Contact point

Induction of a leukoderma following allergic contact dermatitis to FreeStyle® Libre

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Isobornyl acrylate (IBOA) is a potent contact sensitizer contained in the glucose sensor FreeStyle® Libre (1). Many cases of allergic contact dermatitis (ACD) have already been described in this regard. We have herein described a case of ACD caused by IBOA and followed by hypopigmentation in the application areas of this sensor.

Case report

A 35-year-old woman suffering from diabetes mellitus Type 1 was referred to our department with pruritic annular erythematous dermatitis under an adhesive patch of the glucose sensor FreeStyle® Libre affixed to the inner side of her arm. These lesions occurred following 5 months of sensor use. Approximately 6 months later, hypopigmentation appeared on the periphery of the eczematous dermatitis, in the application area of the sensors, and on the inner side of both arms (Fig.1 A1–A2). There was no hypopigmentation on any other part of her body, and there was no personal or family history suggesting an autoimmune disease, such as vitiligo. She had never applied corticosteroid cream or hydrocolloid dressings between the sensor and skin. She was patch-tested with the European Baseline series, an acrylate, plastic, and glue series (Chemotechnique, Vellinge, Sweden; Trolab, Almirall, Hermal, Reinbek, Germany), a piece of the adhesive patch of the glucose sensor, IBOA (purchased from Sigma-Aldrich (Steinheim, Germany), diluted to 0.1% in pet. by the hospital pharmacy (Saint-Luc) and with N,N-dimethylacrylamide (DMAA) (purchased from Sigma-Aldrich and prepared by the Department of Occupational and Environmental Dermatology in Malmo) diluted to 0.1% in pet. Patch tests were performed using IQ Ultra® test chambers (Chemotechnique) and fixed with Fixomull® stretch (BSN Medical, Hamburg, Germany) on the upper back. Readings were performed on Days (D) 2 and 4. The patch test reactions were classified according to European Society of Contact Dermatology (ESCD) criteria (2). A positive reaction was observed for both IBOA (+/++) and DMAA (+/+), as well as for the adhesive part of FreeStyle Libre (+/?) (Fig.1B). A biopsy of the depigmented area showed a complete absence of epidermal melanocytes, which was confirmed via immunohistochemistry using SOX10 labeling.

Discussion

Several cases of ACD due to glucose sensor FreeStyle® Libre have previously been reported (1, 3, 4). To our knowledge, this is the first case of acquired leukoderma following sensitization to FreeStyle® Libre. Acquired leukoderma may occur after an inflammation of the ACD area.

Several chemicals have been reported to cause depigmentation. However, both IBOA (1) and DMMA (4), the two potent sensitizers used in the glucose sensor, have never been described as causative agents of depigmentation. Medical devices with adhesive have been reported to cause hypopigmentation (5), as have some acrylates (6). It should be noted that hydroquinone monomethyl ether (HMME) is also known to cause depigmentation (7). This agent was present, at concentrations varying from 100 to 300ppm, in the IBOA purchased from Sigma-Aldrich (Steinheim, Germany) and applied for patch testing on this patient. Therefore, we can assume it is also contained in the sensors' IBOA. HMME acts as inhibitor to prevent the inadvertent IBOA polymerization. Once polymerization of IBOA has started, at temperatures above 80°C, HMME is mostly degraded (8). However, it has already been reported that the IBOA contained in the sensor's plastic part is also present in the sensor adhesive, though in smaller quantities, due to substance migration (1). We hypothesized that HMME similarly have migrated during one of the steps, thereby contaminating the adhesive patch. Incomplete polymerization could also be responsible. HMME was previously reported to have caused depigmentation of the forehead skin of two workers in a vinylidene chloride plant (9). Of note is that hydroquinone monobenzyl ether (HMBE) and hydroquinone monoethyl ether (HME) (10) both act as very potent depigmentators due to their direct toxicity on melanocytes, potentially resulting in subclinical inflammation via melanocyte destruction. As these two molecules are chemically similar to HMME, we can assume that HMME acts in the same way, thereby accounting for the histological characteristics identified on this patient.

To conclude, we have herein reported the first case of acquired leukoderma following ACD to FreeStyle® Libre, along with the potential role of HMME present in IBOA.

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