



Allergic Contact Dermatitis to Temporary Black Henna Tattoo Due to Sensitization to Para-Phenylenediamine

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This study was presented as a poster at the European Academy of Allergy and Clinical Immunology Congress, 2017, Helsinki.

ABSTRACT

The fashion for temporary “black henna tattoo” is becoming increasingly more common among young adults and teens. An adolescent case with itching, erythema, edema, and inflammatory discharge on the right forearm two days after a temporary tattoo application is presented in this report. To determine the contact sensitizer, a patch test was performed one month after the end of the treatment. A bullous strong positive reaction (3+) was observed against para-phenylenediamine at the 48th and 72nd hours of evaluation after the application. Despite the common belief that henna tattoo application is harmless, the ingredients used in henna tattoo especially para-phenylenediamine can lead to allergenic reactions that can even be severe.

Keywords: Adolescent, contact dermatitis, para-phenylenediamine

INTRODUCTION

Allergic contact dermatitis to black henna tattoo is mostly due to the sensitization to para-phenylenediamine (PPD). Para-phenylenediamine may cause local and systemic toxic effects when applied topically or ingested (1). Temporary “black henna tattoos” have become increasingly widespread among young adults and teenagers. Here, we present a 15-year-old male with allergic contact dermatitis after the second exposure to black henna tattoo after being previously sensitized to PPD by black henna tattoo.

CASE PRESENTATION

A 15-year-old male patient presented to the allergy outpatient clinic with itching, erythema, edema and

inflammatory discharge on his right forearm. The parents explained that the symptoms began two days after the temporary tattoo application. One year ago, the patient had experienced the same mild local symptoms after temporary tattoo application. The patient had no previous episodes of atopic dermatitis or other hypersensitivity disorders. Physical examination of the patient showed that a devil fork shaped, erythematous, edematous area with a yellow dry and purulent discharge on the tattoo application area. The affected area was about 10 cm size around the elbow and extended to the forearm and arm, and the arm was completely edematous (Figure 1).

The patient was hospitalized with the diagnosis of allergic contact dermatitis and soft tissue infection. Laboratory examination showed a white blood cell count of

10.500/ μ l, erythrocyte sedimentation rate of 4 mm/h, and C-reactive protein of 0.25 mg/dl. Although the laboratory findings did not support infection, the clinical signs were compatible with tissue infection. The patient was treated with intravenous sulbactam-ampicillin, clindamycin, oral antihistamines, and moderate potency topical steroid. On the second day of the treatment, systemic steroids were also added to the therapy. After treatment for 5 days, the lesion has healed leaving mild hypopigmentation.

To determine the contact sensitizer, the patch test (T.R.U.E. Test[®]) was performed one month after the end of the treatment. A bullous strong positive reaction (3+) was observed against para-phenylenediamine (PPD) at the 48th and 72nd hours of evaluation after application (Figure 2). Furthermore, other allergenic materials including *caine mix* (*benzocaine* + *tetracaine* + *dibucaine*) (1+); *black rubber* (1+); and *bronopol* (1+) revealed weak positive results. The patient was informed regarding the contact allergens detected in the tests and advised to avoid them.



Figure 1. A devil fork shaped, erythematous, edematous area with yellow dry and purulent discharge on the tattoo application area.

DISCUSSION

Henna is the dried and powdered leaf of *Lawsonia inermis*. It is also called red henna and has been widely used as a dye for the skin, hair, and nails for over 4000 years, especially in Islamic and Hindu cultures. Red henna is relatively safe and has very low allergic potential (1). Black henna is the combination of red henna and PPD. It is used for temporary black henna tattoos (1). Temporary “black henna tattoos” have become increasingly widespread among young adults and teenagers. Henna tattoo contains PPD, other additives (*diamino-benzenes* and *diamino-toluenes*), and heavy metals. These are used to speed up the drying process and to satisfy permanency, and to add the shiny black color (1).

Despite the common belief that henna tattoo application is harmless, the ingredients used in henna tattoo and especially PPD can lead to allergic reactions, sometimes even severe. PPD is an extreme contact sensitizer and is present in hair dyes and in black henna tattoo. Even a minimum concentration (2.5%) of PPD in the tattoo leads to sensitization (1). It is often present in tattoos at various and high concentrations. Recently it has been reported that the levels of PPD varied between 3.37% and 51.6% in black henna tattoo samples in our country (2).

Findings of allergic contact dermatitis occur 1-2 weeks after the first exposure and after 1-3 days in previously



Figure 2. Atopy patch test result at the 72nd hour.

sensitized patients (1). Typical clinical signs are erythema, edema, papules and vesicles. In most cases, allergic reactions are usually limited to the tattoo site but a generalized reaction may also occur. Secondary bacterial infection may develop in addition to allergic contact dermatitis after the application of temporary henna tattoo. Impetigo mimicking allergic contact dermatitis can make the diagnosis difficult (3). In some patients, differentiating allergy from infection may also be difficult.

Treatment of allergic contact dermatitis involves antihistamines and topical steroids. Systemic steroids can be required in some patients (1). Post-inflammatory hypopigmentation is seen especially in children (4).

Patch test is the gold standard diagnostic test and a safe method to determine the allergenic materials of which the patients should be aware (5). Establishing the diagnosis of allergic contact dermatitis is important to avoid re-exposure to PPD and other compounds. Primary sensitizations to PPD by black henna may lead to cross-reactions with other hair dyes, and paraamino compounds. Furthermore, concomitant sensitization that is not related to PPD can be detected by the patch test. Our patient was sensitized to PPD, caine mix; black rubber; and bronopol.

Sensitization to PPD in children may have important consequences especially among teenagers with the growing popularity of temporary tattoos. The patch test should be performed to establish the sensitization in patients who have allergic contact dermatitis or impetigo mimicking dermatitis after henna tattoo exposure.

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