

An uncommon case of systematized bullous contact dermatitis due to *p*-phenylenediamine healing with a “livedoid” pattern

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p-Phenylenediamine (PPD) is a strong sensitizer and present in hair dyes and black henna, black clothing, and undergarments. It is known to cross-react with textile dyes and may sensitize an individual to them. Increased frequency and longer duration of application of hair dye may increase the chance of a more severe, sometimes bullous, possibly systemic allergic reaction to PPD. In PPD-sensitized individuals, wearing black or blue synthetic fibers may precipitate a widespread and patterned allergic dermatitis to the textile dyes. Hence, clinicians should have a high index of suspicion when treating PPD allergic patients with new-onset or recalcitrant truncal or limb dermatitis.

CASE REPORT

A 49-year-old female patient presented with crusted erythematous plaques and bullae over face, hairline, neck, chest, and limbs, and swelling of the eyelids and pinnae for 3 days (Figure 1A–C). She was a regular user of black henna at monthly intervals and experienced some scalp itching after every application. She had recently applied black henna two times in quick succession within 4 days. Skin biopsy was performed with the clinical diagnosis of allergic contact dermatitis (ACD) to PPD in the black henna with possible spreading bullous contact dermatitis. The biopsy showed subepidermal hemorrhagic bullae with overlying thinned out spongiotic epidermis and neutrophils in the dermis. She was given 40 mg oral methylprednisolone and antihistamines, and the lesions on the face, chest, and upper limbs resolved within a week, but the thighs and legs showed persistent erythema and bullae. We noted that she often wore black nylon lowers, and considering the possibility of black textiles containing PPD or textile dyes cross-reacting with PPD, she was advised to wear only light-colored cotton clothes. Interestingly, the lesions

started to heal the next day, leaving a peculiar “livedoid” pattern (Figure 1D).

An extensive search was made for a possible cause of the pattern but her hemogram, metabolic panel, antinuclear antibodies, extractable nuclear antigen antibodies, prothrombin time, activated partial thromboplastin time, and international normalized ratio were normal. Cryoglobulins, tuberculin skin test, viral markers, and venereal disease research laboratory tests were negative. We attributed the “livedoid” pattern to the black cloth being in differential contact with the skin leading to variegated bullae healing with this pattern.

Methylprednisolone was tapered within 3 weeks and she was patch tested 6 weeks after subsidence of the reaction with the Indian baseline series, a cosmetic and a fragrance series, her black henna, and a 2 × 2 cm piece of the black cloth (soaked in warm ethanol for 60 minutes).¹ The test was read on day 2 (D2) and D4 and was ++ each for PPD, her black henna, and the black cloth (Figure S1).

DISCUSSION

Our case elucidates exposure to black lowers as cause of severe bullous ACD, following prior sensitization to PPD in her black henna. PPD is found in nearly 75% of permanent hair dyes worldwide and may be the primary sensitizer for textile dye allergy too.² Black henna is a combination of natural henna and PPD (in unregulated, higher concentrations of 15% to >30%).³ Cross-reactivity between PPD and several textile dyes may occur if these share a similar basic molecular structure.

ACD to hair dye involves the scalp, hair line, and face, varying from mild pruritus to facial and eyelid edema or even bullous dermatitis in severe cases.⁴ Systematization may rarely occur but a bullous reaction at anatomical sites other than the head is a decidedly uncommon

