

Irritant Contact Dermatitis From a Black Henna Tattoo Without Sensitization to Para-phenylenediamine

abstract

Allergic contact dermatitis from nonpermanent black henna tattoos has been frequently reported, particularly in children. Contamination or adulteration of the dyes with para-phenylenediamine has been identified as major cause of active sensitization and elicitation of severe allergic contact dermatitis. Sequelae include permanent sensitization, hyper- or hypopigmentation, scarring, keloids, and hypertrichosis. We report a rare case of irritant dermatitis to an unknown ingredient in a black henna tattoo with consecutive hypopigmentation. Sensitization to para-phenylenediamine and other para-compounds was excluded by patch test evaluation. This is relevant for future exposure to consumer products such as hair dyes or in occupational settings. Generally, black henna tattoos, particularly if done with dyes of unknown composition, should be strongly discouraged. *Pediatrics* 2013;131:e1974–e1976

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KEY WORDS

black henna tattoo, hypopigmentation, irritant contact dermatitis, p-phenylenediamine

ABBREVIATION

PPD—para-phenylenediamine

Dr Kind followed the patient, performed the patch tests, drafted the initial manuscript, and approved the final manuscript as submitted; Dr Scherer supervised the patient's management and patch tests, reviewed and revised the manuscript, and approved the final manuscript as submitted; and Dr Bircher coordinated and supervised the whole procedure, critically reviewed, and finalized and submitted the final manuscript.

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Para-phenylenediamine (PPD) is a well-known contact sensitizer, particularly present in hair dyes and in black henna tattoos.¹ Undeclared concentrations between 1% to 63% PPD have been demonstrated in dyes used for henna tattoos.^{1,2} This may result in active sensitization in young individuals with long-term sequelae and consequences.³ We present an unusual irritant reaction from a black henna tattoo without sensitization to PPD but residual hypopigmentation.

CASE REPORT

While on holiday in Turkey, a 10-year-old white boy had a black henna tattoo applied to his upper arm. It was the first application of such a henna tattoo. One day later, he felt mild burning sensations without skin lesions. Four days later, he presented to our clinic. He had no history or signs of contact dermatitis, atopy, other allergic disorders, or vitiligo. On examination, mild erythema and black crusts exactly where the ornamental tattoo had been placed were present, without any infiltration, papules, vesicles, or spreading beyond its borders. The black ornament itself was raised and had the aspect of an eschar (Fig 1). After a 7-day treatment with mometasone furoate 0.1% cream, the necrotic epidermis had peeled off, and after 3 weeks a hypopigmented non-inflamed exact outline of the tattoo persisted (Fig 2).

Patch tests including the European baseline series and PPD 0.3% in petrolatum were performed 3 weeks after healing of the reaction and obtaining informed consent. Readings at day 2 and 3 were negative apart from a positive test reaction to nickel sulfate. In consecutive patch tests, PPD was tested at 1.0% in petrolatum and a hairdresser and a textile dye series³ were applied, all test agents gave negative results.

DISCUSSION

Typically, patients who have applied black henna tattoos may become sensitized to PPD, and may then cross-react with other para-amino compounds such as p-toluene diamine, amino-phenols, antioxidants used in black rubber (N'-isopropyl-N'-phenyl-PPD),⁴ dyes used in textiles,⁵ and, more rarely, to local anesthetics of the ester family such as benzocaine.^{3,4}

Other long-term sequelae after allergic contact dermatitis from PPD in henna tattoos include scars, keloids,^{6,7} hyper- and hypopigmentation,^{1,8–11} and temporary hypertrichosis,^{12,13} particularly in children. Rarely, disseminated erythema multiforme has been observed.⁶

Our patient suffered from a mild localized burning without any inflammatory skin lesions within 1 day of applying a black henna tattoo. The black dye induced an escharlike circumscribed necrosis of the epidermis similar to a superficial chemical burn. Patch tests did not reveal sensitization to PPD or other para-compounds.² According to the morphology, which was sharply confined to the site of application, the absence of any eczematous changes, the necrotic epidermis and its evolution, and finally the twice negative patch tests, we concluded that the patient suffered from an acute toxic reaction resulting in a superficial epidermal necrosis with consecutive hypopigmentation. The composition of the tattoo dye was unknown; apparently, it contained an irritant ingredient. Agents used in henna tattoo dyes to enhance the color intensity or shorten the time of drying may include lemon juice, eucalyptus and olive oils, vinegar, tea leaves, tannins, charcoal powder, lampblack, and, most often, PPD.¹⁴

A similar case with acquired leukoderma without any erythema or vesiculation 3 days after a dark-colored



FIGURE 1
Escharlike superficial necrosis 4 days after application of a black henna tattoo.

Arabian henna tattoo has been reported in an Indian girl.¹⁵ A toxic reaction was suggested because of the short time interval and the lack of erythema and vesicles.



FIGURE 2
Hypopigmented lesion 3 weeks after application of a black henna tattoo.

