

Henna tattoo contact dermatitis – a report of four cases and brief review of the selected literature

Case Report

Sonja Prcic¹, Aleksandra Matic¹, Milan Matic^{2*}, Aleksandra Petrovic²,
Verica Djuran², Zorica Gajinov²

¹ Pediatric Clinic, Institute of Child and Youth Health Care of Vojvodina,
Hajduk Veljkova 10, 21000 Novi Sad, Serbia

² Dermatovenereological Clinic, Clinical Centre of Vojvodina,
Hajduk Veljkova 1, 21000 Novi Sad, Serbia

Received 27 May 2011; Accepted 27 August 2011

Abstract: Temporary henna tattoos have recently become increasingly popular, especially among teenagers. Combining henna with other colouring agents such as para-phenylenediamine (PPD) may increase its potential for contact sensitization, cross-reaction to related compounds, as well as life-long allergy. Several cases of contact dermatitis from temporary tattoos with black henna have been reported in the literature. We present our experiences with 4 pediatric cases of allergic contact dermatitis induced by henna tattooing and give a brief review of the literature. The agent responsible for contact allergy was proven to be PPD in 3 patients, and in one patch testing revealed positive reactions to PPD and benzocaine, as well as to wool alcohols, nickel sulphate and potassium dichromate, to previously used hair dye—all being of clinical relevance.

Keywords: Henna tattoo • Contact dermatitis • Para-phenylenediamine

© Versita Sp. z o.o.

1. Introduction

Decorative tattoos have been known since the days of ancient Egypt, and for centuries they have been part of tradition of various Eastern cultures. For long time in western cultures, a tattoo was a feature of certain social groups (sailors, soldiers, prisoners). However, it has recently become a fashionable practice among celebrities, and consequently its popularity has increased among adolescents and young people [1]. Temporary tattoos use henna, a natural pigment obtained from the dried leaves of the plant *Lawsonia inermis*, as a coloring agent; it contains lawson (2-hydroxyl-1,4-naphthoquinone) as the active substance. Henna comes in form of greenish powder, mixes easily with water or oil, and is used for dyeing hair or skin. For temporary tattooing, henna is applied to the skin with a brush and left to dry for several hours. It lasts for several weeks, fading gradually. Various substances, such as lemon

oil, instant coffee, vinegar, and para-phenylenediamine (PPD), are added to henna to obtain different shades of colour. Black henna is the most commonly used for temporary tattooing, and a black shade is usually obtained by adding PPD to henna. PPD is the main cause of contact allergies that have been described in patients with temporary tattoos [2]. We present 4 cases of henna tattoo contact dermatitis in children.

2. Case Report

Case 1. A boy, 9 years old, had a temporary henna tattoo put on the upper arm during his summer holiday in Egypt, and immediately after application of the temporary tattoo—black henna—he felt an intense burning. After a few days, an intense redness in a shape of the drawing—a Chinese dragon—appeared, accompanied by moderate itching (Figure 1). At the

* E-mail: mamic@open.telekom.rs

Figure 1. Bizarrely shaped allergic contact dermatitis after temporary henna tattoo on the upper arm.



same time, black henna temporary tattoos were done on his two sisters; both had no adverse reaction. His medical and family histories were unremarkable, and were negative for atopic diathesis or previous allergic reactions. He was referred to dermatologist one month after the tattooing, and upon the application of topical mometasone furoate 0.1% cream the lesion resolved completely in 10 days. Two months later, a patch test was performed and the results observed at 48 and 72 hours showed 3+ reaction to PPD, diagnostic for allergic contact dermatitis to PPD.

Case 2. An 8-year-old girl, had a henna tattoo applied on the right arm during summer holidays in Croatia, and 10 days later redness and papules in a shape of dolphin appeared, accompanied by an intense itch. Secondary bacterial infection arose as consequence of scratching, with purulent secretion and crusting in the area of the tattoo (Figure 2). Her family and personal histories were also unremarkable for atopic diathesis or previous allergic reactions. The skin infection was treated with oral cephalexin and topical potassium permanganate dressings on skin lesions for 10 days, followed by 0.1% mometasone furoate cream; after 2 weeks skin changes resolved, leaving hypopigmentation for 6 months. The girl's parents declined a patch testing procedure.

