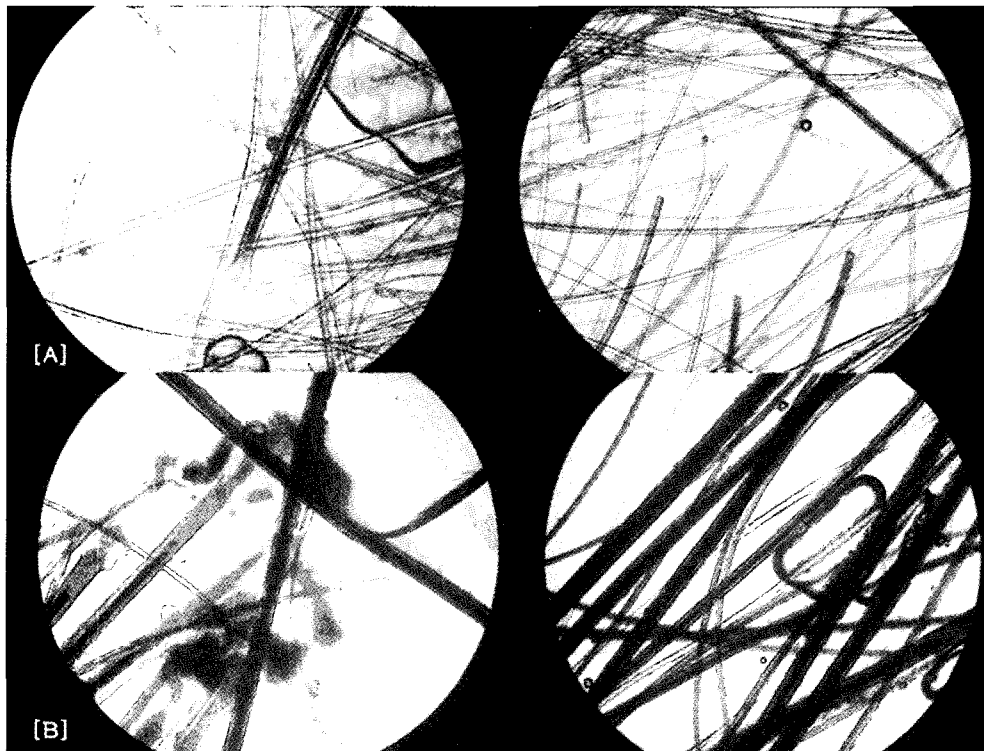


Fig 2. Microscopic appearance of the hair on the lesion (A: non-patch area, B: patch area). It shows melanin-granule pigmentation on hair bulb (left) and shaft (shaft) of the patch area, and nearly no melanin pigmentation in non-patch area.

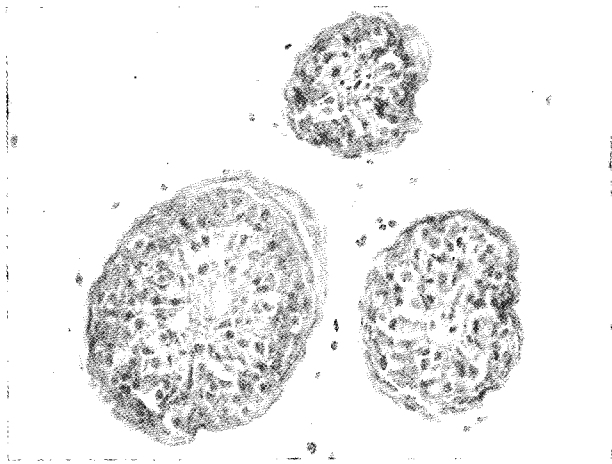


Fig 4. Melanotrichia in a dog. Hair shaft has thick melanin-pigmented granules in subcutis. H&E. $\times 100$.

metallic substances may cause hyperpigmentation, and sulfonamides, penicillins, cephalosporins have been reported to produce idiosyncratic cutaneous reactions in dogs^{2,4,8}. These drugs can induce the various dermatoses. But in this case, two patients had no history of drugs administration prior to the appearance of melanotrichia.

According to results of the several reports previously described, although the mechanism is unknown, it has been suggested that the hyperpigmentation may result from direct actions of the hormonal changes on the melanocytes in sex-hormonal imbalance¹. Mostly, the sex hormone dermatoses lead to diffuse hyperpigmentation, but there can appear to regional sensitivity of hair follicles to estrogenic abnormalities^{1,3,5}. In this case, concentration of estradiol in serum of two dogs was within normal reference range. Therefore estrogen may not lead to melanotrichia.

Moreover, there were no abnormalities of ovary observed on the abdominal ultrasonographic examination.

