

## Irritant Contact Dermatitis in a Dog

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**Abstract :** A 6-year-old, neutered female, Cocker spaniel presented with severe abdominal erythema and crusts. These conditions developed 1 month ago. This patient had a history of using humectant spray for several months. Irritant contact dermatitis was diagnosed by history, clinical signs, laboratory and histopathologic examinations (H-E stain). Complete blood count and serum chemistry showed no remarkable findings. Histopathologic examination of skin samples revealed parakeratosis accompanied by acanthosis of the dermis and mild perivascular inflammations of the superficial dermis. Clinical signs were improved after avoidance of suspected offending substance.

**Key words :** humectant spray, irritant contact dermatitis, parakeratosis.

### Introduction

Contact dermatitis is an inflammatory skin disease seen in dogs that is caused by direct contact with an offending substance (8). Contact dermatitis is divided into two types, irritant contact dermatitis(ICD) and allergic contact dermatitis (ACD) (10).

ICD is a non-specific inflammatory dermatosis, mainly due to the direct toxic action of irritating substance on the skin cells, which triggers inflammation by activation of the innate immune system (1). ICD can affect any animal of any age and has no breed predisposition (8). ACD primarily depends on the activation of allergen-specific T-cells, and is mainly regarded as a type IV hypersensitivity (9). ACD occurs rarely and there is no predisposition in age and breed (8,10).

Clinical signs of contact hypersensitivity include varying degrees of dermatitis, which tend to be confined to hairless or sparsely haired areas of skin in contact regions (8). This is because the hair coat is normally protective against most contactants (5). Acute skin lesions consist of various combinations of erythema, macules, papules, and, rarely, vesicles (8). Chronic lesions are often alopecic plaques that may be hyperpigmented, excoriated, and lichenified (8). Pruritus varies from mild to intense (8). The differential diagnosis of ICD includes atopic dermatitis, ACD, food hypersensitivity, drug eruption, *Malassezia* dermatitis, and seborrheic dermatitis (13). Definitive diagnosis of ICD is based on history, physical findings, provocative exposure test and dermatohistopathology (5,8,13).

Therapy of ICD may include discovering and eliminating offending substance. Without the identification of the irri-

tant, treatment may not be possible (8,13).

The aim of this study is to report the diagnosis and response to treatment in a case that dealt with the using humectant spray on dry skin causing pruritus, crusts and erythema as the main symptoms.

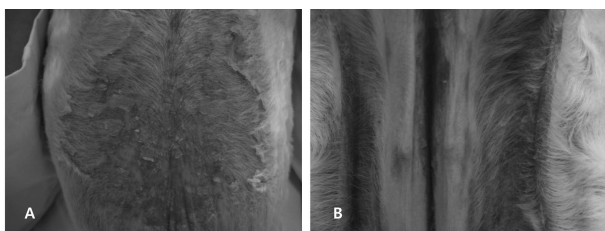
### Case

A 6-year-old, spayed female, Cocker spaniel dog with erythema, crusts and pruritus of the inguinal region was referred to Veterinary Medical Teaching Hospital of Chungnam National University. The conditions developed 1 month ago. This patient had a history of using oatmeal shampoo and humectant spray for several months. In physical examination, the lesions were limited to the abdomen and inguinal regions while being confined to hairless regions. Crusts and erythema could also be seen on the lesions (Fig 1). On complete blood count (CBC) and blood chemistry, there were no remarkable findings. Degenerated neutrophils were found on the dermatologic diagnostic tests.

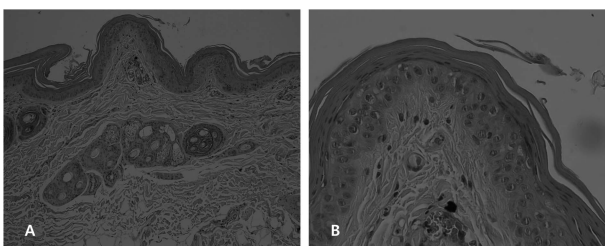
Skin biopsy was taken from the lesion for accurate histopathological assessment. In histological findings, epidermis showed parakeratosis accompanied by acanthosis. There were mild superficial perivascular infiltrations of lymphocytes and plasma cells (Fig 2). There were no remarkable signs of infiltration of inflammatory cells, exocytosis and spongiosis of the epidermis. Based on history, physical examination, dermatohistopathology, the dog was diagnosed with ICD.

Hmectant spray which is suspected to be the cause of ICD was discontinued. Amoxicillin - clavulanate (22 mg/kg PO; Amoxclan<sup>®</sup>, Hanmi Pharm Co., Ltd, Korea), cimetidine (3 mg/kg PO; Signatin<sup>®</sup>, Dongwha Pharm. Co., LTD, Korea), clemastine (0.1 mg/kg PO; Masjil<sup>®</sup>, Taiguk Pharm. Co., LTD, Korea) were used twice daily for dermatitis. After 2 weeks,

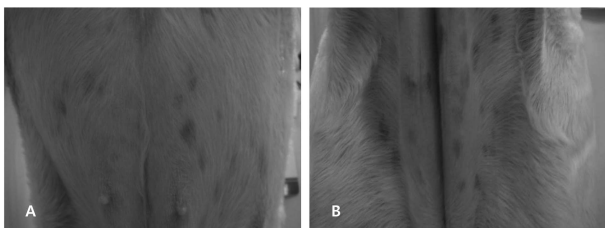
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**Fig 1.** Erythema and crusts lesions on the abdominal and inguinal regions. (A) Upper abdominal region. (B) Lower abdominal and inguinal region.



