

ALLERGIES ASSOCIATED WITH BODY PIERCING AND TATTOOS: A REPORT OF THE ALLERGY VIGILANCE NETWORK

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Body piercing and tattooing are increasingly common. As well as the risk of infection and scarring, allergic reactions are also reported. This is the first multi-centre study to assess the frequency of consultations for allergy. Of the 138 allergologists who answered our two questionnaires, 7.9% reported allergic reactions associated with body piercing and 18.9% identified allergies associated with temporary henna-based tattoos. Contact eczema, rhinitis and urticaria were related to nickel allergy. Contact eczema, generalized eczema, pruritus and edema were caused by tattoos. In 20 out of 28 cases, sensitization to para-phenylenediamine (PPD) was observed. The authors review the literature, underscoring the risk of serious allergy to PPD, the need for long-term monitoring of the risk of skin lymphocytoma, the difficulties met during treatment and the necessity of regulating tattooing and body piercing practices.

Body piercing - Tattoo - Allergy - Nickel - Para-phenylenediamine (PPD).

INTRODUCTION

Body piercing and tattooing, previously considered a feature of primitive societies, is currently widespread in westernized civilization. Several surveys have confirmed that these practices are widespread, not only amongst certain marginalized categories of the population (delinquents and substance abusers), but also amongst young people in general, including students.

Tattooing and body piercing is carried out increasingly by unqualified practitioners and there is a risk of infection (acute infection at the site of piercing and complications occurring later such as endocarditis, osteomyelitis, septicemia or transmission of hepatitis C virus, etc.). Necrosis and cheloid scarring comprise esthetic damage that surgeons and stomatologists know only too well. The legislation concerning these practices is particularly vague. In France, the practices remain largely undocumented, and the question of possible allergic risks arises. A survey carried out by the Allergy Vigilance Network is reported here.

METHODS

The Allergy Vigilance Network was asked to carry out a survey with two questionnaires. It was started on December 4, 2006 and completed on December 22, 2006.

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■ Piercing Questionnaire:

- **Q1:** How many cases of allergy associated with body piercing have you encountered?
- **Q2:** What were the clinical signs?
- **Q3:** Which diagnostic test confirmed the diagnosis? (clinical features, patch tests, recovery after eviction, other).
- **Q4:** Which parts of the body were pierced? (Nose, ears, lips, tongue, navel, genitals, etc.). Was there one or several piercings?

■ Tattoo Questionnaire:

- **Q1:** How many cases of allergy associated with tattoos have you encountered?
- **Q2:** What were the clinical signs?
- **Q3:** Which diagnostic test confirmed the diagnosis? (clinical features, patch tests, recovery after eviction, other).
- **Q4:** Where was the tattoo? Was there one or several?
- **Q5:** Approximately what body area was covered by tattoos? (>50%, 10 to 50%, < 10%).

In January 2007, reporting physicians were asked to provide further information, particularly patient histories.

RESULTS

There were 138 responses (negative or positive), 32 positive replies to one and/or the other of the questionnaires). Of 138 allergists, 7.9% reported allergies

associated with body piercing and 18.9% identified allergy to temporary henna-based tattoo coloring agents.

ALLERGIC REACTIONS TO BODY PIERCING

Eleven (11) physicians saw over 26 cases: 26 detailed cases to which must be added those reported by a Belgian allergist who had identified "more than 10" and those of a French allergist who reported "many cases". In most cases, the reaction was to a single body piercing. The most commonly affected site was the wing of the nose. Eyebrows, ears, lips and navel were rarely affected. Genital piercing was not reported. Most reactions were contact eczema but there were three cases of rhinitis, two of urticaria, and one case of late-onset eczema on the hands of a patient who handled metal bins in the period following the piercing. Non-allergic inflammatory reactions related to secondary infection were reported. One case of piercing in France resulted in a cleft lip requiring plastic surgery. In 13 of the 26 cases, allergic reactions were related to nickel, proved by positive skin patch tests. In three cases where nickel allergy was reported, eviction resulted in a clinical improvement. The symptoms were rhinitis related to nickel sensitization and, in one case, they started again when body piercing jewellery was worn again. It would seem that these conditions are favoured by a predisposition to atopy, as well as by history of nickel allergy evidenced by contact eczema with costume jewellery (three of five well-documented cases). No other history (auto-immune disease, diabetes, etc.) was reported.

ALLERGIC REACTIONS ASSOCIATED WITH TATTOOS

Twenty-six (26) physicians reported on 74 patients with reactions to tattoos. In all but one case, these were temporary tattoos made with henna. The tattooed area was always under 10% of body area. There were various sites: cheeks, upper limbs, shoulders, lumbar sacral area and ankles. All cases presented eczema, mostly contact eczema. In one case, there was an associated facial edema. Local or general pruritus was reported twice, together with one case of a chronic inflammatory reaction requiring corticoid ointments over several months. One patient suffered late-onset allergic reactions to hairdressing products and textile dyes. Skin patch tests identified sensitization to para-phenylenediamine (PPD) in 20 of 28 cases. One patient

was also allergic to "disperse orange dye". One case caused by a green tattoo was related to sensitization to chromium. No allergens were identified in other patients who underwent patch tests.

