

BRIEF REPORT

Type 1 and type IV hypersensitivity to nickel

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ABSTRACT

We report a case of type 1 and type IV contact hypersensitivity to nickel. Very few cases of immediate contact urticaria to nickel have been reported. The mechanism behind this is not fully understood, although it has been postulated that nickel may act as a mast cell discharger on a non-immunological basis. Nickel is found in varying concentrations in stainless steels; its biological availability varies depending on the alloy composition. Our patient has adapted her lifestyle to minimize her contact with household appliances containing nickel. If medical or dental treatment using stainless steel equipment is required, we recommend a short course of oral corticosteroids and antihistamines.

Key words: Allergic contact dermatitis, type 1 hypersensitivity, type IV hypersensitivity.

INTRODUCTION

Allergic contact dermatitis secondary to nickel is a common problem. Type 1 hypersensitivity eliciting an urticarial response has rarely been reported. We report a female patient who shows evidence of both a type 1 and a type IV hypersensitivity to nickel.

CASE REPORT

A 38-year-old atopic woman was referred by her dentist with a history of reacting to dental procedures since childhood. She recalled developing pain and swelling in any part of her mouth where dental instruments had come into contact.

Direct contact with knives and forks induced pruritus, pain and tingling of the palms within minutes and swelling and erythema within 1 h.

Within minutes of venesection, she described itchiness, pain and swelling at the site and resultant erythema and oedema lasting for up to 1 week.

She has never had accompanying rhinitis or asthma at the time of these reactions.

We patch tested her to nickel sulfate on her ventral forearm (1%, 3% and 5% pet., 5% obtained from Chemo-technique Diagnostics™); the dilutions were prepared by our hospital pharmacy. Within seconds of the application, she complained of discomfort at the site of the 5% concentration. After 20 min, erythema and oedema was visible consistent with an urticarial type of reaction at all three sites (Figs 1,2). Because of discomfort, the patches were then removed. After 96 h, there was evidence of residual eczema at the site of the 5% application (Fig. 3).

DISCUSSION

Allergic contact dermatitis secondary to nickel is a commonly encountered problem, attributable to a type IV hypersensitivity reaction. The results from the European Surveillance System on Contact Allergies demonstrated that nickel sulfate is the most commonly encountered allergen during patch testing, with 19.7% of patients reacting to it.¹ Very few cases of type 1 hypersensitivity to nickel have been reported.^{2–4} The mechanism behind this is not fully understood, although it has been postulated that nickel may act as a mast cell discharger on a non-immunological basis.⁵

Stainless steels are widely used metals, defined as iron-based alloys containing at least 10.5% chromium and a maximum of 1.2% carbon.⁶ Their concentration of other metals such as nickel and sulfur can vary. Studies have shown that low sulfur stainless steel grades such as AISI 304, 316L and 340 released very little nickel in acid artificial sweat and elicited no reactions in patients known to have a contact dermatitis to nickel. In contrast, steel grades containing >0.1% sulphur elicited a contact dermatitis in 4–17% of individuals with a known contact allergy to nickel. Stainless steels that are nickel-plated elicited a reaction in 87–99% of the same population.⁷

The possibility of pressure urticaria was raised as a potential diagnosis for this patient. We felt this was unlikely as she did not complain of skin discomfort or irritation at classical sites of sustained pressure.

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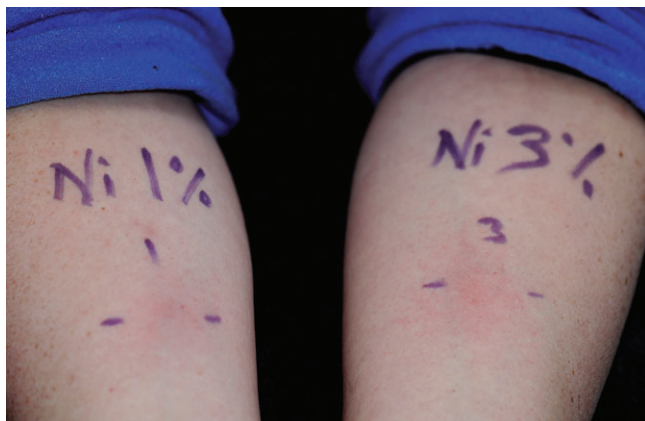


Figure 1 An urticarial type reaction developed almost immediately at the sites of all nickel sulphate tested.



Figure 2 Erythema and oedema was evident within 20 minutes of application.

Wherever possible, this patient tries to avoid direct contact with substances potentially containing nickel. She carries vinyl gloves with her, which she wears when eating in restaurants. She has plastic-handled cutlery and kitchen appliances at home. She wears gloves if handling coins or keys. Following general research and discussion, she has decided not to try and comply with a nickel-free diet.

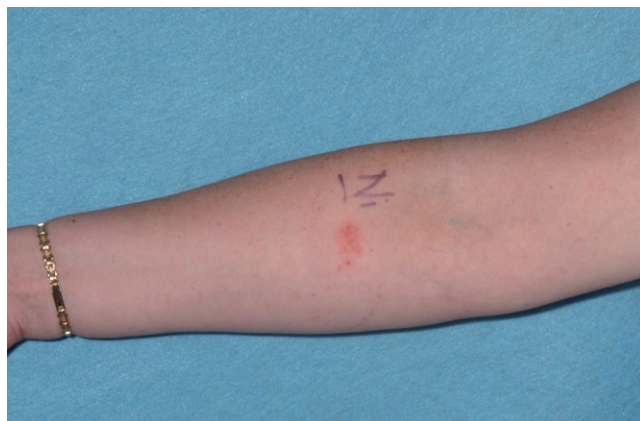


Figure 3 Residual eczema evident at the site of 5% nickel sulphate after 96 hours.

There is limited dental equipment available that is not made from stainless steel. No hypodermic needles are produced that are free from nickel; on average, they contain 8–10% nickel. When dental or medical treatment is necessary, we have advised a prescription of antihistamines and prednisolone before the procedure.

REFERENCES

1. Uter W, Ramsch C, Aberer W *et al.* The European baseline series in 10 European Countries, 2005/2006 – Results of the European Surveillance System on Contact Allergies (ESSCA). *Contact Dermatitis* 2009; **1**: 31–8.
2. Estlander T, Kanerva L, Tyyasa O *et al.* Immediate and delayed allergy to nickel with contact urticaria, rhinitis, asthma and contact dermatitis. *Clin. Exp. Allergy* 1993; **23**: 306–10.
3. Valsecchi R, Cainelli T. Contact urticaria from nickel. *Contact Dermatitis* 1987; **17**: 187.
4. Tosti A, Melino M, Labanca M *et al.* Immediate hypersensitivity to nickel. *Contact Dermatitis* 1986; **15**: 95.
5. Osmundsen P. Contact urticaria from nickel and plastic additives (butylhydroxytoluene, oleyamide). *Contact Dermatitis* 1980; **6**: 452–4.
6. Cunat P-J. *Stainless Steel: The Safe Choice Environment and Human Health Series*, vol. 1. Brussels: Euro Inox Publishers, 2000.
7. Haudrechy P, Mantout B, Frappaz A *et al.* Nickel release from stainless steels. *Contact Dermatitis* 1997; **37**: 113–17.