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Systemic allergic dermatitis caused by thiamine after iontophoresis

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Iontophoresis involves percutaneous administration of a drug (e.g. anti-inflammatory and local anaesthetics) with galvanic current.

Case Report

A 46-year-old woman developed a pruritic micropapular erythematous rash on the right shoulder after topical application of Voltaren® (diclofenac) and Inzitan® [lidocaine, dexamethasone, cyanocobalamin (vitamin B_{12}) and thiamine (vitamin B_1)] by iontophoresis. It resolved over several weeks with desquamation.

Patch tests were performed according to International Contact Dermatitis Research Group guidelines (1), with the TRUE Test® system and the implicated drugs, with occlusion for 48 hours and with readings on D2 and D4. On D4, only nickel (++) and epoxy resin (++) gave positive reactions. Skin tests (prick and intradermal; Table 1) (2) showed no sensitization to diclofenac and Inzitan® at immediate and delayed readings (made at 24 hr). Therefore, once informed consent had been obtained from the patient, challenge tests were performed. She tolerated oral diclofenac (50 mg). One hour after the application of intramuscular Inzitan® (one half-ampoule) (the usual method of administration), she developed skin itching, and 24 hr later, erythematous plaques in the forearms and right shoulder (the application area of the iontophoresis treatment).

Taking into account these results, skin tests were repeated with each of the components of Inzitan® [lidocaine, dexamethasone, cyanocobalamin (vitamin B_{12}), thiamine (vitamin B_1), and Tween-80] and a corticosteroid series (hydrocortisone, methylprednisolone, prednisone, betamethasone, and triamcinolone). Negative results were obtained at immediate and delayed readings. The patient agreed to have oral challenge tests

Table 1. Concentrations used for skin tests

Drugs tested	Prick	Intradermal
1. Diclofenac	'as is' (25 mg/ml)	0.01 mg/ml
2. Inzitan®	'as is'	1/1000
3. Components of Inzitan®		
Lidocaine	50 mg/ml	2 mg/ml
Dexamethasone	'as is' (4 mg/ml)	1/100 (0.04 mg/ml)
Vitamin B_{12}	500 µg/ml	1/10 (50 µg/ml)
Vitamin B_1	'as is' (100 mg/ml)	1/100 (1 mg/ml)
Tween-80	0.04 mg/ml	1/10 (0.004 mg/ml)

Fig. 1. Positive patch test with vitamin B1 (thiamine hydrochloride 10% aq.) on D4.

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Fig. 2. Positive intradermal test with thiamine at delayed reading (24 hours).

with each of the components of Inzitan®. She showed good tolerance to lidocaine and dexamethasone. Eight hours following oral administration of a multivitamin (Neurodavur®) containing vitamins B_1, B_{12} and B_6, she developed a pruritic micropapular erythematous rash on the buttocks and back.

Finally, patch tests were performed with Finn Chambers®, with this multivitamin and its components. Patch tests gave positive results with Neurodavur® ('as is', +++) and vitamin B_1 (thiamine hydrochloride 10% aqua, ++) at readings on D4 (Fig. 1). An intradermal test with thiamine was also performed, and gave a positive result at a delayed reading at 24 hr (Fig. 2). Patch tests with vitamins B_{12} and B_6 gave negative results. Control patch tests with thiamine performed in 10 patients gave negative results.

Discussion

Inzitan® is a widely used formulation in Spain for the treatment of musculoskeletal pain. It is marketed in ampoules that are usually administered by the intramuscular route, but, for iontophoresis, are used topically. Delayed hypersensitivity reactions have been reported, caused by its dexamethasone component (3). No reactions with the thiamine component have been previously described. In our case, the sensitization was confirmed by positive delayed hypersensitivity test results (patch test and delayed intradermal skin test) and challenge test results.

Hypersensitivity reactions to vitamins are rare. Those described with thiamine include anaphylactic and anaphylactoid reactions after parenteral administration (4, 5), and occupational cases of asthma and contact dermatitis in workers employed in the manufacture of vitamin-enriched breakfast cereals and in the pharmaceutical industry (6, 7).

We report a case of allergic contact dermatitis and systemic allergic dermatitis from sensitization to vitamin B_1 (thiamine) contained in Inzitan® after application by iontophoresis. Foti et al. described a case of allergic contact dermatitis caused by diclofenac after iontophoresis, and considered this treatment to be a risk factor for topical sensitization (8).

As in our case, Hjorth (9) reported systemic allergic dermatitis after oral challenge with thiamine in patients diagnosed with contact dermatitis caused by thiamine. Our patient was advised to avoid drugs and multivitamins containing thiamine; no other dietary restrictions were recommended, as she has no problems with her usual diet.

References

1 Wilkinson D, Fregert S, Magnusson B et al. Terminology of contact dermatitis. *Acta Derm Venereol* 1970: **50**: 287–292.

2 Dreborg S. Skin tests used in type I allergy testing. Position paper. *Allergy* 1989: **44** (Suppl. 10): 1–59.

3 Villas F, Garmendia F J, Joral A, Villarreal O, Navarro J A. Systemic allergic reaction to dexamethasone. *Allergy* 1997: **52** (Suppl. 37): 176.

4 Molero Sancho I, Franco Ibáñez C, Longo Areso N, Fernández Ibáñez E. Anafilaxia por vitamina B1 o tiamina. *J Investig Allergol Clin Immunol* 2010: **20** (Suppl. 2): 225–226.

5 Proebstle T M, Gall H, Sterry W, Jugert F K, Merk H F. Specific IgE and IgG serum antibodies to thiamine associated with anaphylactic reaction. *J Allergy Clin Immunol* 1995: **95**: 1059–1060.

6 Drought V J, Francis H C, McL. Niven R, Burge P S. Occupational asthma induced by thiamine in a vitamin supplement for breakfast cereals. *Allergy* 2005: **60**: 1213–1214.

7 Larsen A I, Jepsen J R, Thulin H. Allergic contact dermatitis from thiamine. *Contact Dermatitis* 1989: **20**: 387–388.

8 Foti C, Cassano N, Conserva A, Vena G A. Allergic contact dermatitis due to diclofenac applied with iontophoresis. *Clin Exp Dermatol* 2004: **29**: 91.

9 Hjorth N. Contact dermatitis from vitamin B1 (thiamine). *J Invest Dermatol* 1958: **30**: 261–264.

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