DISCUSSION

This retrospective survey revealed the frequency of allergic reactions associated with body piercing and tattoos. Nearly 10% of the allergists had diagnosed cases in the context of body piercing and 24% in that of tattoos.

Reactions to body piercing have been known for a long time. These are usually contact dermatitis, although some cases of granulomatous dermatitis have been described (1, 2). These may be signs of late-onset hypersensitivity, as evidenced by the onset of granuloma at the site of skin patch tests (2, 3). They have been described with regard to various metals: gold, palladium, titanium alloy, vanadium, aluminium (4).

Nickel is the principal agent involved in contact eczema. Currently 18% of body ornaments release nickel, as evidenced by the dimethylglyoxime test (5). Nickel allergies are related to body piercing, and according to two studies on Norwegian and Danish children, the risk increases with the number of piercings (6, 7, 8, 9). It is interesting to note that risk is lower with dental prostheses: the different metals used for braces and orthodontics rarely cause hypersensitivity to nickel, since prolonged contact with the oral mucosa results in tolerance (8, 10). A study of nickel-induced lymphocyte proliferation (in the presence of IL-4 and IL-7) in allergic and non-allergic subjects showed that the allergic subjects produced IL-5, whereas non-allergic subjects had higher levels of an immuno-regulatory cytokine, IL-10 (10).

Some people may be at particular risk because of previous nickel hypersensitivity and this must be taken into account, since a prospective survey of children with atopic dermatitis showed that 14% were sensitized to nickel (11).

People with a history of nickel allergy, or presenting signs of *de novo* allergy to body piercing, may later show signs of allergy to prostheses or stents. A relationship has been established between nickel allergy and stent thrombosis (12).

Where the allergic reaction is severe, the body ornament should be removed. We have, however, observed that sometimes patients will choose to suffer rather than remove their body ornament (a personal case concerning rhinitis).

Allergy associated with permanent tattoos has been known for a long time, particularly with coloured tattoos involving various metal pigments (chromium, cobalt, etc.). As a result of tourism in Mediterranean

countries, temporary tattoos with black henna have become particularly widespread. Tattoo allergy has been documented for children (13, 14, 15, 16).

Symptoms generally consist of contact dermatitis, sometimes accompanied with, or followed by, hypopigmentation (17, 18). In severe cases, eczema is generalized.

Cases of bullous rash and extensive edema have been reported (19, 20) as well as granulomatous lesions (21). Granulomatous reactions have been related to metals (nickel, chromium) present in the pigments used and detected in macrophages (21).

It is certain that most allergic reactions (contact eczema) are related to PPD and to isopropyl PPD (IPPD). Sensitization is sometimes dramatic, causing severe allergic reaction from the 4th day after tattooing (19, 22, 23, 24, 25).

Vegetable henna dyes often contain PPD or IPPD (26, 27) that darken the dye, accelerate the process and give more precision to the design (28). The PPD content of tattoo dyes is high: 15.7% in the study carried out by Brancacio, which is much higher than the amount of PPD in hair dyes (26). It should be noted that these dyes are extremely toxic when ingested by mistake: renal failure and death was reported for 31 Sudanese children (29). In six cases, poisoning occurred after application to the skin.

All the detailed allergy reports confirmed that clinical reactions were related to late-onset hypersensitivity to PPD, diagnosed by patch test. Patch tests to pure henna, however, were negative (30, 19). A single case of IgE-mediated allergy has been reported (31).

One of the effects of PPD hypersensitivity is the risk of cross-reaction to azoic dyes. Patch tests with various dyes are sometimes positive (30, 17). Also, some patients sensitized to PPD by tattooing may suffer allergy to hair dyes (32, 28, 33) or to textile dyes (34). Conversely, late-onset PPD hypersensitivity may reflect the very common sensitization to procaine and sulfonamide groups (35).

Using rubber inking stamps may also trigger hypersensitivity reactions to other products: thiuram and latex (36, 16). Sensitization to fragrances has also been reported (37).

Long-term effects remain unknown. However, years after tattooing, activated macrophages, capillary proliferation and lymphocyte infiltrations are seen in tattooed skin, demonstrating that tattooing is not a harmless process. Inflammatory reaction patterns have been detected, with granulomatous reaction being the least harmful effect (38). Monitoring for onset of skin lymphocytoma is recommended.

Possible treatments include local infiltrations with corticoids, laser, or even tattoo removal through excision (39). However, a risk of immediate allergic reaction during laser treatment has been reported (40). It

is therefore far more difficult to treat than to prevent the condition, so these body modification practices, affecting a population mainly of youngsters, should be regulated more stringently.

The frequency of body piercing and tattoos, particularly amongst adolescents, of all social classes, causes a certain number of allergic reactions, since 7.9% of physicians identified allergy associated with body piercing, and 18.9% identified allergy associated with tattoos. Thus, it seems necessary to give some thought as to how these practices can be regulated in France, following the example of other European countries.

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