A Case of Eosinophilic Annular Erythema (EAE) Concomitant with Autoimmune Hypothyroidism

Dear Editor,

Eosinophilic annular erythema (EAE) is a relatively new disease, which was introduced for the first time in 2000.[1] We report a case of EAE with transient hypothyroidism.

An 82-year-old male had noticed infiltrating erythema with itchiness on both of his thighs as well as the trunk of his body since two weeks prior to his first visit, which gradually expanded centrifugally and became a ring-shaped erythema, also with obvious pedal edema [Figure 1]. He had undergone pancreaticoduodenectomy due to caput pancreatic cancer nine years previously. No new medication had been administered in the past six months.

Laboratory examinations showed markedly elevated eosinophils and a decrease in the thyroid gland function as follows: WBC 7,400/μl (Neutrophils 34.0%, Eosinophils 50.0%, Lymphocytes 12.5%, Monocytes 3.5%), TSH 10.5 μIU/ml (standard: 0.35–4.94), FT3 2.4 pg/ml (standard: 1.68–3.67), and FT4 0.8 ng/dl (standard: 0.7–1.48). Thyroglobulin antibodies, Thyroid peroxidase (TPO) antibodies, antinuclear antibodies, anti-SSA antibodies, and anti-SSB antibodies were negative. All other laboratory findings were unremarkable.

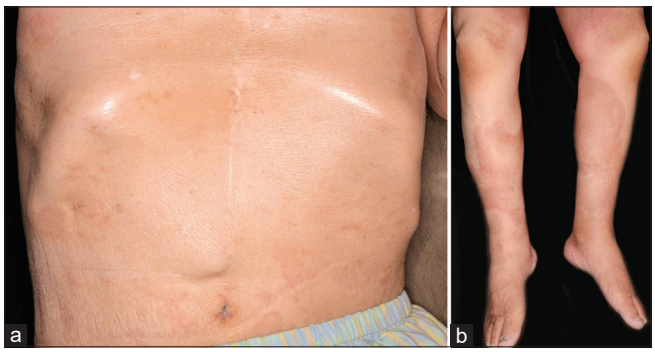

Figure 1: At first visit: scattered ring-shaped erythema with infiltration (a) abdomen and (b) front part of the lower limbs

On ultrasound, a low echo swollen area was found in the thyroid gland. He was suspected of transient sick euthyroid syndrome.

Histologically inflammatory cell infiltrate with mainly eosinophils among the collagenic fiber bundles of the dermal tissues surrounding the blood vessels, and fat tissues were observed. There was no degranulation of eosinophils, flame figures, or granulomatous lesions [Figure 2]. As a result, we diagnosed EAE. The exanthema disappeared after one month of treatment with betamethasone dipropionate ointment. The eosinophil count decreased after starting treatment, and it recovered to the normal range after approximately four months. The thyroid hormone level appeared to recover without endocrinological treatment. Thereafter, no exacerbation has been observed.

EAE is a relatively new condition that was first introduced by Kahofer *et al*. in 2000 as a prolonged centrifugal erythema with infiltrating eosinophils around blood vessels.[1] In 2008, Howes *et al*. identified the deposition of mucin or vacuolization of the basal stratum, yet histopathologically such patients lacked the features of classical Wells' syndrome such as the degranulation of eosinophils, flame figures, or granulomatous lesions in EAE.[2] In 2013, El-Khalawany *et al*. reported that histopathological images of EAE during the progressive period exhibited similarities with Wells' syndrome and that EAE is a subtype of Wells' syndrome.[3]

An analysis of 50 cases worldwide from 2000 to 2020 showed that the age of onset varies from infants to the elderly (mean age: 50 years), and there is no gender difference. The most common site of onset is the trunk and extremities. Some cases tend to be localized. The main clinical manifestation is annular erythema, but there are also reports of a bullous type of disease. The course lasts from several weeks to several months, and while some cases

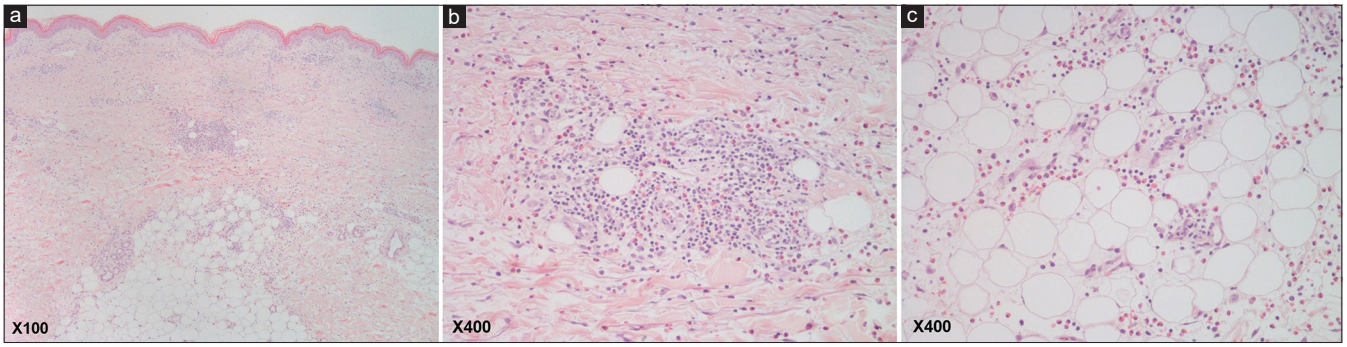

Figure 2: Inflammatory cell infiltrate mainly with acidophilic leukocytes in between the collagenic fiber bundles of the dermal tissues surrounding the blood vessels, and the fat tissues. H and E 100× (a) and 400× (b and c)

disappear relatively quickly, there are some intractable cases that repeatedly demonstrate both disappearance and relapse. There is still no established treatment. The administration of oral steroids has been shown to be effective, while some patients have also been successfully administered hydroxychloroquine or diphenylsulfone in combination. In other cases, NB-UVB, tacrolimus ointments, NSAIDs, nicotinic-acid amide, biological drugs, and cyclosporine were also administered. The causal factor of EAE has not been clearly elucidated. Although an allergic reaction to insect bites, malignant tumors, or autoimmune disorders is suspected, it is more likely to develop in patients with diabetes or chronic kidney failure. In my case, transient sick euthyroid syndrome occurred in conjunction with annular erythema. Because there was no new drugs and malignancies noted, and erythema had disappeared along with the improvement of hypothyroidism, we thought that there might be a relationship between EAE and transient sick euthyroid syndrome.

Similarly, one case has been reported to demonstrate intercurrent disease, and the symptoms of EAE were also proportional.[4] Marcos *et al*., showed a correlation between the erythema and the prostate specific antigen (PSA) levels in EAE associated with prostate cancer.

When EAE is suspected, it is therefore important to search for related conditions. The disease definition of EAE is ambiguous, and much remains to be elucidated. We hope that the onset mechanism and optimal treatment can eventually be established by number of reports in the future.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

Risa Ikutama, Takasuke Ogawa, Kageumi Takeno[1], Shigaku Ikeda

Departments of Dermatology and Allergology, [1]Diabetology, Endocrinology and Metabolism, Juntendo University Graduate School of Medicine, Tokyo, Japan

Address for correspondence:
Dr. Takasuke Ogawa, Departments of Dermatology and Allergology, Juntendo University, 2-1-1 Hongo, Bunkyo-ku, Tokyo - 113-8421, Japan.
E-mail: t-ogawa@juntendo.ac.jp

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