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Case Report

Importance of Measures against *Staphylococcus aureus* in Atopic Dermatitis as a Superantigen Disease - ②

Kazuo Sugimoto^{1*}, Takamichi Hattori², Yoshio Kitsukawa³, Akiyo Aotsuka³, Takeshi Wada³, Hitoshi Kubosawa⁴ and Shoichi Ito⁵

¹Department of Clinical Allergology, Neurology Clinic Tsudanuma, Japan

²Department of Neurology, Neurology Clinic Tsudanuma, Japan

³Internal Medicine, Chiba Aoba Municipal Hospital, Japan

⁴Clinical Pathology, Chiba Aoba Municipal Hospital, Japan

⁵Department of Neurology, Chiba University Graduate School of Medicine, Japan

***Address for Correspondence:** Kazuo Sugimoto, Department of Clinical Allergology, Neurology Clinic Tsudanuma, Japan, E-mail: ka.sugimoto.chiba.jp@nifty.com

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ABSTRACT

Patients with AD showed high incidence of duodenitis and cervical spine as a disorder other than skin. We experienced many cases where treatment resulted in improvement of eruptions of AD and other disorders other than skin were alleviated. We also experienced patients with AD with duodenitis normalized by repeated testing. In the same case of AD, many disorders of the organs of the duodenum and the cervical spine were observed. The toxin produced by *S. aureus* detected from the skin of patients with AD was high rate.

Keywords: Atopic dermatitis; *Staphylococcus aureus*; Superantigen; Disinfectant; IgE antibodies to SEA and SEB

BACKGROUND

There are reports that *Staphylococcus aureus* (*S. aureus*) is involved in the onset and exacerbation of Atopic Dermatitis (AD) [1]. In the United States bleach bath therapy is incorporated into the guidelines for treatment of AD. For these reasons, measures against *S. aureus* in AD are important. In addition to skin, Yamada et al. [2] reported inflammation of intestinal tract for patients with AD, and Kira et al. [3] reported inflammation of the cervical vertebrae. Kino et al. [4] reported inflammation in the colon of infants with AD. Ito et al. [5] reported the neurologic findings and Magnetic Resonance Imaging (MRI) of patients with AD; they concluded that AD might become the risk factor in disc degeneration. IgE antibody titer to the toxin which is produced by *S. aureus* is able to reflect the pathogenesis of AD as shown in a number of reports [6-9].

METHOD

In addition to the conventional treatment with topical steroids and moisturizing agents for AD patients the researchers treated *S. aureus* using disinfectants, such as Isodine[®] solution [10]. As a result, short term improvements in patients' skin rash were seen. For patients who wish to be examined among AD patients, patients with abnormalities such as neurological reflex were further examined for MRI of the cervical vertebrae. In addition, endoscopic examination including duodenal biopsy was performed for those who wanted examination among patients with AD. Detection of toxins produced by *S. aureus* was also examined by Polymerase Chain Reaction (PCR) method in *S. aureus* specimens detected from rashes of patients with AD. We also examined IgE antibodies to Staphylococcal Enterotoxins A (SEA) and Staphylococcal Enterotoxins B (SEB) of AD patients over time.

RESULTS

Regarding the neurological abnormalities that are sometimes seen in patients with AD, we identified neurological abnormalities in 89 patients of 110 AD patients (80.9%). Using MRI, we also observed an abnormality in the cervical spine of 54 patients of 69 AD patients (78.2%) who showed a neurological abnormality.

We have observed 21 patients of the 32 AD patients (65.6%) in the damage of both the duodenum and the cervical spine. We also observed duodenitis in 43 of 53 duodenal - biopsied AD patients. Along with the improvement of the rash by Staphylococcal disinfection skin care method for AD that we have developed [10], of 12 patients with repeated duodenum biopsies, the duodenitis had normalized in five cases [11]. We have already reported detection rate of toxin using PCR from *S. aureus*, which is detected from patients with AD who visited our hospital. The detection rates of staphylococcal enterotoxins A, B, C and E were 9.7, 55.6, 7.7 and 30.6%, respectively. The detection rate of toxic shock syndrome toxin 1 was 6.6% and those of exfoliative

toxins A and B were 4.1 and 1.5%. The total detection rate of toxins was 80.1% from 196 *S. aureus* strains [11].

DISCUSSION

We developed a treatment regimen that uses a disinfectant against *S. aureus* detected from the skin of a patient with AD as a general treatment for the treatment of AD; we have reported some effects [10-13]. There is also a report that *S. aureus* is involved in the onset and exacerbation of AD [1]. In the United States bleach bath therapy is incorporated into the guidelines for treatment of AD. For these reasons, measures against *S. aureus* in AD are important. *S. aureus* produces toxins at a high rate. Produced toxin acts as a Superantigen [15] to humans. Ochi et al. [16] reported that superantigen is involved in disorders of the cervical spine. In patients with AD, many disorders of the intestinal tract and cervical vertebrae are found in addition to the skin. In the same patient with AD, there were many cases in which disorder of the intestinal tract and cervical vertebrae was observed in addition to the skin, and the frequency was high, and we experienced cases where the disorder became normal when worried by treatment. We also experienced a number of cases in which treatment with IgE antibodies to SEA and SEB of patients with AD improves over time by treatment [6-9]. Last year, authors had reported for the first time in the world that AD may be one of the Superantigen Diseases [17]. The Journal of Pharmaceutical Microbiology titled *Staphylococcus aureus* vs. AD published in April 2016 was published [18].

CONCLUSION

Lesions of patients with atopic dermatitis were not only in the skin but also in the intestinal tract and the cervical vertebrae with high - frequency disorder. A high rate of *S. aureus* is detected from rash in patients with AD. *S. aureus* produces toxins. The detection rate of toxin produced by *S. aureus* is high, and toxin acts on people as superantigens. IgE antibodies to SEA and SEB are improved by improvement of the eruption. For these reasons, AD was proposed as the world's first super-antigenic disease last year [17]. From now on, it seems indispensable to introduce a treatment which takes wide countermeasures against *S. aureus* in the treatment of AD [10-14,17-19].

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