



H186 Fatal Angioedema Due to a Delayed Hypersensitivity Reaction Associated With Hair Dye and a Temporary Tattoo

Ami L. Jackson, DO*, Winston-Salem, NC 27104; Jerri McLemore, MD, Wake Forest School of Medicine, Winston-Salem, NC 27157

Learning Overview: The goal of this presentation is to increase awareness of a possible hypersensitivity reaction at autopsy.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by enforcing the need for thorough investigation of the circumstances surrounding death, including friend and family interviews.

A young woman was found dead on her bedroom floor after complaining of a sore throat the previous evening. Two days prior, the decedent sat through a five-hour hair salon appointment to dye her hair a darker color. The decedent had dyed/bleached her hair a lighter color in the past, but this most recent hair treatment consisted of a dark color that she had not used before. She had complained of the fumes being too strong while her hair was being treated. Discussion with family members revealed no other changes in her daily routine, no history of recent exposures to new foods or chemicals, and no history of recent insect or other animal bites or exposures. She had no known history of allergies or predisposition to allergic reactions. Further investigation revealed the decedent had purchased a temporary tattoo from a European website approximately ten months prior to death.

At autopsy, the decedent had swollen lips and marked edema of the soft tissues of the larynx, the epiglottis, and vocal folds, along with periorbital and conjunctival petechiae. Microscopic analysis of the edematous tissue revealed an exuberant band of lymphoplasmacytic inflammatory cells in the submucosa with less intense mononuclear inflammation within the deeper tissue. A stain for mast cell tryptase was positive for numerous mast cells throughout the tissue. No other anatomic cause of death was found.

Hypersensitivity reactions, mainly in the form of allergic contact dermatitis or erythema, have been linked to a number of cosmetic products, including hair dyes. A common ingredient of darker tints of hair dyes is Paraphenylenediamine (PPD), an ingredient that imparts a dark color and is present in dark dyes used for fabrics; hair coloring products; paints and lacquers; cosmetics, particularly eye shadow; and shoe polish to name only a few items. PPD is also commonly used as the dark pigment in temporary tattoos, especially henna tattoos, sold outside of the United States. PPD derivatives have been implicated in the development of cross reactions and the development of angioedema in susceptible persons.¹ Fatalities associated with PPD usually involve intentional ingestion of this product as a means of suicide, predominantly in India.² Review of the medical literature uncovered one case report similar to this case of a delayed hypersensitivity reaction with angioedema connected to the use of a temporary tattoo followed by use of hair dye containing PPD a year later; however, no death was associated with this prior reported case.³

This case demonstrates the need for recognition of a possible hypersensitivity reaction at autopsy and thorough investigation, including extensive interviews with friends and family by medical examiners/coroners and death investigators, to pinpoint possible immunologic triggers. Outside of the fields of dermatology and cosmetology, the potential for this type of hypersensitivity reaction is not well known.

Reference(s):

1. Tukenmez Demirci G., Kivanc Altunay I., Atis G., Kucukunal A., Allergic Contact Dermatitis Mimicking Angioedema Due to Paraphenylenediamine Hypersensitivity: A Case Report. *Cutaneous and Ocular Toxicology* 31, no. 3 (Sep 2012):250-2, <https://doi.org/10.3109/15569527.2011.641195>.
2. H. Haluk Akar, S. Adatepe, F. Tahan, I. Solmaz. Hair Dyes and Temporary Tattoos Are a Real Hazard for Adolescents?, *European Annals of Allergy and Clinical Immunology* 46, no. 1 (Jan 2014): 35-37, pmid: 24702872.
3. Dilip Gude, Dharam Pal Bansal, Rahul Ambegaonkar, and Jayaram Prajapati. Paraphenylenediamine: Blackening More Than Just Hair”, *Journal of Research in Medical Sciences* 17, no. 6 (Jun 2012):584-6, pmid: 23626641.

Paraphenylenediamine, Delayed Hypersensitivity Reaction, Death