Is There a Medical Explanation?

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A 13-year-old girl of African American descent is brought to the pediatrician’s office because of a lesion on her neck. The girl’s mother had telephoned the office before the visit, stating that the lesion resembled a blister at first, but now looked like a burn.

**Case 1: & Case 2: CASE 1:**
A 13-year-old girl of African American descent is brought to the pediatrician's office because of a lesion on her neck. The girl's mother had telephoned the office before the visit, stating that the lesion resembled a blister at first, but now looked like a burn. In the office, the girl is afebrile and not distressed. She explains that she awoke the morning prior to the visit with a blister on the right side of her neck. It gradually became bigger, and she used cold washcloths to wipe it. The central area became more painful and the skin layers peeled off, revealing a weepy, inflamed circular area (**Figure 1**). The burn is of second degree in the center and first degree in the surrounding tissue. There are no other skin findings, and the rest of the physical examination is normal. The mother is very upset by the finding but can offer no explanation. The girl repeatedly says she does not know how the lesion occurred. **Case 2:**

An 11-year-old boy is brought by his mother to the pediatrician's office with a 1-day history of a rash on his shoulders and arms. His mother relates that he woke up with the rash, and she was very concerned about how quickly it appeared. The patient is a healthy boy who denies any recent illness, associated pruritus, trauma to the skin, or use of any new products. Physical examination reveals macular, hyperpigmented lesions on the boy's shoulders and upper arms. They appear in a similar pattern on both shoulders without vesiculation, petechiae, or bruising. The rest of the physical examination is normal. Because child abuse is suspected, photographs are obtained (**Figures 2 and 3**). Note the linear hyperpigmented marks in **Figure 3. Have the children in these 2 cases been intentionally harmed—or is there a medical explanation in both cases for the lesions?**

**Case 1: and Case 2: DISCUSSION:** Any injury without adequate explanation should raise the suspicion of abuse. When a verbal child is unable to explain an injury that apparently occurred on a relatively protected area of the body, such as the neck, there is more reason to suspect abuse. In case 1, the lesion resembles a fresh burn, and no other medical explanation seems to fit the findings in the history or physical examination. The child and parent were asked open-ended questions about
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how this burn occurred, but neither could supply further information. In case 2, the hyperpigmented findings suggest a healed burn or unusual bruising pattern. The linear marks look like drip lines. In general, when an inflicted burn is suspected, a diagnosis depends on ascertainment of the following:

- Is there an adequate explanation?
- Is the child developmentally able to cause this injury?
- Does the lesion’s morphology form a recognizable pattern?
- What are the dimensions and pattern of the lesion(s), and do these match the dimensions of a known object, such as a cigarette?
- Are there other signs of abuse?
- Are there other risk factors for abuse?
- What is the child’s history? Is there a history of repeated injuries or burns? Is there a history of fire setting?
- What is the degree of the burn?
- If you suspect a scald burn, what temperature was the water?
- How long ago do you suspect the lesion was inflicted (what is the stage of healing) and where were the caregivers at that time?

Possible causes of burns include flames, electrical current, steam, hot substances, or chemicals. These can be classified as thermal, electrical, chemical, or scald burns. Burns can be further classified by depth of injury. First-degree burns are confined to the epidermis and involve minimal tissue damage. Most sunburns are first-degree burns. Second-degree burns or partial-thickness burns destroy the epidermis and part of the dermis and typically are painful. The possibility of a burn from a particular cause should be ascertained before concluding that child abuse occurred.

**CAUSE OF THESE “BURNS”: PHYTOPHOTODERMATITIS**

**Case 1:** Here, the mother was thought to be deceptive because she did not seem to offer any explanation for the lesion. However, further specific questioning regarding some possible causes of burn revealed the diagnosis. Although the possibility of sunburn in this case was unlikely (the girl has deeply pigmented skin and lives in an area of the Northeast with little strong sunlight), we asked if she had been out in the sun. She reported that she had been sitting on her porch the day before the lesion erupted and specifically remembered feeling the heat of the sun on that side of her neck. Further questioning about use of any lotions, creams, sprays, or other cosmetics on her neck ultimately led to the diagnosis. The patient reluctantly reported that she had used her mother’s new perfume (without her mother’s knowledge) on the right side of her neck. The combination of the perfume and sunlight caused a phototoxic reaction: the result was phytophotodermatitis. **Case 2:** In case 2, the mother and patient were questioned in more detail once child abuse was added to the differential. The boy had been outdoors swimming the day before the rash appeared; his shirt was off all day. He was with friends who were drinking a citrus fruit punch. The key to the diagnosis was that one of his friends threw some of the drink on him as a prank and he tried to wipe it off with a towel. Some juice apparently remained on his skin and ran down his arm, creating a linear pattern. Because he kept his shirt off all day, the psoralens in the citrus punch reacted with the sunlight, creating a phytophotodermatitis.

