Atrophie Blanche Examined with Thermography

Takashi Miura, Wakio Torinuki and Yoshio Tanahashi
Department of Dermatology, Tohoku University School of Medicine, Sendai

Miura, T., Torinuki, W. and Tanahashi, Y. Atrophie Blanche Examined with Thermography. Tohoku J. exp. Med., 1976, 119 (2), 165-169 — Atrophie blanche developed in a 25-year-old man with systemic lupus erythematosus is reported. A thermographic examination was applied to estimate skin temperature, and the temperature was low on areas where lesions were distributed.

Atrophie blanche is not a disease but a symptom which develops as such vermicular small white atrophic lesions distributed mainly on fingers and toes. They are preceded by small painful ulcers, surrounded by telangiectasia, and are associated with various diseases such as systemic lupus erythematosus, scleroderma, cryoglobulinemia and others. It has been confirmed that the lesion is caused by occlusion of dermal blood vessels (Neslon 1955; Gray et al. 1966; Stevanović 1974), and lesions usually occur at lower extremities where blood flow is poor (Gray et al. 1966; Stevanović 1974). It is assumed that the skin temperature on areas where lesions are distributed may be lower than that on healthy skin areas. We employed a thermographic examination to estimate skin temperature and confirmed this on a patient with atrophie blanche associated with systemic lupus erythematosus.

Case Report

A 25-year-old man has had several attacks of Raynaud's symptom on his fingers and toes when exposed to cold for the past 4 years, and for recent 2 years several rice-grain-sized ulcers have developed on fingers, toes and heels. Some of them became persistent painful ulcers, but others healed spontaneously leaving vermicular small white atrophy patches. About 2 years ago he noted an onset of pain on knee joints and development of erythematous rash on the face and forearms.

Physical examination revealed the presence of finger-tip-sized erythematous-squamous lesions on the face and forearms. On dorsa of fingers, toes, lateral sides of feet, heels and knee there were distributed several finger-tip-sized white vermicular atrophy patches. They were slightly depressed and surrounded by telangiectasia and branched out like an amoeba (Figs. 1, 2). On some parts of dorsa of fingers and heels there developed deep ulcers.

The following relevant investigations gave normal results: urine, faeces.
Fig. 1. Lesions of atrophie blanche developed on the right forefinger, middle finger, ring finger, and little finger. Numbers of the lesion are less on the middle finger than those on other fingers.

Fig. 2. Lesions of atrophie blanche and a persistent ulcer developed on the left heel.
blood, liver function, blood sugar, electrolytes, E.C.G., chest X-ray film, rheumatic reaction, Coombs' test, tuberculin test, trichophytin test, skin photosensitivity test, serum fibrinogen, plasmin, plasminogen, activator, proactivator, antiplasmin, and antiactivator, and porphyrins in urine, faeces and blood. E.S.R. was 7 in 1 and 21 mm in 2 hrs, respectively. Gamma globulin was 25%, and biological false positive reaction in S.T.S. L.E. test was positive, but no L.E. cells were detected. Cryoglobulin was not detected. Immunoglobulins estimated by Tri-partigen method had elevated Ig A and Ig G patterns (470 and 2880 mg/100 ml), but $C_4$ and $C_3c$ were within normal limit. Anti-nuclear antibody was $\times 80$, and anti-ss DNA antibody estimated by PHA method was $\times 16$. Anti-ds DNA and anti-RNA antibody were not detected. Serum complement estimated by 50% hemolysis method was 25 CH50/ml. In the histopathological specimen obtained from an erythema on the face, hyperkeratosis, atrophy of the epidermis, liquefaction degeneration of the basal layer, and basophilic degeneration of the collagen were noted. In a biopsy specimen of lesions of atrophy, moderate or complete occlusion of blood vessels was prominent in the dermis; such vessels showed intimal swellings and were filled by amorphous materials (Fig. 3). These fluoresced in a green-yellow color when stained with anti-Ig G fluorescent antibody.

Fig. 3. Histopathology of a lesion of atrophie blanche. Dermal blood vessels are occluded by amorphous materials with intimal swellings. (H.E.-stain, $\times 100$)
Fig. 4. Thermogram of hands. White areas show normal high temperature and black, lower one. There is a gradual variation of temperature from dorsa of hands to finger-tips. The right middle finger has a normally high temperature.

Thermographic examination. A thermoviewer JTG-MB (JEOL) was applied to estimate skin temperature. Patient's hands were placed on a desk, and infra-red rays from the skin were projected to a cooled HgCdTe window of the machine set apart from the patient. The energy was transferred to electric current which was registered and visualized on a Braun tube giving numerous stripes of various tones of black and white according to the degree of the radiation. They were printed to a paper by equipped polaroid camera, in which white zone corresponded to high temperature and black, lower one. The result obtained showed that there was a considerably low temperature on all finger-tips except for the right middle finger in contrast to normal ones on dorsa of hands and an eccentric gradual variation of temperature from higher to lower one on areas from dorsa of hands to finger-tips (Fig. 4). Temperature of the right middle finger was higher than that on other fingers; numbers of lesions of atrophie blanche on this area being less than those on other fingers (Fig. 1).

Prednisolone was given 30 mg daily during successive 9 months, and erythematous-squamous lesions on the face and arms disappeared during the course accompanied with a considerable improvement of laboratory data, but no improvement of persistent painful ulcers. Phenformin hydrochloride and ethylestrenol were given by mouth in addition to the steroid therapy and continued for the next 8 months. At the end of the course, the patient observed diminution in pain, and ulcers showed significant evidence of healing. No Raynaud's symptom has occurred on fingers and no new lesions have developed after initiation of the therapy.
DISCUSSION

The white atrophy observed in the present case showed a characteristic feature of atrophie blanche, and dermal blood vessel occlusions were revealed in the lesions as described by Nelson (1955), Gray et al. (1966), and Stevanović (1974). The condition was associated with systemic lupus erythematosus likewise in a case reported by Stevanović (1974), and various symptoms including erythematous-squamous rash of systemic lupus erythematosus were well managed by administration of corticosteroid by mouth. Persistent painful ulcers, however, did not respond to corticosteroid and these were gradually improved after the initiation of fibrinolytic therapy as described by Gilliam et al. (1974) accompanying disappearance of attacks of Raynaud's symptom on fingers.

It is known that lesions of atrophie blanche usually occur at lower extremities where blood flow is poor (Gray et al. 1966; Stevanović 1974), and in considering the fact that Raynaud's symptom occurred on fingers in the present case, a particular attention was paid to estimate skin temperature on fingers where lesions were distributed. The thermography we employed in the present case had the following merits; 1) infra-red rays could be measured at a distance and no contact with the skin was necessary, 2) a single measurement took for only 20 seconds, and 3) measurement gave a continuous reading for a small area of the skin rather than for a point showing local variations of temperature (Williams et al. 1960; Gershon-Cohen 1967). Results obtained in the present case showed that lesions of atrophie blanche were located on areas where skin temperature was low. This was clear from the observations that the right middle finger had normally high temperature as shown in Fig. 4 and that numbers of lesions on that area were less than those on other fingers (Fig. 1). Further, there was a gradual variation of temperature from higher to lower one corresponding to areas from healthy to involved ones, namely, from dorsa of hands to finger-tips. To summarize these observations, we confirmed that lesions of atrophie blanche were located on areas where skin temperature was low, presumably on areas where blood flow was poor.

References