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Clinical and Histological Features of Dry Skin in Atopic Dermatitis

MASAMI UEHARA

Department of Dermatology, Shiga University of Medical Science, Seta, Otsu, Japan

Of 200 atopic dermatitis patients observed during cold months, 44 (22 %) had ichthyosis vulgaris. Histologically, the dry skin in atopic dermatitis coexistent with ichthyosis demonstrated ichthyotic features which were frequently superimposed with eczematous changes. The dry skin in pure atopic dermatitis demonstrated the histology of mild eczema. Examinations using monoclonal antibodies showed that the dry skin in pure atopic dermatitis had increased numbers of OKT6-positive cells in epidermis. The lymphocytes in the dermal infiltrates consisted predominantly of LEU-3a-positive cells. It is concluded that the dry skin often seen in atopic dermatitis may be a mild eczematous lesion of atopic dermatitis, or a manifestation of concomitant ichthyosis, or a complex of these two changes. *Key words: Histopathology; Immunohistochemical analysis; Monoclonal antibodies; Ichthyosis vulgaris.*

Dry skin has long been recognized as one of the cutanous stigmata of atopic dermatitis (1–3), and it is reported that skin surface lipids are decreased (4, 5). The reduction of skin lipids is due to a decrease in skin lipids of sebaceous origin (6, 7). Sebaceous glands in the skin of these patients are atrophic (8, 9), indicating that the atrophy of sebaceous glands is responsible for the dryness.

On the other hand, it is well known that patients with atopic dermatitis often have ichthyosis vulgaris (10). Ichthyosis vulgaris also shows dry skin and atrophy of sebaceous glands (11, 12). It is therefore inevitable that the intrinsic features of dry skin in atopic dermatitis must be obscured by the concomitant ichthyosis vulgaris.

The present study was designed to clarify the morphological characteristics of dry skin in pure atopic dermatitis not accompanied by ichthyosis vulgaris.

PATIENTS AND METHODS

Patients. A total of 200 patients of both sexes aged 15 to 30 years and suffering from atopic dermatitis, were selected for the present study. All examinations were performed in cold months when the clinical signs of ichthyosis vulgaris are most prominent, because the main aim of the present study was to compare the morphological characteristics of the dry skin in pure atopic dermatitis with those of the dry skin in atopic dermatitis coexistent with ichthyosis vulgaris.

Prevalence of ichthyosis vulgaris in atopic dermatitis. To find the prevalence of ichthyosis vulgaris in the 200 patients with atopic dermatitis, the skin of the trunk and limbs of each patient was closely observed. The diagnosis of ichthyosis vulgaris was established by the following criteria: (*a*) small polygonal scales on the extensor limbs and trunk, and (*b*) hyperlinear palms (13, 14).

Histological examinations. Dry skin from 48 patients (21 with atopic dermatitis and ichthyosis vulgaris, 27 with atopic dermatitis alone) were examined. In each patient, a 4 mm punch biopsy specimen was obtained from a finely scaling, clinically non-inflamed, dry skin on the lateral aspect of the buttocks. The specimen was serially sectioned in 5 μm thickness and stained with hematoxylin-eosin.

Immunohistochemical examinations. Dry skin from 12 patients with pure atopic dermatitis were examined. Using the avidin-biotin complex (ABC) method (15), cryostat sections (6 μm) were studied for distribution of Langerhans' cells in epidermis, and T-lymphocyte subsets in the dermal infiltrates. The monoclonal antibodies employed included Leu 1 (anti-pan T-cell), Leu 2a (anti-T-suppressor/cytotoxic cell), Leu 3a (anti-T-helper/inducer cell), and OKT6 (anti-Langerhans' cell) antibody.