**PHYTOPHOTODERMATITIS: A CHILD ABUSE MIMIC**

Phytophotodermatitis is an eruption on the skin that is the result of a phototoxic reaction that occurs with exposure to sunlight after contact with certain plants, fruits, or chemicals. The resulting dermatitis can mimic a variety of diseases, including child abuse. Phytophotodermatitis can also mimic contact dermatitis, infectious lymphangitis, atypical bruising, malignancy, erythema multiforme, and cellulitis. It is commonly mistaken for a type IV hypersensitivity reaction (poison ivy) or a chemical burn. Because the reaction occurs after contact with a photosensitizing agent on a sun-exposed area of the body, the resulting lesion may be linear, may resemble a hand or drip mark, or may suggest child abuse because of a bizarre shape. The dermatitis generally develops within 24 hours after exposure, but desquamation and denudation sometimes occur days after exposure, making it more difficult to ascertain a cause. The dermatitis generally has a benign character, but can present as a partial-thickness burn, as in case 1. Lime juice is a common cause of phytophotodermatitis; it contains furocoumarin (psoralen). Plants produce psoralens to protect themselves from predation or mechanical damage. The juice is often inadvertently dripped around the mouth, face, or hands—or purposely applied in a misguided attempt to prevent or treat bug bites, jellyfish stings, and other assorted ailments. The photobiological agent, psoralen, acts by inducing cross-linking of DNA strands on exposure to UV-A (320 to 400 nm) sunlight. Epidermal cells are damaged, and erythema, edema, and bullae form acutely. Hyperpigmentation from stimulation of melanin can occur with
chronic or acute exposure; it resolves slowly over several weeks to months. Humidity and moisture enhance the reaction by increasing the percutaneous absorption of the psoralens.\textsuperscript{1,4} The reaction is not an allergic process and therefore does not require prior sensitization; it causes direct damage to the skin. The diagnosis of phytophotodermatitis is frequently made in people who spend a lot of time outdoors (eg, florists, gardeners, and agricultural workers). Large amounts of furocoumarin ingestion may cause a severe generalized reaction. Psoralen has been used therapeutically to treat vitiligo and psoriasis (ie, PUVA therapy).\textsuperscript{4}

Other members of the Rutaceae family (oranges, grapefruits, and lemons), as well as other plants (celery, parsley, parsnip) that contain furocoumarins, may cause phytophotodermatitis (Table).\textsuperscript{1,2,5,8,9} Plants and essential oils that contain furocoumarin derivatives (psoralen, 8-methoxypsoralen, 5-methoxypsoralen, and 4,5,8-trimethoxypsoralen) are implicated in phytophotodermatitis.\textsuperscript{4,8} Case 2 demonstrates the effects of a citrus juice and sunlight, producing hyperpigmentation in an unusual pattern. In case 1, the fragrance most likely contained oil of bergamot, a psoralen-rich fragrance.\textsuperscript{8,10} The oil is obtained from the rind of \textit{Citrus bergamia}, a bergamot lime. The phototoxic agent is bergapten (5-methoxypsoralen). A phototoxic reaction from fragrances is called berloque dermatitis and is the most likely diagnosis in this child's case. Berloque (derived from the French for trinket or charm) is used to describe pendant streaks of pigmentation on the neck, face, arms, or trunk.\textsuperscript{10} Most psoralen-containing fragrances have been removed from cosmetics in the United States. However, colognes such as "Florida Water" and "Kananga Water" may still be used for spiritual blessing, treating headaches, and personal hygiene.\textsuperscript{11} Exposure to psoralens does not cause a skin eruption in the absence of exposure to ultraviolet light. Exposure to ultraviolet radiation in wavelengths greater than 320 nm (UV-A) is necessary to cause the phototoxic reaction.\textsuperscript{12} The intensity and duration of the light exposure increase the intensity of response to the agent. The child in case 1 was exposed to sunlight in the spring in the Northeast, which provided a very weak dose of ultraviolet light. It is likely that the dose of psoralens in the inexpensive fragrance was very high to have caused a severe reaction with such low intensity sunlight. Plants contain differing concentrations of phototoxic agents, depending on the geographic area, season, and year of harvest.\textsuperscript{8,12} Patients present most often in the summer and in warmer climates because psoralen concentrations are highest and people are outside with less clothing. TREATMENT Treatment of phytophotodermatitis is primarily symptomatic, and further therapy is often unnecessary. Cool compresses, avoidance of the sun, and use of sunscreens and topical corticosteroids have been recommended. Topical corticosteroids early in the course of the clinical presentation may reduce the inflammation and therefore limit the hyperpigmentation.\textsuperscript{1,8} Silver sulphadiazine is effective for partial-thickness burns.\textsuperscript{4} Sunscreens should be applied to the area because the skin may remain sensitive for several months. Some dermatologists recommend depigmentation agents (ie, topical hydroquinone) for severe hyperpigmented conditions.\textsuperscript{10}

References: REFERENCES:

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