Acquired chemical leukoderma has also been reported after long-term use of PPD-containing hair dyes.¹⁶ In our patient, topical corticosteroids to minimize inflammation and cutaneous sequelae were initiated, and a later patch test with PPD was negative. PPD may cause depigmentation by direct chemical action after allergic contact dermatitis and may aggravate vitiligo.¹⁷ Hair dyes and textiles containing PPD have been implicated as a common cause of leukoderma in a large study including >800 patients; however, confirmatory patch testing was

not performed.¹⁷ Other allergens (eg, rubber components such as thiuram, natural rubber latex, and fragrances) have been reported to cause active sensitization or allergic contact dermatitis from black henna tattoos.^{18,19} Our patient had negative prick (latex) and patch tests to these substances. Heavy metals identified in henna tattoo dye mixtures include nickel, cobalt²⁰ and lead.²¹ Our patient was sensitized to nickel; therefore, an allergic reaction to nickel traces cannot be definitely excluded. However, the morphology, the time pattern,

and the evolution render an allergic contact dermatitis unlikely. Because of the relevance of sensitization to PPD and other para-compounds (eg, in occupational settings), we recommend performing patch tests in children who have had a cutaneous reaction to a henna tattoo. This is relevant for future exposure to consumer products such as hair dyes or in occupational settings. We strongly urge, however, that so-called black henna tattoos with dyes of unknown composition be completely avoided.

REFERENCES

- Chung WH, Chang YC, Yang LJ, et al. Clinicopathologic features of skin reactions to temporary tattoos and analysis of possible causes. *Arch Dermatol*. 2002;138(1):88–92
- Almeida PJ, Borrego L, Pulido-Melián E, González-Díaz O. Quantification of p-phenylenediamine and 2-hydroxy-1,4-naphthoquinone in henna tattoos. *Contact Dermat*. 2012;66(1):33–37
- Kind F, Scherer K, Bircher AJ. Contact dermatitis to para-phenylenediamine in hair dye following sensitization to black henna tattoos - an ongoing problem. *J Dtsch Dermatol Ges*. 2012;10(8):572–578
- Marcoux D, Couture-Trudel P-M, Riboulet-Delmas G, Sasseville D. Sensitization to para-phenylenediamine from a streetside temporary tattoo. *Pediatr Dermatol*. 2002;19(6):498–502
- Boschnakow A, Treudler R, Lieps D, Steinhoff M, Orfanos CE. [Temporary tattooing with henna induces contact allergy to textile dyes]. *J Dtsch Dermatol Ges*. 2003;1(12):962–964
- Gunasti S, Aksungur VL. Severe inflammatory and keloidal, allergic reaction due to para-phenylenediamine in temporary tattoos. *Indian J Dermatol Venereol Leprol*. 2010;76(2):165–167
- Lewin PK. Temporary henna tattoo with permanent scarification. *CMAJ*. 1999;160(3):310
- Jappe U, Hausen BM, Petzoldt D. Erythema-multiforme-like eruption and depigmentation following allergic contact dermatitis from a paint-on henna tattoo, due to para-phenylenediamine contact hypersensitivity. *Contact Dermatit*. 2001;45(4):249–250
- Di Landro A, Valsecchi R, Marchesi L. Allergic reaction with persistent hypopigmentation due to temporary tattooing with henna in a baby. *Contact Dermat*. 2005;52(6):338–339
- Valsecchi R, Leghissa P, Di Landro A, Bartolozzi F, Riva M, Bancone C. Persistent leukoderma after henna tattoo. *Contact Dermat*. 2007;56(2):108–109
- Wöhrl S, Hemmer W, Focke M, Götz M, Jarisch R. Hypopigmentation after non-permanent henna tattoo. *J Eur Acad Dermatol Venereol*. 2001;15(5):470–472
- Durmazlar SP, Tatlican S, Eskioglu F. Localized hypertrichosis due to temporary henna tattoos: report of three cases. *J Dermatolog Treat*. 2009;20(6):371–373
- Kluger N, Garat H. Transient localized hypertrichosis on a temporary henna tattoo. *Contact Dermatit*. 2010;62(3):188–189
- Lestringant GG, Bener A, Frossard PM. Cutaneous reactions to henna and associated additives. *Br J Dermatol*. 1999;141(3):598–600
- Mendiratta V. Acquired leucoderma after henna tattoo in an Indian girl. *J Eur Acad Dermatol Venereol*. 2009;23(5):582–583
- Farsani TT, Jalian HR, Young LC. Chemical leukoderma from hair dye containing para-phenylenediamine. *Dermatitis*. 2012;23(4):181–182
- Ghosh S, Mukhopadhyay S. Chemical leukoderma: a clinico-aetiological study of 864 cases in the perspective of a developing country. *Br J Dermatol*. 2009;160(1):40–47
- Martin JA, Hughes TM, Stone NM. “Black henna” tattoos: an occult source of natural rubber latex allergy? *Contact Dermatit*. 2005;52(3):145–146
- Temesvári E, Podányi B, Pónyai G, Németh I. Fragrance sensitization caused by temporary henna tattoo. *Contact Dermatit*. 2002;47(4):240
- Kang IJ, Lee MH. Quantification of para-phenylenediamine and heavy metals in henna dye. *Contact Dermatit*. 2006;55(1):26–29
- Jallad KN, Espada-Jallad C. Lead exposure from the use of *Lawsonia inermis* (henna) in temporary paint-on-tattooing and hair dyeing. *Sci Total Environ*. 2008;397(1–3):244–250

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