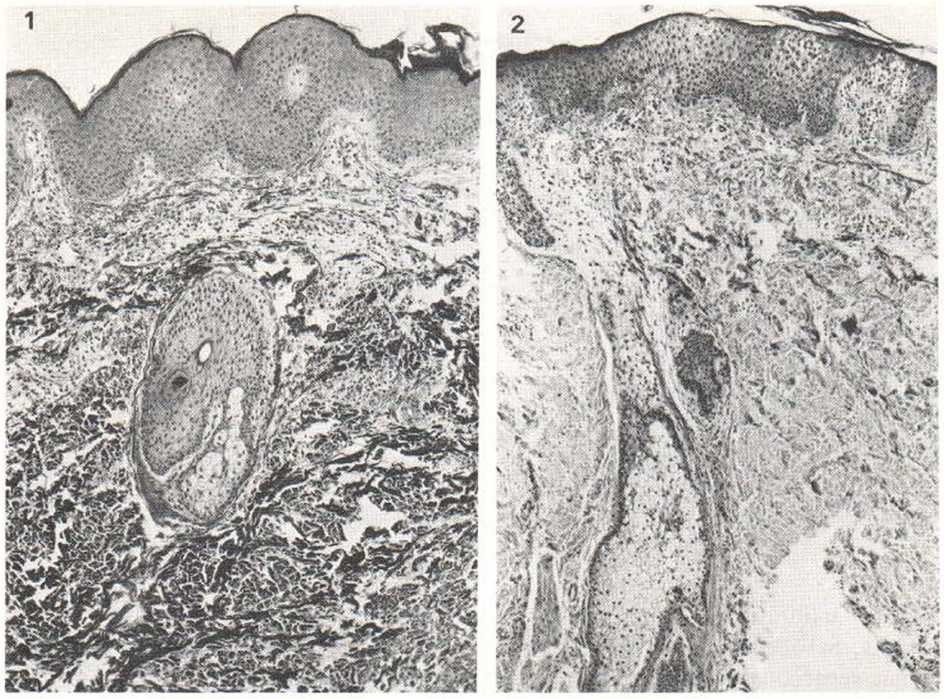

Fig. 1. Dry skin in atopic dermatitis coexistent with ichthyosis vulgaris. Although epidermis shows acanthosis, granular layer is thinned or nearly absent. Sebaceous gland is atrophic. (H. E., ×70.)

Fig. 2. Dry skin in pure atopic dermatitis. There is a mild eczematous change: parakeratosis, acanthosis, spongiosis and mononuclear cell infiltrate. Note normal granular layer and well-developed sebaceous gland. (H. E., ×80.)

RESULTS

Prevalence of ichthyosis. Clinical signs of ichthyosis vulgaris were observed in 44 (22%) of the 200 patients with atopic dermatitis examined. The incidence of ichthyosis vulgaris among this group of atopic dermatitis patients may be higher than the prevalence of ichthyosis vulgaris in atopic dermatitis in general, because the present study included only those patients who visited our clinic in cold months.

Distribution of dry skin in pure atopic dermatitis. Of the 156 patients with atopic dermatitis who did not have ichthyosis vulgaris, 8 (5%) showed general dry skin that covered 70% or more of the body surface, 95 (61%) had partial dry skin, and 53 (34%) revealed smooth, normal-appearing skin except areas with eczematous lesions.

Histology of dry skin in atopic dermatitis coexistent with ichthyosis vulgaris (Fig. 1). Of the 21 biopsy specimens taken from dry skin of patients with atopic dermatitis who simultaneously suffered from ichthyosis vulgaris, 19 specimens showed atrophy of sebaceous glands. Normally developed sebaceous glands were seen in only 3 specimens. The granular layer was reduced in all of the 21 biopsy specimens examined. This ichthyotic picture was often superimposed by eczematous features.

Histology of dry skin in pure atopic dermatitis (Fig. 2). In all of the 27 biopsy specimens taken from dry skin of patients with atopic dermatitis and who did not have ichthyosis vulgaris, mild eczematous features were regularly observed. The epidermis showed hyperkeratosis, with areas of parakeratosis, slight to moderate acanthosis, and focal spongiosis

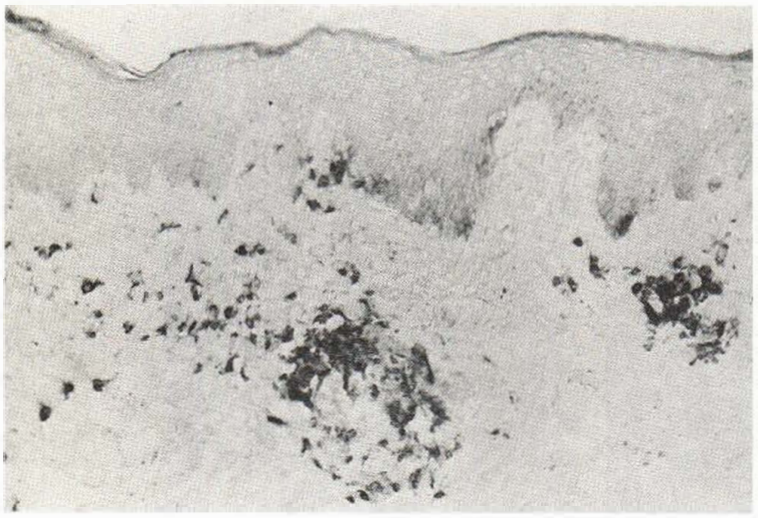

Fig. 3. Dry skin in pure atopic dermatitis. Leu 3a staining pattern. The great majority of lymphocytes are positive. (×160.)

with mononuclear cell infiltrates. There were perivascular infiltrates of mononuclear cells in the upper dermis. Sebaceous glands were normal in most of the biopsy specimens examined. Atrophic sebaceous glands were seen in only a few specimens.

The results of the histological examinations are summarized in Table I.

