HAIR BLEACHING AND SKIN BURNING

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SUMMARY. Hairdressing-related burns are preventable and therefore each case is one too many. We report a unique case of a 16-yr-old girl who suffered full-thickness chemical and thermal burns to the nape of her neck and superficial burns to the occiput after her hair had been dyed blond and placed under a dryer to accelerate the highlighting procedure. The wound on the nape of the neck required surgical debridement and skin grafting. The grafted area resulted in subsequent scar formation.

Keywords: deep dermal burns, hair bleaching

Introduction

Most celebrities nowadays have their hair dyed, highlighted, and very often bleached as well, with the result that the application of highlights is becoming increasingly popular amongst women and men worldwide. However, scalp burns secondary to hair styling procedures are rarely reported in medical literature.

Scalp burns are either thermal or chemical burns. Thermal burns are caused by direct heat application by hair straighteners, curling irons, hair dryers, and overheated aluminium foil. Chemical burns result from caustic chemicals, such as hydrogen peroxide and persulphates. A caustic reaction from the chemicals applied may result in irritant dermatitis, superficial chemical burns, and also deep burns. Deep burns usually require hospitalization, surgical excision and grafting and are likely to lead to scar revision and alopecia later on.

The patient reviewed here was admitted to our burns unit 12 days after the injury. Until then the girl had been treated conservatively by a dermatologist.

Case report

A healthy 16-yr-old girl underwent a hair bleaching procedure at a local hairdressing salon. It was not the first time, and the patient had no known allergies. To dye her hair blonde the professional hairdresser applied a creamy mixture of 9% hydrogen peroxide (H₂O₂) and “dust-free bleach for controlled lightening”, containing, among other ingredients, potassium and ammonium persulphate.

Subsequently the girl’s hair was covered with a plastic cap and her head placed under a hood dryer for about 30 min. During the whole procedure the girl did not feel any discomfort and kept herself occupied with her smartphone. During rinsing of the hair with lukewarm water, skin changes became visible in the occiput and nape of the neck. The whole posterior scalp was red and the skin in the nape of her neck showed nonblanchable erythema.

Fig. 1 - Wound excised on day 12, posterior scalp healing spontaneously after conservative treatment in the meantime.
At the same time the girl experienced burning pain and tightness in the affected area. She was seen first in a local hospital where conservative wound treatment with silver sulphadiazine cream was initiated and the follow-up check-ups were carried out by a dermatologist. Because of the non-healing wound in the nape the patient was referred to our burns unit ten days later, where a 1% full-thickness chemical burn wound was diagnosed. The posterior scalp had healed spontaneously in the meantime (Fig. 1).

The wound was excised on day 12 and a split-thickness graft applied. The first graft did not take and wound revision became necessary.

Before the second grafting a vacuum-assisted closure (VAC) system for wound conditioning was applied for five days. The second grafting was uneventful and the 1:1.5 meshed graft take was very satisfactory (Fig. 2). For graft protection VAC was installed. There were no further complications and the patient was discharged from hospital two days later. Check-ups at the out-patient clinic weeks later on showed a red, hypertrophic, itchy scar (Fig. 3).

**Discussion**

Hair highlighting is a kind of hair colouring that uses a highlighting mixture containing H$_2$O$_2$, persulphates, and alkalizers. The typical range of H$_2$O$_2$ concentration in hair colouring is 3% to 6%. In a concentration greater than 10%, H$_2$O$_2$ may induce blistering. Under alkaline conditions, the persulphates used in hair highlighting accelerate the bleaching process of peroxide hair treatment by making the hair "porous", thus facilitating hair dye absorption.

Alkalizers consist of colourless to white or greyish crystals and are highly water-soluble. Prolonged exposure to these oxidizing chemicals causes continued tissue necrosis. Clinical manifestation at the sites of maximal injury resembles a full-thickness burn. Peters reports that persulphates cause dermal, oral, and inhalation toxicity. Immediate skin reactions include contact dermatitis, allergic eczematous dermatitis, localized contact urticaria, as well as rhinitis and syncope. Delayed skin reactions may develop several days after exposure.

In the literature the cases reported of chemical burns secondary to the hair highlighting process usually refer to the scalp. Burn wounds located on the face, scalp, ear, back, neck and extremities are discussed as a coincidental occurrence due to hair care products and flame contact, and were reported by Boucher et al. The present occasion was the first time all of our patient’s hair had been bleached and dyed blond, and for the first time the occiput had been included. Previously, only the front part of her hair had been bleached, without any adverse reactions, in the same hairdressing salon and using the same technique. We surmise that the wound on the nape developed as a result of the highlighting mixture accumulating in the lowermost part of the plastic cap, as the girl was sitting upright, meaning that the amount of mixture - and therefore the concentration of ingredients (H$_2$O$_2$, persulphates, alkalizers) - was at its highest at that point. The local chemical reaction in the skin may have been intensified by the heat from the hood dryer, which was on for about 30 min. During the procedure the patient had been wearing a thin necklace containing nickel, but in our opinion this was irrele-

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**Fig. 2** - Second grafting uneventful with very satisfactory 1:1.5 mesh graft take.

**Fig. 3** - Out-patient clinic check-up showing red, hypertrophic, itchy scar after one year.
vant: the size of the wound on the nape of her neck and an additional, superficial wound on the occiput speak against it. The fact that the patient did not experience any discomfort earlier may be explained by the fact that she was completely distracted by being on her phone.

Talking privately to hairdressers, they admit they quite frequently see transient redness after the application of bleaching chemicals for hair dyeing. Usually the symptoms disappear spontaneously without leaving a mark within hours or, more rarely, within days. At one time or another, some hairdressers still use concentrations of $\text{H}_2\text{O}_2$ about 9% and higher because this speeds up the whole hair bleaching process. Deep dermal burns to the scalp are rarely reported; however, they present a significant type of injury with long-term sequelae. In our patient the chemical burn developed on the nape of the neck, an area not involved in the procedure of hair bleaching and dyeing. To our knowledge this location has not been previously reported in literature.

**Conclusion**

Although there is no proof of any kind of catalysing chemical reaction between nickel-containing necklaces and the chemical mixture, we strongly recommend the removal of any kind of fashion jewellery before commencement of hairdressing in view of the fact that we cannot totally exclude the possibility.

This case underlines the importance of the proper training of hairdressers and the use of standard guidelines, which need to be imposed and checked. There is still a lot that needs to be done.

**RÉSUMÉ.** Les brûlures causées par les coiffures sont évitables et donc chaque cas constitue un cas de trop. Nous présentons le cas unique d’une jeune fille de 16 ans atteinte de brûlures chimiques et thermiques à toute épaisseur à la nuque et de brûlures superficielles à l’occiput après un traitement pour rendre les cheveux blond patinés suivi par séchage sous un séchoir pour accélérer l’application des mèches. Pour les lésions à la nuque la patiente a eu besoin d’une opération de débridement chirurgical et d’une greffe cutanée. La greffe, avec le temps, a causé la formation de zones cicatricielles.

**Mots-clés:** brûlures dermiques profondes, décoloration des cheveux

**BIBLIOGRAPHY**


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