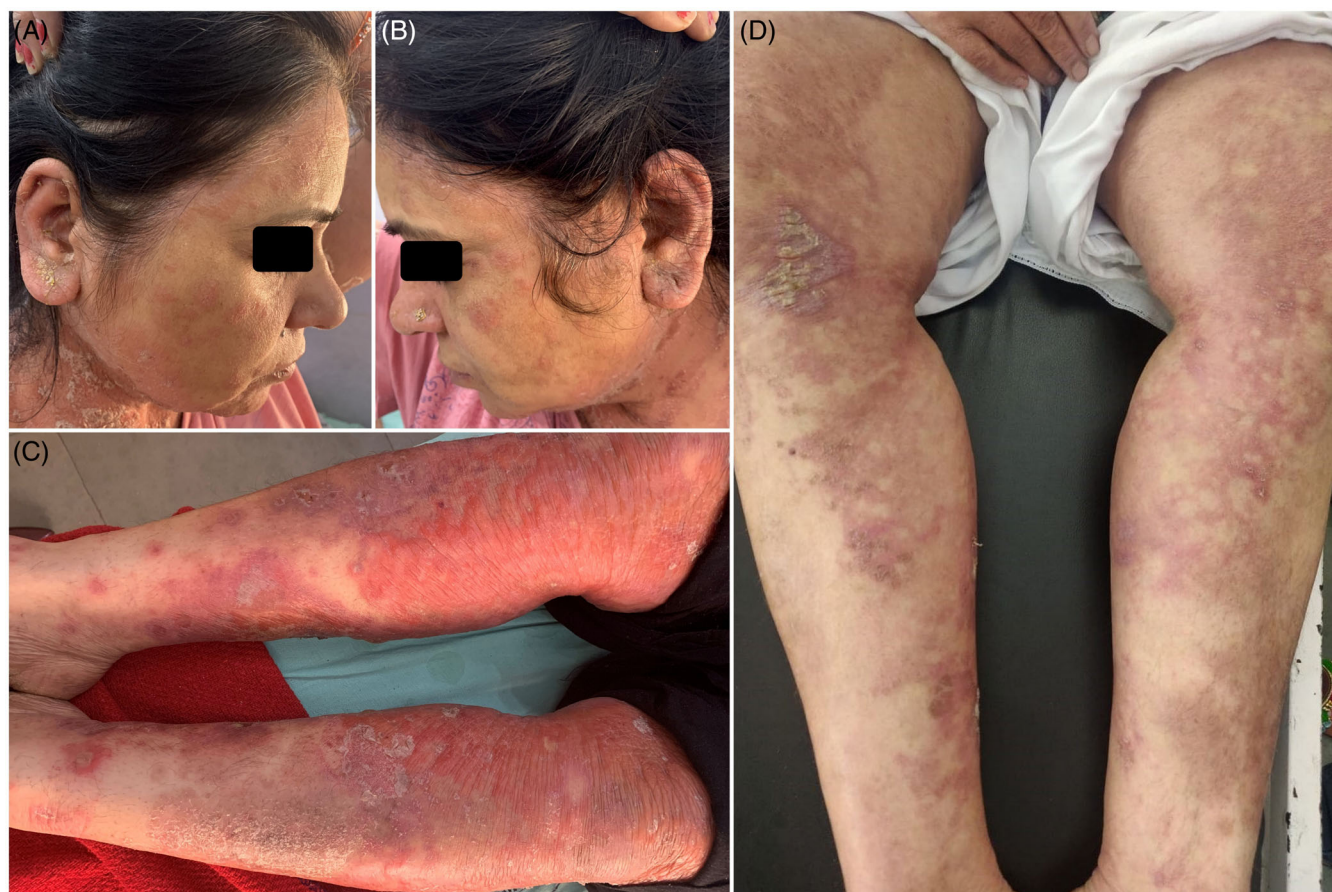


FIGURE 1 Clinical images showing (A, B) crusted erythematous plaques and bullae over the hair line, face, ears, and chest with swelling of the pinnae, (C) persistent intensely erythematous bullae with few pustules studded at the margins over the lower thighs and legs; the black lowers can be seen in the photograph; and (D) the “livedoid” pattern seen once resolution of the bullae and erythema occurred. The right knee shows a healing erythematous bulla with crusting

manifestation.^{5,6} High concentrations of PPD, frequent application of PPD-containing hair dyes or black henna, and longer skin contact probably increase the risk of sensitization.⁷

Resolution relies not only on avoidance of the allergen but also of possible cross-reactors, most importantly textile dyes. PPD cross-reacts with some “disperse” dyes, used on synthetic fabrics such as nylon and polyester.⁸ Disperse dyes only partially bind to textile fibers and can easily migrate onto the skin, especially in poor quality non-color-fast textiles. Moisture and friction can facilitate their release and, in our country, the climatic conditions favor such an occurrence.⁹

Textile dye ACD may manifest with varied patterned forms and widespread autoeczematization reactions have also been reported.¹⁰⁻¹² Heratizadeh et al in their work had concluded that black or blue textiles were involved in 60% patients with positive patch tests to their clothing.² Ryberg et al showed that contact allergy to PPD, female sex, increasing age, and previous childhood eczema are important risk factors for textile dye allergy.¹³ Relevant to our case, textile dye allergy following sensitization by PPD in henna tattoos has been reported and cases with the reverse phenomenon have also been reported.¹⁴⁻¹⁶ However, a generalized bullous reaction pattern is uncommon and can prove to be a

diagnostic conundrum by mimicking other bullous disorders such as bullous pemphigoid.

