

Sensitization to cyanoacrylates caused by prolonged exposure to a glucose sensor set in a diabetic child

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Monitoring of blood glucose and administration of insulin are pivotal in the treatment of type 1 diabetes mellitus in children. Adverse effects such as skin problems caused by glucose sensor sets or insulin pumps are rarely reported (1–4). We present a child with newly diagnosed type 1 diabetes mellitus who developed allergic contact dermatitis caused by contact allergy to a cyanoacrylate used in the glue for the fabric parts of a glucose sensor set.

Case Report

A 2-year-old girl was referred with chronic eczema of the upper gluteal regions. Ten months previously, she had been diagnosed with type 1 diabetes mellitus, which, since then, had been treated with insulin administered by an insulin pump, blood glucose continuously being monitored by a glucose sensor set according to national paediatric guidelines. The eczematous lesions began shortly after the initiation of blood glucose control with the glucose sensor set. The glucose sensor set was placed at the upper part of one gluteal region for up to 7 days (Fig. 1a). The glucose sensor set was then placed at a new skin site, that is, the contralateral gluteal region, for each sensor session, to allow the skin to heal, in accordance with the guidelines provided by the manufacturer (5). As the diabetes department suspected an irritant skin reaction to the insulin pump or glucose sensor set, treatment with a lipolotion and topical corticosteroids was initiated; however, there was no improvement of eczema.

On dermatological examination, erythematous and infiltrated eczema was found on both buttocks, in areas in direct skin contact with the adhesive (Fig. 1b). Allergic contact dermatitis caused by prolonged skin exposure to adhesives from the insulin pump or the glucose sensor set was suspected; however, use tests with the different adhesives that came into direct contact with the skin and EMLA lotion on the forearms gave negative results. After another look at the clinical picture (Fig. 1b), we found accentuation on skin areas under the glucose sensor where the sensor pod was fixed. The glucose sensor set (Dexcom G4[®] PLATINUM Sensor) was a common model composed of a sensor pod (Dexcom G4[®] PLATINUM Sensor Pod) directly attached with sensor adhesive to the skin. The sensor transmitter (Dexcom G4[®] PLATINUM transmitter), a wireless device hooked up with a receiver (Dexcom G4[®] PLATINUM Receiver with Share), was mechanically attached to the sensor pod (6).

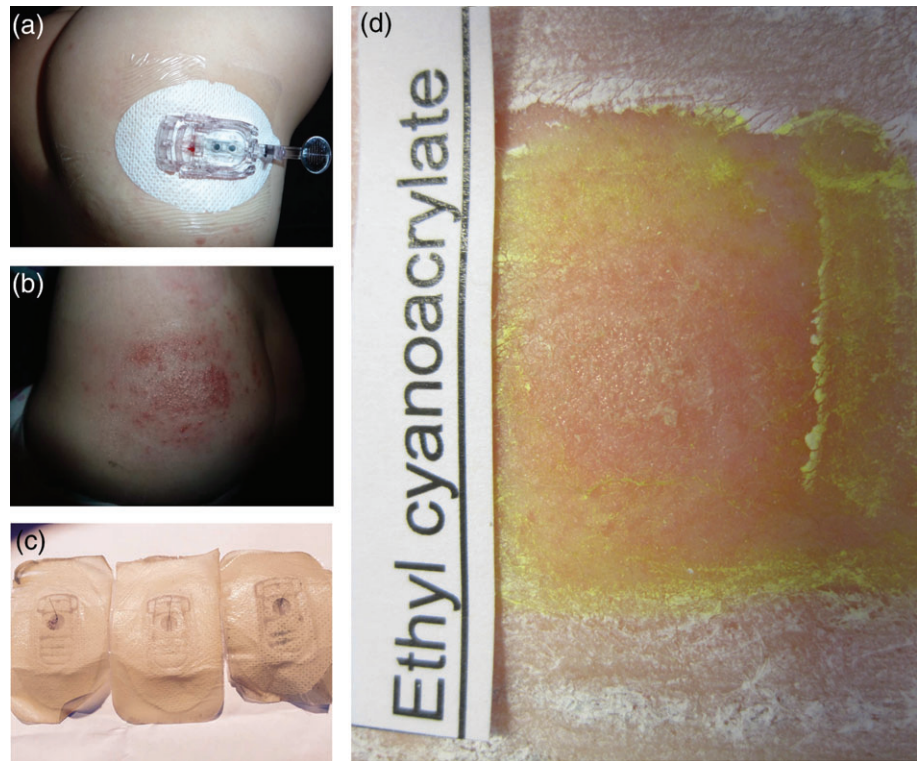
Upon request, the manufacturer stated that the sensor adhesive was pressure-sensitive acrylic adhesive coated on top of polyester spun lace fabric. The sensor pod was attached to the adhesive non-skin part with cyanoacrylate glue from Loctite[®] (Fig. 1c) (7).

Patch testing was then performed with lidocaine, Emla[®], and ethyl cyanoacrylate, as part of targeted testing. Finn Chambers[®] (8 mm; Smartpractice, Phoenix, AZ, USA) on Scanpor[®] tape (Norgesplaster A/S, Alpharma, Vennesla, Norway) were used. The patch test were applied to the upper back, and occluded for 2 days. Readings were performed on day (D)2, D3, and D7, according to ICDRG recommendations (8). The patch tests showed a positive (1+) patch test reaction to ethyl cyanoacrylate on D2 (Fig. 1d). The patient was thus diagnosed with contact allergy to ethyl cyanoacrylate and allergic contact dermatitis, on several occasions widespread, caused by the prolonged exposure to cyanoacrylates used to attach the sensor pod to the non-skin part of the adhesive (Fig. 1c).

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Fig. 1. Four pictures illustrating: (a) the placement of the glucose sensor on the upper gluteal region; (b) the infiltrated erythema with papules accentuated at the upper part of the gluteal region; (c) three skin adhesives of the glucose sensor set (Dexcom G4® PLATINUM Sensor) seen from below (the skin side), showing the outline of the sensor pod located at the opposite side, and the plastic catheter for insertion; (d) the positive patch test reaction to ethyl cyanoacrylate.



Discussion

Cyanoacrylates are commonly used as fast-acting adhesives for industrial, medical or other uses. Allergic contact dermatitis caused by cyanoacrylates, for example following postsurgical closure, has previously been reported (9). In the present case, the child experienced gluteal eczema shortly after the start of therapy with monitoring by the glucose sensor set. To our knowledge, no other case of contact allergy to a cyanoacrylate resulting from such an exposure has previously been published. The increased

use of medical devices, beneficial as they are for disease control, may have a negative impact on the quality of life of the patient, as described in this specific case and in others (1–4, 8). Patients wearing medical devices on their skin who subsequently experience eczema should be thoroughly patch tested. Thus, it is important to have precise and complete information on the medical device concerning the chemical substances used, to enable investigation of the cause of the skin reaction and correct identification of the allergen.

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