CASE REPORT

Severe facial swelling in a pregnant woman after using hair dye

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SUMMARY

A 33-year-old Caucasian pregnant woman (26 weeks' gestation) presented to the emergency department. She had a 2-day history of severe itching of the scalp and steadily worsening swelling of the face over the previous 12 h, which had extended to the neck. She had no difficulty breathing. The itching and swelling had developed 3 days after she had used hair dye. The patient had no history of allergic responses to hair dye or black henna tattoos. A diagnosis of type IV delayed hypersensitivity reaction was made. Permanent hair dyes are the most frequently used professional hair dyes and are most commonly based on paraphenylenediamine (PPD) or related chemicals. PPD is known to be one of the most potent allergens which cause allergic contact dermatitis. After treatment with intravenous antihistamines and steroids, the facial swelling reduced and the patient had completely recovered by the following day.

BACKGROUND

This case highlights the potential dangers of using permanent hair dyes, manifesting as a severe delayed type IV hypersensitivity reaction. Hair care products are a major source of lifestyle-related chemical exposure in the general population in the 21st century. Hair dying is increasingly becoming part of youth culture, thereby putting an increasing number of people at risk, particularly as there are no satisfactory alternatives to the use of permanent hair dyes. Appropriate risk assessment has not been undertaken by this wealthy industry, and the chemicals used are not properly regulated. We therefore felt that the dangers associated with the use of permanent hair dyes should be highlighted in light of a potential increased burden on health services in young people and their children. This is the first report of a severe reaction in a pregnant woman after the use of hair dye.

CASE PRESENTATION

A 33-year-old Caucasian pregnant woman (G3P0, 26 weeks' gestation) presented herself to the emergency department with a 2-day history of severe itching of the scalp and a steadily worsening swelling of the face for the previous 12 h, which now extended to her neck. Due to severe swelling of the eye lids she was unable to open her eyes (figure 1). The itching and swelling had developed 3 days after she had used hair dye. Physical examination revealed no signs of respiratory distress or allergic contact dermatitis. The patient had normal vital signs. She had no history of allergic responses to

hair dye or black henna tattoos. A diagnosis of type IV delayed hypersensitivity reaction was made and immediate treatment with intravenous antihistamines and steroids was started in the emergency ward. As a precautionary measure, we admitted the patient to an inpatient ward to monitor her response to treatment. Monitoring of the fetus with cardiotocography (CTG) showed no irregularity. The following day, the facial swelling had reduced and the patient was discharged.

INVESTIGATIONS

Investigations included clinical examination, full blood count, inflammatory markers such C-reactive protein and erythrocyte sedimentation rate, and fetal monitoring in the ward using CTG.

TREATMENT

The patient was treated with intravenous antihistamines (clemastine 2 mg) and steroids (methylprednisolone 20 mg) and admission to the medical inpatient ward for 1 day.

OUTCOME AND FOLLOW-UP

The patient visited the outpatient clinic 1 week later. Blood tests showed no food-specific IgE antibodies. Epicutaneous patch tests revealed a strong

Figure 1 Patient with severe facial swelling.

CrossMark

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positive reaction to paraphenylenediamine (PPD) (+4), a common ingredient of hair dyes. Supplementary 'hairdresser series' tests (18 additional hairdressing chemicals) showed an allergy to 4-toluenediamine (4+), 4-aminophenol (3+) and 3-aminophenol (3+). The remaining course of her pregnancy and delivery was uneventful.

DISCUSSION

Permanent hair dyes represent 70–80% of the colouring products market in Europe. These commercial products are used by more than 60% of women and by 5–10% of men between 30 and 60 years of age, who colour their hair six to eight times per year.¹ The dyes are most commonly based on PPD or its related chemicals and are used in many home and salon permanent hair colouring products.

PPD is an oxidative chemical known as a potent contact allergen which causes immediate-type or delayed-type contact dermatitis.² The severity of the allergic response depends on the concentration and duration of exposure to PPD and varies from mild itching to anaphylactic shock.^{3–5} Furthermore, PPD is also used in so-called 'black henna tattoos' to speed up the staining process, intensify the pigment and make the 'tattoo' last longer. Although legislative action against the use of PPD in these tattoos has been undertaken in Europe and the USA, so far there has been no regulatory control of the use of PPD in hair dye products.⁶

As more and younger people dye their hair, subsequent allergic sequelae due to PPD sensitisation are frequently observed in this population.⁷ In addition, the number of pregnant women who dye their hair will also increase, with potential risks for the mother and child. Individuals with allergic contact dermatitis after exposure to PPD demonstrate increased activity of Th2 cytokines in CD4 and CD8 T cells.⁸ A maternal non-respiratory allergic response during pregnancy, especially where there is increased activity of Th2 cytokines such as occurs in PPD allergy, can mediate the maternal transfer of asthma risk to children.⁹ Although the pathogenesis of asthma is multifactorial and not yet entirely understood, allergic contact dermatitis is considered to be one of the mechanisms that may cause increased asthma risk in offspring.

Allergic contact dermatitis to hair dye is also relevant in occupational exposures. Workers in several occupations may be at higher risk of developing sensitisation to PPD and thus increased risk of an allergic response.¹⁰ For instance, skin lesions are frequently reported in professional hairdressers. PPD is used in hair dyes, but PPD and PPD-like chemicals may also be present in textile, leather and fur dyes, and in many other products used in daily life. Awareness of PPD sensitisation is therefore important.

Appropriate risk assessment has not been undertaken by this wealthy industry, the chemicals used are not properly regulated and there are no satisfactory alternatives to the use of permanent hair dyes.¹ Recently, dermatologists have reported a higher frequency of positive reactions to PPD on patch testing.⁷ However, patch testing itself may cause PPD sensitisation, leading to an increasing number of allergic responses to this

chemical. Although a hair dye self-test (PPD) application has become available for consumers, the test has not been properly validated.¹⁰

Based on the observations in the pregnant patient described here, we would like to encourage a wider debate on the safety and composition of hair dyes. It might be necessary to develop specific rules, even laws, regarding the use of hair dyes containing PPD in order to safeguard children and decrease the burden on health services.

Learning points

- ▶ Most hair dye products contain the highly potent contact allergen paraphenylenediamine (PPD) and are therefore associated with a high incidence of hypersensitivity reactions.
- ▶ The public should be made aware of the potential allergic response after hair dyeing, which may result in severe acute allergic contact dermatitis.
- ▶ The manufacturers of hair care products should increase their search for less allergenic chemicals and advise consultation with a physician in individuals with increased risk of a hypersensitive response.

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Competing interests None.

Patient consent Obtained.

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