We could not do a patch test with the textile dye series as this was not available for us, but in the absence of a universally accepted screening allergen for textile dye allergy and the ubiquitous presence of PPD in most baseline patch testing series, we propose that ACD to PPD is a plausible indicator of blue/black textile dye allergy and, being the great “mimicker,” it should be considered in individuals with PPD allergy with a new-onset or recalcitrant truncal or limb dermatitis.¹⁷

CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

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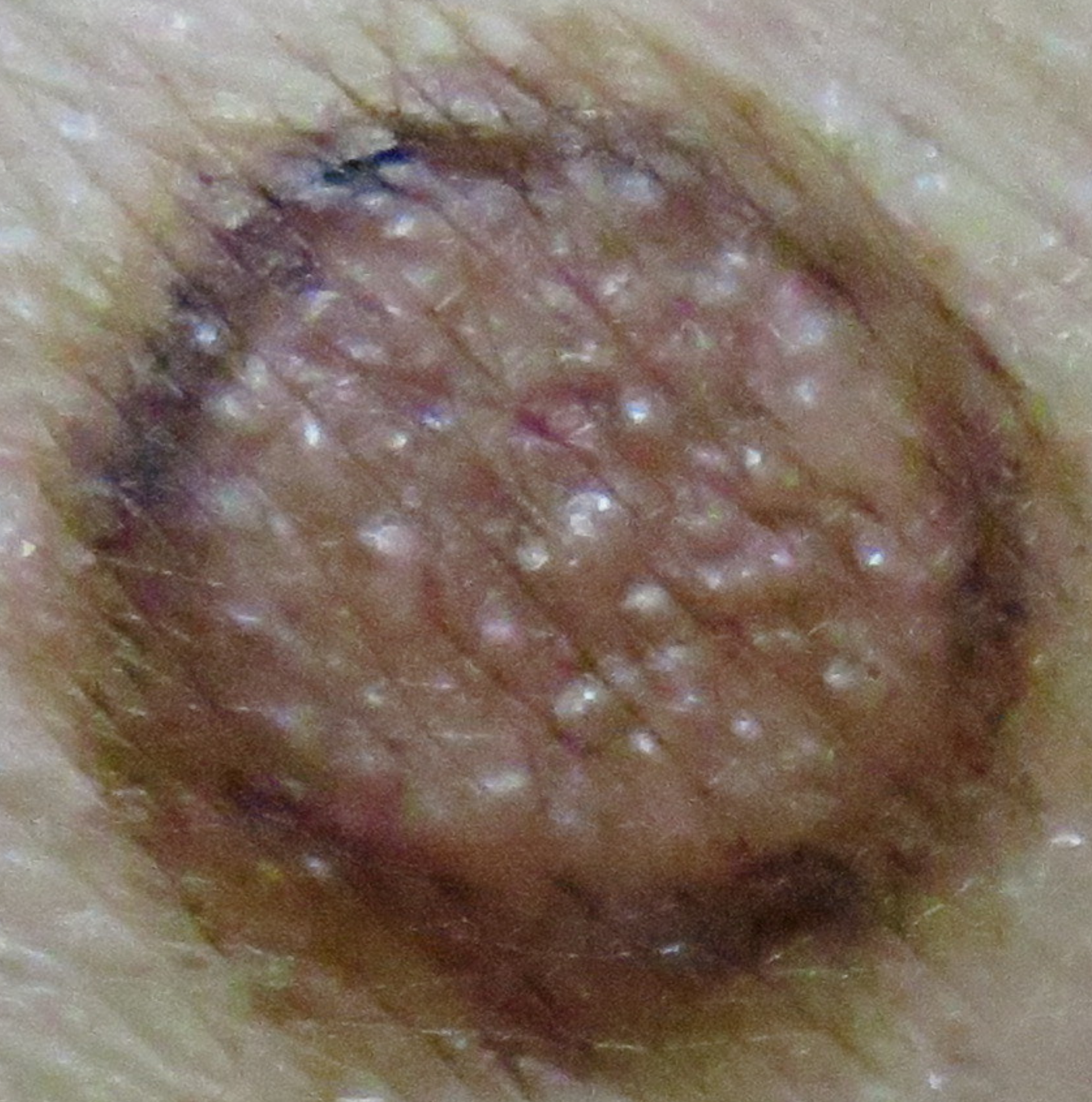
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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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Black henna



Black cloth

