



Title page

Title: Allergic contact dermatitis to red tattoo ink with positive patch tests

Short title: Contact dermatitis to red tattoo ink with positive patch tests.

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Allergic contact dermatitis to red tattoo ink with positive patch tests

Complications with red tattoo ink (RTI) can be cutaneous or systemic. At the same time, it can be immediate or delayed; these last include allergic contact dermatitis (ACD), granulomatous dermatitis, lichenoid dermatitis and pseudolymphomatous reactions. (1)

Skin reactions to RTI are common, but identifying the allergens is challenging nowadays. (2)

The RTI has the most common adverse reactions on skin (2), being ACD one of them (3).

A 22-year-old man, laborer profession, unknown allergies to drugs or food and a black tattoo done years ago without complications. The patient gets done a multicolored tattoo (black, red, orange, green and purple ink) in the anterior face of the left forearm. One months later, he started with itching in the areas of the skin where it was applied the RTI (Eternal ink®, composition: only organic pigments). Later, he presented some erithemato-purpuric and pruritic papules with mild desquamation in the areas where the RTI was placed.

Skin biopsy from one papule revealed spongiosis with vesicles formation in epidermis and a moderate superficial and deep lympho-histiocytic infiltrate in dermis, with occasional eosinophils and plasma cells. Histiocytes with exogenous pigment are observed.

Allergy study:

Results of Patch tests (PT) with standard battery (True test®) (reading in 48, 96 h and 1 week later were): all negative, including cobalt chloride (CC).

20 days later, PT (Bial-Aristegui Lab, Bilbao, Spain) with metals battery (CC -1%, aluminum, mercury, nickel, copper, palladium, titanium): all negative except for CC that was positive (++) (48 and 96 hours later). Moreover, PT with RTI in water (30%) and petrolatum (30%) was positive (++) in petrolatum and negative in water -48 and 96 hours later- (Figure 1).

Discussion

Allergic reactions due to tattoos are an emerging health problem (3) and they may start after a few weeks or even after months or years. Our patient began with itching in the areas where the red ink had been applied only one month later, so CC is probably the potential culprit allergen especially in the light of such an early reaction to the ink (96 hours) and relatively short time until the tattoo reaction developed (1 month) (2,3,4). However, preservatives might be culprit allergens as well but were unfortunately not patch tested.

The biopsy confirmed a histological pattern of eczema.

Patch and prick test results are usually disappointing with RTI. (4) However, the diagnosis of ACD was confirmed in this case because the PT were positive for RTI and CC. We think that the sensitization to CC is relevant since this metal might be found as a contaminant in RTI. (2,3) The exogenous pigment found in the biopsy could be RTI and/or traces of metallic pigments (probably CC) although we do not have techniques to analyze it.

Verification of allergic sensitization to RTI with PT may be difficult due to the poor penetration into the skin of the applied azo pigments. Although tests with RTI are generally negative, (3) we recommend performing them because they are negative in 48 - 96 hours but they become positive in 1-2 weeks, as occurs in some pseudolymphomas or metals (4).

We do not perform intradermal tests with the RTI due to the risk of lasting cutaneous reactions or infections (3).

In conclusion, we present a patient with ACD triggered by RTI and with positive PT to the RTI and CC.

References

1. Forbat E, Al-Niaimi F. Patterns of Reactions to Red Pigment Tattoo and Treatment Methods. *Dermatol Ther (Heidelb)*. 2016; 6:13–23.
2. Serup J, Hutton Carlsen K, Dommershausen N, Sepehri M, Hesse B, Seim C, Luch A, Schreiber I. Identification of pigments related to allergic tattoo reactions in 104 human skin biopsies. *Contact Dermatitis*. 2020; 82(2):73-82.
3. Price A, Tavazoie M, Meehan SA, Leger M. Identification reaction associated with red tattoo ink. *Cutis*. 2018;102(5): E32-E34.
4. Gaudron S, Ferrier-Le Bouëdec MC, Franck F, D'Incan M. Azo pigments and quinacridones induce delayed hypersensitivity in red tattoos. *Contact Dermatitis*. 2015;72(2):97-105.

Figure 1. Contact dermatitis caused by red-tattoo ink and allergological study.

Figure 1.1

Skin injuries where red ink was applied.



Figure 1.2

Patch test of metals and RTI (96 hours reading).