Case 3. An 8-year-old boy, had a henna tattoo applied to the left leg in a shape of a tiger, and after 14 days experienced itch, erythema and oedema of tattooed skin (Figure 3). No data about atopic or allergic diseases were present in his family and personal history. After application of potent topical corticosteroid cream (0.1% mometasone furoate) skin changes resolved within two weeks with mild postinflammatory hypopigmentation. Three months after tattooing, an allergy patch test was performed. The results of the patch test were evaluated after 48 and 72 hours and showed a 2+ reaction to PPD,

Figure 2. Eczematous dolphin-shaped reaction at the site of a henna tattoo on the right forearm.



confirming the diagnosis of allergic contact dermatitis to PPD.

Case 4. A 17-year-old girl, had an allergic reaction several hours after dyeing her hair with hair dye containing henna. Four years earlier, she had had her first temporary henna tattoo and developed eczematous reaction in the tattoo area. Additionally, she had dyed her hair on two occasions during previous 2 years, both times followed by eczema at the site of contact with hair dye that resolved after topical corticosteroid treatment. After the last hair coloring, a more severe reaction with angioedema occurred; she was treated as an inpatient at the Dermatology department. Upon admission she had erythema and oedema on the forehead, face, scalp, around the ears and on the neck. Intravenous methylprednisolone 40 mg/day and oral loratidine 5 mg/day were prescribed for 3 days, with topical treatment with 0.025% fluocinolon acetonid gel for 1 week. The lesions cleared, leaving residual pigmentation. Two months later, an allergy patch test with the European standard series of allergens was performed. The results were analyzed after 48 h and 72 h and revealed a 4+ to PPD, 3+ to Benzocaine, 3+ to wool alcohols and 3+ to nickel sulphate, 6 H₂O 5% and 1+ to potassium dichromate (Figure 4).

Figure 3. Acute allergic contact dermatitis on the tattoo site of an 8-year-old boy.



Figure 4. Positive patch test with PPD, benzocaine, wool alcohols, nickel sulphate, and potassium dichromate.



3. Discussion and Conclusion

Henna tattooing has recently become very popular. Unlike permanent tattoos, it is of limited duration, and painless, an inexpensive and relatively safe method with virtually no risk of hepatitis B, C and HIV viruses transmission [3]. Allergic and irritant reactions to henna alone are rare. However, for the purpose of temporary tattoos, brown-colored henna is often mixed with PPD to hasten drying and to achieve darker, black shades of colour [2,4,5]. Black henna is considered to cause the increasing prevalence of contact dermatitis to temporary tattoos, particularly among adolescents and school children [6,7]. Para-phenylenediamine (PPD) is an oxidative chemical, frequently used as a permanent hair coloring agent. Its contact-sensitizing potential is well known [2,4,5,8-11]. When PPD and similar chemicals are used for skin staining in temporary tattoos; an active sensitization may occur within a few weeks. The reactions can be very severe, including

serious cutaneous inflammatory reactions and scarring. Immediate hypersensitivity reactions with urticaria, angioneurotic oedema and collapse occurred less frequently [10,12,13]. The sensitization will be lifelong. Persons who become allergic to PPD that is used as additive to black henna in temporary tattoos may also demonstrate allergy, not only to other substances that contain PPD (most commonly hair dyes), but also can cross react with related structures, such as azo-dyes used for clothing, some medications with sulphonamide structures (oral sulfonyleureas), "caine" anesthetics, topical sunscreens [12]. In addition, repeated contact with allergens can increase the severity of reaction in subsequent exposures, as in our patient (Case 4) who reacted with angioedema upon repeated contact with PPD. The other 3 patients presented allergic contact dermatitis to PPD that appeared 1 to 2 weeks after temporary tattoo; its role of PPD as a sensitizing agent was confirmed by patch test in Cases 1 and 3.

PPD is often present in henna dye in rather high concentrations (15.7%), in spite of the directive of the European Community Cosmetics Directive, which allows maximum concentration of 6% for PPD as well as for all diaminobenzene compounds in hair dyes. The USA Food and Drug Administration (FDA) advises that para-phenylenediamine should not be applied on the skin and recommends that the practice of applying para-phenylenediamine-adulterated henna tattoos on skin should be stopped [7,11].