**Fig 2.** Histopathologic findings of irritant contact dermatitis in a dog. Note parakeratosis, acanthosis on the epidermis and mild superficial perivascular infiltrations of lymphocytes and plasma cells. H&E stain, (A)  $\times 100$ , (B)  $\times 400$ .



**Fig 3.** After 2 weeks, the lesions of the Fig 1 demonstrating erythema and crusts were improved. (A) Upper abdominal region. (B) Lower abdominal and inguinal region.

clinical signs of pruritus, crusts and erythema were improved (Fig 3).

## Discussion

ICD occurs by direct toxic action of irritating substance causing cellular damage and is an acute reaction which can be induced by a single exposure to the irritant within 24 hours (5). On the other hand ACD is a reaction of type IV hypersensitivity which can occur within 24-48 hours after re-exposure in months or years of sensitization (8,12).

Cellular damage causing inflammatory reactions induces ICD. The rapidity of onset and the intensity of the reaction depend on the nature of the contactant, its concentration, and the duration of the contact. A number of primary irritants such as soap, detergent, disinfectant, hair-coloring agent, weed and insecticidal spray, fertilizer, strong acid and alkaline, and flea collar are potential causative agents (8). In humans, there is

documented evidence of contact dermatitis resulting from exposure to many of the ingredients in moisturizing agents like aloe vera (3), chamomile (15), cocamidopropyl betaine (7), cocamide DEA (4), glycerine (11), propylene glycol (6) and sodium chloride (16). In this case, the humectant spray which is suspected to be the cause of the dermatitis, was made up of propylene glycol, glycerin, lactic acid and urea. Out of these compounds it is believed that propylene glycol was the causative agent because toxicity testing on humans showed that after 7 days of applying propylene glycol on skin, mild irritation occurred.

The pathogenesis of ICD is that irritants induce skin barrier disruption and epidermal cellular damage. The damaged epidermis releases pro-inflammatory mediators like TNF- $\alpha$  and interleukin-1, causing skin inflammation (1,14). Erythema and crusts are the clinical signs of ICD which are similar to the clinical signs of other contact dermatitis. However, unlike the broad lesions of ACD, the lesions of ICD are focal and usually occur at the inguinal and axillary region. The hair coat normally is protective against most contactants. Thus, most environmental irritants that initiate ICD are more likely to affect glabrous skin or areas where the hair coat is either naturally thin or missing due to skin disease or clipping (2,8,11). Pruritus is variable in intensity but usually is present (5,8). In this case, the lesions were limited to the abdomen and inguinal regions with severe pruritus.

Definitive diagnosis of ICD is based on history, physical findings, results of provocative exposure and histopathology. Provocative exposure involves avoiding contact with suspected allergenic substances for up to 14 days. The animal is then re-exposed to suspect substances, one at a time, and is observed for an exacerbation of the dermatosis over 7 to 10 days. Provocative exposure is time consuming, requires a patient and dedicated owner, and is frequently impossible to undertake (8). Erythematous macules or papules represent early stages of contact dermatitis and, if present, should be sampled for biopsy. Newer lesions should be chosen over chronic lesions, as lesions characterized by hyperpigmentation and lichenification are less likely to provide useful diagnostic information. Parakeratosis is accompanied by variable acanthosis, and there may be accompanying serous and neutrophilic inflammation, leading to crusts. Variable superficial perivascular infiltrations of lymphocytes, neutrophils, and macrophages are present (5).

Therapy of ICD is identification of irritant substances and elimination of the offending substances. Without the identification of the irritant, treatment may not be possible. Therefore as an alternative, washing with water or with non-irritating shampoo numerous times then drying carefully should be performed. Furthermore to block physical exposure to the irritant, if possible, clothing can be considered.

Identification of the irritant substances is essential for the prognosis of the patient. Since avoidance of the irritant gives a fair prognosis, all suspected substances should be avoided when the irritant is unknown.

## Conclusion

After the using of humectant spray to treat dry skin induced severe erythema and crusts, a skin biopsy was performed. In histopathological findings, epidermis showed parakeratosis accompanied by acanthosis. There were mild superficial perivascular infiltrations of lymphocytes and plasma cells. Based on these findings, the dog was diagnosed with ICD. Treatment was performed by avoiding the suspected humectant spray and it showed a good prognosis.

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## 개에서 발생한 자극성 접촉성 피부염 1례

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**요약** : 6년령의 중성화한 암컷 코커 스파니엘이 1개월 전부터 시작된 서혜부의 홍반과 가피, 소양감을 주증으로 본원에 내원하였다. 환축은 건성 피부에 대하여 보습을 목적으로 오트밀 샴푸와 보습용 스프레이를 수 개월간 사용하였다. 전혈구 검사와 혈청 생화학 검사결과 특이 소견은 관찰되지 않았다. 조직병리학적 검사 결과, 표피의 이상각화증과 표피증식증이 확인되었으며, 진피 상층부의 혈관주위 염증이 관찰되었다. 병력, 임상증상, 신체검사 및 혈액학적 검사, 피부기본 검사와 조직병리학적 검사를 통하여 자극성 접촉성 피부염으로 진단하였다. 자극성 접촉성 피부염의 원인으로 생각되는 보습용 스프레이의 사용을 중지하였으며 2주 후 서혜부의 홍반, 가피와 소양감이 개선되었다.

**주요어** : 보습용 스프레이, 자극성 접촉성 피부염, 이상각화증