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Title: Cicatricial alopecia following allergic contact dermatitis from hair dyes: a rare clinical presentation

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Allergic reactions to hair dye are common and may vary from mild localized pigmentation to severe dermatitis and rarely systemic complications. We here report an unusual case of cicatricial alopecia following severe allergic contact dermatitis from paraphenylenediamine (PPD) in hair dyes.

Case report

A 30-year-old female had been applying hair dyes of different brands once every 2-3 months for the past 2 years. The last application, 6 months ago, had resulted in itchy, oozing plaques over the scalp, forehead and ears.. Clinical examination at presentation showed a residual violaceous pigmentation over the scalp, adjacent forehead and supero-lateral portions of the ears, along with scarring and patchy hair loss (cicatricial alopecia) of the scalp and forehead(**Fig.1**).

The patient denied any previous history of allergic contact dermatitis, however she had generalized dry skin and allergic rhinitis.

A skin biopsy from a hyperpigmented alopecic lesion showed focal basal cell damage with moderate pigment incontinence and vertically oriented bands of scars, with loss of hair follicles and sebaceous glands, suggestive of follicular scarring (**Fig.2B**). She was thus suspected to have cicatricial (lichenoid) alopecia with pigmentation due to allergic contact dermatitis from hair dye.

Thereupon patch tests were performed with the Indian Standard Series¹ (Chemotechnique Diagnostics, Vellinge, Sweden) and 16 patient materials, the latter including 9 hair color products (4 hair dyes containing PPD, 2 hair dyes devoid of PPD, 1 containing indigo powder, 2 natural henna products), 3 color developers, 3 mixtures (1:1) of hair dyes and their respective color developers, and 1 sunscreen. All commercialized allergens were applied on Finn chambers (8

mm diameter) , and the patient materials were tested using 15µl of each product (“as is”) on Whatman filter paper (no. 3, 1x1 cm, GE Healthcare UK Limited, Buckinghamshire, UK). All tests were secured on the back using Micropore tape (3M Healthcare, Minnesota, USA), and were occluded for 2 days. Readings, performed as per International Contact Dermatitis Research Group guidelines on day D2 and D4, showed positive reactions (+++) to 7 materials: 4 brands of PPD-containing hair dyes (among which 1 color shampoo), and 3 mixtures of hair dye with color developer; a very strong reaction (+++) to PPD 1% pet. was also observed (**Fig.2A**).

The patient was instructed to avoid hair dyes containing PPD (and cross-reactors), and she was advised to apply 0.01% fluocinolone acetonide lotion topically over the skin areas affected by residual hyperpigmentation and hair loss. However, there was no further improvement 6 weeks later , after which she was lost to follow up.

Discussion

Contact dermatitis to hair dye may present as an eczematous, (de)pigmented, bullous or lichenoid contact dermatitis, , and, occasionally, even as pseudolymphoma or contact urticaria and anaphylaxis.²⁻⁴ Unusual clinical presentations also include erythema multiforme, Sweet syndrome, rhabdomyolysis and acute renal failure.⁵

There are only a few reports of alopecia following the use of hair dye. Ishida et al, reported a 41-year-old female showing severe non-cicatricial hair loss affecting 90% of the scalp, interpreted as telogen effluvium, after the use of a PPD-containing hair dye. Patch tests showed a (++) reaction to PPD 1% pet..⁶ Asadi et

al. described another unusual case of (non-scarring) alopecia totalis after the use of a permanent hair dye.⁷

Sharma et al. described 4 PPD-positive cases of clinical and histological lichenoid contact dermatitis from PPD-containing hair dyes, presenting as a persistent dark grey pigmentation.⁸ Bishnoi et al. reported 108 patients with acquired dermal hyperpigmentation of the face and scalp with an interface dermatitis on histopathology; 90 (83.3%) of them used hair dye, and 39 (36.1%) tested positive to PPD.⁹ Interestingly, in 4 large case series, together comprising 248 patients with contact dermatitis to hair dye, there were no reports of (lichenoid) cicatricial alopecia,¹⁰⁻¹³

To the best of our knowledge we here described for the first time a severe acute lichenoid allergic contact dermatitis from PPD-containing hair dyes resulting not only in hyperpigmentation but also in cicatricial alopecia.

References

1. Sharma VK, Sethuraman G, Garg T, Verma KK, Ramam M. Patch testing with the Indian standard series in New Delhi. *Contact Dermatitis* 2004;51(5-6):319-21.
2. Rubegni P, Fimiani M, de Aloe G, Andreassi L. Lichenoid reaction to temporary tattoo. *Contact Dermatitis* 2000;42(2):117-8.
3. Sequeira FF, Jayaseelan E, Stephen J. Paraphenylenediamine-induced cutaneous pseudolymphoma. *Indian J Dermatol* 2014;59(4):424.

4. Pasche-Koo F, French L, Piletta-Zanin PA, Hauser C. Contact urticaria and shock to hair dye. *Allergy* 1998;53(9):904-5.
5. Lönngren V, Young E, Simanaitis M, Svedman C. Neutrophilic and Eosinophilic Dermatitis Caused by Contact Allergic Reaction to Paraphenylenediamine in Hair Dye. *Arch Dermatol* 2012;148(11):1299–1301.
6. Ishida W, Makino T, Shimizu T. Severe Hair Loss of the Scalp due to a Hair Dye Containing Para phenylenediamine. *ISRN Dermatol* 2011 ;2011:1-2.
7. Asadi LK, Goldberg LH. A case report of alopecia totalis associated with permanent hair dye use. *J Am Acad Dermatol* 2020;6(9):801-3.
8. Sharma VK, Mandal SK, Sethuraman G, Bakshi NA. Para-phenylenediamine-induced lichenoid eruptions. *Contact Dermatitis* 1999;41(1):40-1.
9. Bishnoi A, Vinay K, Arshdeep, et al. Contact sensitization to hair colours in acquired dermal macular hyperpigmentation: results from a patch and photo-patch test study of 108 patients. *J Eur Acad Dermatol Venereol* 2019;33(7):1349-57.
10. Sørensen, H., Agner, T., Andersen, K.E. and Menné, T. 55 cases of allergic reactions to hair dye: a descriptive, consumer complaint-based study. *Contact Dermatitis* 2002;47(5): 299-303.
11. Gupta M, Mahajan VK, Mehta KS, Chauhan PS. Hair dye dermatitis and p-phenylenediamine contact sensitivity: A preliminary report. *Indian Dermatol Online J* 2015;6(4):241-5.
12. Sørensen H, Johansen JD, Andersen KE, Menné T. Severe allergic hair dye reactions in 8 children. *Contact Dermatitis* 2006; 54(2):87-91.

13. Woo YR, Kim JS, Lim JH, et al. Acquired diffuse slate-grey facial dyspigmentation due to henna: an unrecognized cause of pigment contact dermatitis in Korean patients. *Eur J Dermatol* 2018;28(5):644-8.

Legends to figures:

Figure 1 A-D: Lichenoid pigmentation involving the scalp, hairline and ears , along with scarring and patchy hair loss (cicatricial alopecia) of the scalp and forehead.

Figure 2A: Positive (+++) patch test reactions to paraphenylenediamine (1% pet.), to 4 commercially available brands of hair dye , and to 3 mixtures (1:1) of hair dyes and color developers. 2B: Focal basal cell damage (solid arrow) with moderate pigment incontinence (dotted arrow), loss of sebaceous glands and hair follicles, and vertically oriented bands of scars, suggestive of follicular scarring. (Hematoxylin and eosin, 40x)



