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Backyard Pool Party Not Your Typical Sunburn

Two sisters, ages 7 and 10 years, present to their local community emergency department in extreme pain with blistering lesions to their hands, arms, and legs. Earlier in the evening, they noticed some reddened areas to their hands and back of legs after spending the day with 3 other neighborhood friends swimming in a backyard pool and making cool drinks during a hot (103 F) summer day in Central California. After going to bed without distress, the sisters awakened screaming and complaining of burning sensation in all of the affected skin areas (Figs. 1–3). Vital signs, the remainder of the physical examination, and laboratory studies are otherwise unremarkable. Simultaneously, another of the neighborhood friends is at the local burn center. Two additional girls present later the same night for evaluation with similar skin lesions.

Can you pick your poison?

CASE CONCLUSION AND DISCUSSION

Discrete blistering lesions raise concerns about a wide variety of chemical exposures as well as nonaccidental trauma. The parents were asked extensively about intentionally inflicted injury, especially as 1 of the girls had a lesion on her back that had the appearance of a handprint and was thought to have been a bruise. None of the involved families had previous reports of physical abuse. A detailed exposure history for chemicals, medications, and medical comorbidities was negative in all of the involved girls. Because it became apparent that there were multiple victims, questions quickly shifted to assess common activities including potential shared exposures. The girls reported that they had been

making limeade and lemonade drinks and that they had been squeezing and throwing limes and lemons at one another during the afternoon pool party. After transfer of all of the girls to the local burn center, and consultation with the toxicology and dermatology specialists, it was determined that the blistering was consistent with phytophotodermatitis resulting from lime-juice exposure.

All 5 children were evaluated in a healthcare setting and 3 were hospitalized for several days for pain management, topical, and oral steroids (Table 1). Because of the severity of pain resulting from dressing changes, procedural sedation was used during dressing changes over several days of inpatient care. One month after discharge, all 5 girls had some degree



FIGURE 1. Partial thickness and superficial burns of the left thigh of the 10-year-old girl.



FIGURE 2. Partial thickness and superficial burns of the right hand of the 7-year-old girl.

Authors interested in submitting a case study in pediatric poisoning for the *Pediatric Emergency Care* feature *Pick Your Poison* are encouraged to contact the Section Editor, Kevin C. Osterhoudt, MD, via E-mail at OsterhoudtK@email.chop.edu. Disclosure: The authors declare no conflict of interest. Copyright © 2017 Wolters Kluwer Health, Inc. All rights reserved. ISSN: 0749-5161 DOI: 10.1097/PEC.0000000000001204



FIGURE 3. Partial thickness and superficial burns of the left hand of the 10-year-old girl.

of hyperpigmentation but noted that significant fading had already occurred. All girls had returned to regular activity.

Phytophotodermatitis may result after dermal exposure to a photosensitizing agent and subsequent prolonged sun exposure. Furocoumarins (psoralens), thought to be involved in a plant's ability to fight fungal infections and regulate plant growth, are commonly implicated photosensitizers. Limes and other citrus contain the psoralens 5-methoxypsoralen, xanthotoxin, and limettin that are thought to be the cause of this phototoxic eruption after dermal exposure.¹ Beach vacations, swimming pools, homemade lime-juice beverages, and drinking beer with lime are commonly described scenarios for this phenomenon.²⁻⁶

Psoralens are found in many types of wild and cultivated plants with a wide geographic distribution. The Umbelliferae (celery, carrot, or parsley), Rutaceae (citrus, bergamot), Leguminosae (legumes, peas, or beans), and Moraceae (mulberry or fig) families of plants all contain psoralens and are commonly cited causes of phytophotodermatitis.¹⁻¹⁶ Although most cases result from topical exposures, phototoxic burns have been reported after ingestion of celery with subsequent UV exposure from a tanning booth.¹⁶

Photodermatitis may result after phototoxic and photoallergic reactions. Psoralens contribute to a phototoxic reaction when UVA light and phototoxic compounds combine and cause reactive oxygen species generation, DNA cross-linking, and prevention of cell growth and division.^{2,8} These lesions have an appearance similar to sunburn and do not require previous exposure and sensitization. This may result minutes to hours after sunlight exposure. Bullae and vesicles may also subsequently develop. Phototoxic agents including certain antibiotics, diuretics, and nonsteroidal anti-inflammatory drugs may induce phototoxicity.⁸ Photoallergic reactions are rare, immunologic type-IV hypersensitivity reactions that are cell mediated, require previous sensitization, take more than 25 hours after exposure to develop, and have an appearance similar to allergic contact eczema.⁸

There is considerable overlap in the appearance of photodermatitis lesions and other more commonly encountered rashes and skin changes. The rash resulting from phytophotodermatitis can be easily misdiagnosed, both because it may be relatively unknown to the emergency providers who initially see these cases and because of its relative rarity. The blistering and

vesicular lesions may be mistaken for a chemical burn, and hyperpigmentation may be mistaken for bruises. Cases that have prompted suspicions of child abuse have been described.²⁻⁵ Rashes in the shape of fingerprints and handprints may be present on areas where a child is likely to be held or touched. Alternatively, if the rash presents with a linear- or loop-shaped streaking from drips of juice or plant, or patterns of wiping away the juice, it may look similar to abuse patterns that result from flagellation or traumatic use of cords or ropes. On the other hand, this linear pattern may also be mistaken for areas of poison oak exposure, or even jellyfish envenomation, depending on a patient's history and potential recent environmental exposures.⁶

Various infectious processes may mimic phytophotodermatitis as well. Cellulitis, fungal infections, herpes simplex or zoster, superficial lymphangitis, and impetigo have been described.^{2,17} To differentiate between these conditions, careful examination of skin folds and potential for dermatome distribution must be considered. Phytophotodermatitis will tend to spare skin folds, presenting in only sun-exposed areas, and will not follow a dermatome distribution. Furthermore, the rash will not generally be pruritic, but rather burning in quality. Fever and malaise suggest an infectious cause or perhaps superinfection of an initial phytophotodermatitis.

Time, supportive care, and prevention of further exposure to sunlight have been suggested as the most important components of care. Some photosensitizing drugs have metabolites that remain in the skin for weeks making avoidance of further UVA exposure paramount; some fluorescent lamps transmit UVA⁶ and it is also important to know that UVA light may also travel through window glass. Cold compresses and antihistamines may help to relieve discomfort; however, topical and oral steroids have also been recommended.^{7,11,13} Use of silver sulfadiazine and silver impregnated nonadherent dressings has also been described in the treatment of partial-thickness blisters.^{5,7,13}

TABLE 1. Detailed Description of Patient Presentations and Clinical Care

Patient Identification	Age (y)	Total Body Surface Area Involved (%)	Distribution of Skin Findings	Clinical Setting	Hospital Length of Stay (d)
1	7	10	Face and bilateral upper extremities	Burn unit	4
2	8	18	Face and bilateral upper and lower extremities	Burn unit	3
3	9	8	Face, hands, and bilateral lower extremities	Pediatric ward	3
4	9	5	Lips and left thigh	Emergency department	<1
5	10	10	Bilateral anterior thighs, bilateral anterior forearms, and lower abdomen	Emergency department	<1

Postinflammatory hyperpigmentation may develop after psoralen phototoxicity. Although the exact mechanism remains unclear, melanocyte proliferation and migration and synthesis and thickening of the stratum corneum have been proposed. Persistent hyperpigmentation has been treated with bleaching agents such as hydroquinone.¹¹

Final Diagnosis: *Phytophotodermatitis*.

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