Immunohistochemical findings of dry skin in pure atopic dermatitis (Figs. 3–5). In the slightly acanthotic epidermis of dry skin in pure atopic dermatitis, OKT6-positive dendritic cells (Langerhans' cells) were constantly increased in number. Virtually all of the dermal lymphocytes showed positive staining with anti-pan T-cell antibody (Leu 1). Most of the T-lymphocytes were positively stained with anti-T-helper/inducer cell antibody (Leu 3a). The anti-T-suppressor/cytotoxic cell antibody (Leu 2a) stained only a minority of the T-lymphocytes.

DISCUSSION

Although there have been reports (8, 9) that sebaceous glands are atrophic in dry skin or uninvolved skin of patients with atopic dermatitis, it was not clear whether the patients in these reports had atopic dermatitis alone, or whether they suffered from atopic dermatitis and ichthyosis vulgaris. In the present study, patients with atopic dermatitis were classified into two groups: one group with atopic dermatitis and ichthyosis vulgaris, and another with atopic dermatitis alone. By this classification it was demonstrated that atrophy of

Table I. *Histology of dry skin in pure atopic dermatitis and in atopic dermatitis coexistent with ichthyosis vulgaris*

	Atrophy of sebaceous glands	Eczematous change
Dry skin in pure atopic dermatitis	5/27	27/27
Dry skin in atopic dermatitis and ichthyosis vulgaris	19/21	8/21

Fig. 4. Dry skin in pure atopic dermatitis. Leu 2a staining pattern. Scattered individual positive cells are seen in the dermal infiltrate. (×160.)

sebaceous glands was observed most frequently in the dry skin of patients with atopic dermatitis who had ichthyosis vulgaris, while atrophic sebaceous glands occurred only rarely in the dry skin of patients with atopic dermatitis alone. This indicates that the atrophic sebaceous glands seen in dry skin of atopic dermatitis are primarily a manifestation of concomitant ichthyosis vulgaris.

It should be stressed that the dry skin in patients suffering from atopic dermatitis and ichthyosis vulgaris showed the histological picture of ichthyosis vulgaris, which was frequently superimposed with a mild eczematous change.

In contrast, the dry skin in patients with pure atopic dermatitis exhibited the histology of mild eczema: parakeratosis, acanthosis, focal spongiosis, and dermal infiltrates of mononuclear cells. Recently, several studies (16, 17) have noted that an eczematous change is responsible for the dryness of skin in atopic dermatitis.

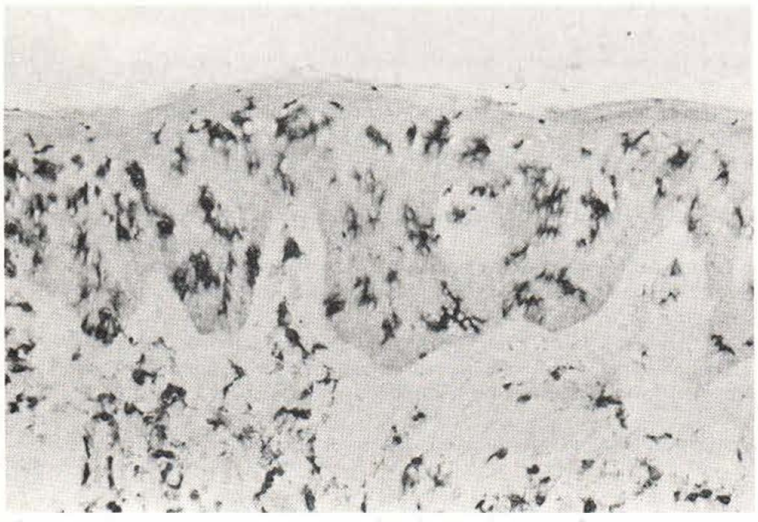

Fig. 5. Dry skin in pure atopic dermatitis. OKT6 staining pattern. The slightly acanthotic epidermis has increased numbers of positive cells. (×160.)

The immunohistochemical examinations in the present study demonstrated that the slightly acanthotic epidermis of dry skin in pure atopic dermatitis had increased numbers of Langerhans' cells. The dermal lymphocytes were stained predominantly with anti-T-helper cell antibody. Only a small number of the lymphocytes were positively stained with anti-T-suppressor cell antibody. It is known that Langerhans' cells are increased in number in lichenified lesions of atopic dermatitis (18). The lymphocytes in dermal infiltrates in such lichenified lesions are comprised mainly of T-helper cells (15, 19). Thus, the distributions of epidermal Langerhans' cells and dermal T-cell subsets in the dry skin of pure atopic dermatitis are compatible with the observations in lichenified lesions of this condition. All these data definitely show that the dry skin in pure atopic dermatitis is eczematous in nature.

In conclusion, the dry skin often seen in atopic dermatitis is not homogeneous. The dry skin may be a mild eczematous lesion of atopic dermatitis, or a manifestation of concomitant ichthyosis, or a complex of both of these changes.

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M. Uehara, Department of Dermatology, Shiga University of Medical Science, Seta, Otsu 520-21, Japan.