In the last decade, several cases of contact allergic dermatitis to henna tattoo have been described, most of them being younger patients who travelled for a vacation to countries where henna is traditionally used. Allergy tests were performed in most patients, and hypersensitivity to henna itself was seldom demonstrated [11]. Sensitivity to other additives to henna, mostly to PPD, was more prevalent [6,7,12,14-17]. Intensity of skin lesions may vary from eczema, erythema multiforme-like reactions, to bullous contact dermatitis reactions [6,12,15,18-21]. As a consequence of temporary tattoo contact dermatitis, scarring, keloid formation, and permanent post inflammatory pigment changes have been described [14,22,23]. Hypopigmentation or leukoderma were more frequent in children, as in our Case 2 [15].

Our Case 4 shows that hypersensitivity reactions to PPD tattoos carry long-term risks. The girl had been sensitized on previous holidays with black henna temporary tattoos. A few years later, she had a severe allergic reaction after dyeing her hair. Her patch testing revealed a positive reaction to PPD, but also to benzocaine, as well as to wool alcohols, nickel sulphate and potassium dichromate. Because PPD is found in

dyes for hair and textiles, patients sensitized to PPD can manifest long-term contact dermatitis to both these products [8]. It has been documented in the literature that PPD can also induce cross-sensitization to other allergens. Those are structurally related compounds having amino group in para position of their benzene ring, i.e. natural rubber latex, azo-dyes, sulphonamide, thiurams, p-amino benzoic acid sunscreen, para-aminosalicylic acid, and local anaesthetics such as benzocaine and procaine [12,24-29]. Moreover, the sensitizing properties of PPD might be increased by other factors such as the presence of various oils, solvents and ultraviolet light, or the lack of an oxidizing agent in the mixture. Kang et al also found, besides PPD, heavy metals (nickel, cobalt) in henna tattoo mixtures [30].

References

- [1] Sonnen G. Type IV hypersensitivity reaction to a temporary tattoo. *Proc (Bayl Univ Med Cent)* 2007; 20(1): 36-38
- [2] Lestringant GC, Berner A, Frossard PM. Cutaneous reactions to henna and associated additives. *Br J Dermatol* 1999; 141: 598-600
- [3] Brown KM, Perlmutter P, McDermott RJ. Youth and tattoos: what school health personnel should know. *J Sch Health* 2000; 70:355-60
- [4] Chung WH, Chang YC, Yang LJ, Hung SI, Wong WR, Lin JY, et al. Clinicopathologic features of skin reactions to temporary tattoos and analysis of possible causes. *Arch Dermatol* 2002; 138: 88-92
- [5] Le Coze CJ, Lefebvre C, Keller F, Grosshans E. Allergic contact dermatitis caused by skin painting (pseudotattooing) with black henna, a mixture of henna and p-phenylenediamine and its derivatives. *Arch Dermatol* 2000; 136: 1515-7
- [6] Marcoux D, Couture-Trudel P-M, Rboulet-Delmas G, Sasseville D. Sensitization to paraphenylenediamine from a streetside temporary tattoo. *Pediatr Dermatol* 2002; 19: 498-502
- [7] Brancaccio RR, Brown LH, Chang YT, Fogelman JP, Mafong EA, Cohen DE. Identification and quantification of para-phenylenediamine in a temporary black henna tattoo. *Am J Contact Dermatitis* 2002;13:15-8
- [8] Matulich J, Sullivan J. A temporary henna tattoo causing hair and clothing dye allergy. *Contact Dermatitis* 2005; 53(1): 33-6
- [9] Nikkels AF, Henry F, Pierard GE. Allergic reactions to decorative skin paintings. *J Eur Acad Dermatol Venereol* 2001; 15: 140-2
- [10] Oztas MO, Onder M, Oztas P, Atahan C. Contact allergy to henna. *JEADV* 2001; 15: 91-92
- [11] Corrente S, Moschese V, Chianca M, Graziani S, Iannini R, Rocca ML, Chini L. Temporary henna tattoo is unsafe in atopic children. *Acta Pædiatrica* 2007; 96 (3): 469-71
- [12] Onder M. Temporary holiday "tattoos" may cause lifelong allergic contact dermatitis when henna is mixed with PPD. *J Cosmetic Dermat* 2004; 2 (3-4):126-130
- [13] Abdulla KA, Davidson NM. A woman who collapsed after painting her soles. *Lancet* 1996; 348: 658
- [14] Onder M, Atahan CA, Oztas P, Oztas MO. Temporary henna tattoo reactions in children. *Int J Dermatol* 2001; 40 (9): 577-9
- [15] Neri I, Guareshi E, Savoia F, Patrizi A. Childhood allergic contact dermatitis from henna tattoo. *Pediatr Dermatol* 2002; 19 (6): 503-5
- [16] Jovanović D, Slavković Jovanović M. Allergic contact dermatitis from temporary henna tattoo. *Journal of Dermatology* 2009; 36: 63-5
- [17] Tomljanovic-Veselski M, Zilih-Ostojic C. Contact dermatitis to temporary tattoo. *Acta Dermatovenerol Croat* 2006;14(3):160-2
- [18] Baron S, Baxter K, Wilkinson M. Allergic contact dermatitis to henna tattoo. *Arch Dis Child* 2003; 88 (9): 747
- [19] Van den Keybus C, Morren MA, Goossens A. Walking difficulties due to an allergic reaction to a temporary tattoo. *Contact Dermatitis* 2005; 53 (3): 180-1
- [20] Jung P, Sesztak-Greinecker G, Wantke F, Gotz M, Jarisch R, Hemmer W. A painful experience: black henna tattoo causing severe, bullous contact dermatitis. *Contact Dermatitis* 2006; 54 (4): 219-220
- [21] Spornraft-Ragaller P, Kämmerer E, Gillitzer K, Subsequent reactions to lawsone have been noted in some patients [26]. Susceptibility of pediatric population to develop PPD allergy has been demonstrated to be greater than in adults, and henna tattooing is the main source of exposure to PPD among children [21].