The role of genetics has not been definitively proven in dogs but is thought to play a role due to breed predilection. In particular, melanotrichia may be seen commonly in Poodles³. But possibility of genetic relation is relatively low since melanotrichia of these cases occurred immediately after clipping. Many diseases characterized by chronic erythematous papular lesions may undergo hyperpigmentation, and the lesions are most commonly seen with superficial pyoderma^{3,8}. Most pruritis in hypersensitivity disease may lead to hyperpigmentation due to secondary inflammation³. Although this case had no hypersensitivity disease, it had mild inflammatory lesion on the dermis of patch area based on the histopathological findings. This lesion might be induced by secondary infection after clipping. This hypothesis can be confirmed by the history that two Poodles had concurrently melanotrichia on dorsum after clipping. Some studies suggest that keratinocytes may be able to locally stimulate melanogenesis by releasing melanocyte stimulating factors. These factors' levels and activity are increased in response to stimulation or kerat-

inocyte stress⁷. Post-clipping syndromes may be related to the stimulation and keratinocyte stress. In this case, alopecia was seen after clipping in two Poodles. Post-clipping alopecia was reported in some cases, but its mechanism has not been cleared at this time^{3,6}. But, presumably, it should be stressful condition on skin, and that can be the reason.

The possible mechanism is that stimulation of clipper might be induced the release of melanocyte stimulation factors, which can induce melanogenesis.

Conclusion

In conclusion, based on history, physical examination, CBC, serum chemistry profiles and histopathological examination, melanotrichia of these cases can be related to inflammation after clipping. Two poodles had concurrently melanotrichia on dorsum after clipping, and that may be related to post clipping dermal inflammations and stimulation of the melanogenesis by melanocyte stimulation factors.

This disease may be important not because it is serious clinical signs, but because it highly cause cosmetic problems.

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References

1. Bergfeld WF, McMahon JT. Identification of foreign metallic substances inducing hypopigmentation of skin. Light microscopy, electron microscopy, and x-ray energy spectroscopic examination. In: *Advances in Dermatology*, Chicago: Year Book Medical Publishers. 1987; 2: 171-180.
2. Cribb AE. Idiosyncratic reactions to sulfonamides in dogs. *J Am Vet Med Assoc* 1989; 195: 1612-1614.
3. Danny WS, William HM, Craig EG. In: *Muller and Kirk's Small Animal Dermatology*, 6th ed. Philadelphia: Saunders. 2001: 1005-1024.
4. Danny WS, William HM. Idiosyncratic cutaneous adverse drug reactions in the dogs: Literature review and report of 101 cases. *Canine Prac* 1999; 24: 16-22.
5. Eigenmann JE. Estrogen-induced flank alopecia in the female dog: Evidence for local rather than systemic hyperestrogenism. *J Am Anim Hosp Assoc* 1984; 20: 621-30.
6. Gross TL, Ihrke PJ, Walder EJ. In: *Veterinary Dermatopathology*. St Louis: Mosby-Year Book. 1992: 223-237.
7. Joseph JY, Joseph GM, Sandra JW, Kristen BR, David AN, Martin RZ. Cultured human keratinocytes synthesize and secrete endothelin-1. *J Invest Dermatol* 1993; 100: 23-26.
8. MacDonald JM. Hyperpigmentation. In: *Current Veterinary Dermatology*. St Louis: Mosby-Year Book. 1993: 234-244.
9. Mina Y, Barbara AG. Human Melanocyte growth and differentiation: A decade of new data. *J Invest Dermatol* 1991; 97: 611-617.
10. Walter BS, Howard MR, Grant M. Pyridoxine-dependent hair pigmentation in association with homocystinuria. *Arch Dermatol* 1972; 106: 228-230.

푸들에서 발생한 *melanotrichia*: 임상적 그리고 조직병리학적 특징

김하정 · 박 철 · 정동인 · 김주원 · 강병택 · 임채영 · 서정향* · 김춘근** · 박희명¹

건국대학교 수의과대학 내과학 교실
*건국대학교 수의과대학 조직 병리학 교실
**서울 태일 동물병원

요 약 : 5살과 2살의 푸들 견이 미용 직후, 등 부위의 털의 변색과 전신적 탈모증세로 건국대학교 부속 동물 병원에 내원하였다. 병변 부위에서는 육안적으로 약간의 피부 발적과 소농포가 발견되었지만 총 혈구 계산, 혈액 화학 검사에서는 특이한 소견이 발견되지 않았다. 아울러 최근 약물투여 병력도 없었다. 병변부의 trichogram에서는 모근 쪽과 모간에 멜라닌 과립이 착색되어 있었고, 병변 이외의 부위에서는 멜라닌 착색이 관찰되지 않았다. 그리고 병변부 피부 생검에서는 약한 부전 각화증이 관찰되었으며 아주 미약한 진피층의 호중구 침윤이 관찰되었다. 본 케이스에서는 *melanotrichia*가 미용 직후에 피부에 가해지는 각종 자극에 의해 발생할 수 있음을 보여주고 있다. 그러나, 미용 후 멜라닌 신생의 정도와 멜라닌 세포의 증식 기전은 본 증례로서는 현재까지 명확하게 밝혀지지 않았다.

주요어 : *Melanotrichia*, Poodle.