Based on our experience and the experience of other authors, temporary black henna tattoo is not harmless. Allergic contact dermatitis to PPD that is contained in henna tattoo mixtures is a potentially serious problem that can cause acute and permanent skin changes, along with active lifelong sensitization, with possible cross-reactions to a number of related compounds. Therefore we suggest that temporary henna tattoos should be discouraged, especially in children.

- Schmitt J. Severe allergic reactions to para-phenylenediamine in children and adolescents: should the patch test concentration of PPD be changed? *JDDG* 2011;9: In press
- [22] Bukhari IA. Cutaneous hyperpigmentation following nonpermanent henna tattoo. *Saudi Med J* 2005; 26(1):142-4
- [23] Jappe U, Hausen BM, Petzold D. Erythema-multiforme-like reactions and depigmentation following allergic contact dermatitis from a paint-on henna tattoo, due to para-phenylenediamine contact hypersensitivity. *Contact Dermatitis* 2001;45:249–250
- [24] Sosted H, Johansen JD, Andersen KE, Menne T. Severe allergic hair dye reactions in 8 children. *Contact Dermatitis* 2006;54(2):87–91
- [25] Martin JA, Hughes TM, Stone NM. 'Black henna' tattoos: an occult source of natural rubber latex allergy? *Contact Dermatitis* 2005; 52(3):145-6
- [26] Jung P, Sesztak-Greinecker G, Wantke F, Gotz M, Jarisch R, Hemmer W. The extent of black henna tattoo's complications are not restricted to PPD-sensitization. *Contact Dermatitis* 2006; 55(1):57
- [27] Arranz Sanchez DM, Corral de la Calle M, Vidaurrezaga Diaz de Arcaya C, de Lucas Laguna R, Diaz Diaz R. Risks of black henna tattoos. *An Pediatr (Barc)* 2005; 63(5):448-52
- [28] Seidenari S, Mantovani L, Manzini BM, Pignatti M. Cross-sensitizations between azo dyes and para-amino compound. A study of 236 azo-dye-sensitive subjects. *Contact Dermatitis* 1997; 36: 91–6
- [29] Saunders H, O'Brien T, Nixon R. Textile dye allergic contact dermatitis following paraphenylenediamine sensitization from a temporary tattoo. *Australas J Dermatol* 2004; 45:229-31
- [30] Kang IJ, Lee MH. Quantification of para-phenylenediamine and heavy metals in henna dye. *Contact Dermatitis* 2006; 55(1):26-9