CASE REPORT

Solar urticaria in a 1-year-old infant: diagnosis and management

Elana Fay Hochstadter,¹ Moshe Ben-Shoshan²

¹Department of Pediatrics, Western University, London, Ontario, Canada
²Division of Paediatric Allergy and Clinical Immunology, Department of Paediatrics, Montreal Children's Hospital, McGill University Health Center, Montreal, Canada

Correspondence to
 Dr Moshe Ben-Shoshan,
 moshebenshoshan@gmail.com

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SUMMARY

Solar urticaria is a type of inducible urticaria triggered by sun exposure resulting in hives on exposed skin as well as risk of developing systemic symptoms. Most cases are reported in the adult population. However, cases do occur in children. We present a case of visible light induced urticaria in a 12-month-old girl that demonstrates the need for accurate diagnosis and appropriate management.

BACKGROUND

Inducible chronic urticaria (CU) is defined when a trigger for CU can be identified. Inducible urticarias include physical urticarias that are classified according to the physical trigger. Solar urticaria is one of the rare forms of physical urticaria, which may be under-reported. It was first documented in 1904 by Merkin¹ and subsequently the term 'solar urticaria' was coined by Duke in 1923.² Solar urticaria accounts for 0.4% of all cases of CU and is characterised by the development of wheals and pruritus within a few minutes after exposure to visible (400–600 nm), ultraviolet (UV) light (UV-A (320–400 nm), UV-B (280–320 nm) and/or occasionally infrared light (>600 nm).³ The hives usually resolve within 24 h. This photodermatosis is especially interesting because each person has his own footprint based on the wavelength of light that triggers hives.⁴

Solar urticaria is thought to occur more commonly in young adults. However, case reports have been documented in children^{5–10} and there is one case report of solar urticaria in infancy.⁵ Early identification of solar urticaria in children is important to control symptoms and allow activities despite sun exposure.

CASE PRESENTATION

A 12-month-old girl presented to the allergy clinic. At the age of 8 months, she developed diffuse hives on her arms, legs and face after she ate a snack containing peanuts and pistachio. The reaction occurred within 30 min after sun exposure. She had no sunscreen and the hives appeared only on solar exposed areas. The hives lasted a few hours and resolved without treatment. Apart from hives there were no other symptoms. Parents reported no known history of similar symptoms, allergic, inflammatory or autoimmune conditions in first-degree relatives.

At the time of her visit her physical examination was normal. Her skin prick tests were negative for peanut and pistachio. An oral challenge for peanut was negative. However, light provocation test

Figure 1 (A) Twelve-month-old girl's provocation test using projector lamp in attempt to reproduce symptoms of solar urticaria; (B) induction of erythema and wheals after being exposed to visible light using a projector for 10 min.

(projector with visible (400–600 nm) light) was positive after 10 min, reproducing hives and erythema on the area of exposure (figure 1A, B).

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Given history and provocation test results, she was diagnosed with solar urticaria. Treatment involved antihistamines prior to intense sun exposure, wearing sunscreen and protective clothing. The parents were instructed to keep an urticaria activity score diary and follow-up every 3–6 months in the allergy clinic.

INVESTIGATIONS

Skin prick testing was performed to rule out peanut and pistachio allergy, however, both were found to be negative. A negative oral challenge to peanut confirmed that the reaction was not triggered by peanut ingestion. Complete blood count (CBC) limits (total leucocytes $9.7 \times 10^9/L$, neutrophils $1.2 \times 10^9/L$, lymphocytes $7.5 \times 10^9/L$, monocytes $0.7 \times 10^9/L$, eosinophils $0.03\text{--}0.4 \times 10^9/L$, basophils $0.0 \times 10^9/L$, platelet $444 \times 10^9/L$ and haemoglobin 131 g/L) and C reactive protein (CRP) level were within normal. As the patient was otherwise healthy and had a clear history that was suggestive of idiopathic solar-induced urticaria no further investigations were needed to exclude other photodermatoses. Peanut and pistachio were reintroduced to her diet with no adverse reaction.

DIFFERENTIAL DIAGNOSIS

Urticaria commonly occurs in children without a known cause. The most common conditions associated with the development of hives on initial presentation include viral-induced urticaria, food allergy, inducible (mainly physical urticaria and urticaria related to drug hypersensitivity) and idiopathic causes. In addition, in cases associated with sunlight exposure it is important to rule out other photodermatoses and systemic diseases.

Photodermatoses that resemble solar urticaria include actinic prurigo (pruritic plaques that occur mainly on the face, lesions appear after hours to days), erythropoietic protoporphyria (metabolic disorder due to ferrochelatase deficiency shown by elevated erythrocyte protoporphyrin level) and systemic lupus erythematosus (SLE) (with characteristic sun hypersensitivity lesions that are non-pruritic and persist for weeks. Presence of antinuclear antibodies (ANA) as well as autoimmune cytopenia can help establish the diagnosis of SLE). Additionally, polymorphous light eruption (PMLE) may present very similarly to solar urticaria. PMLE is characterised by more delayed onset of urticaria with papular, plaque lesions.¹¹ Chronic diseases that have been linked with solar urticaria include cystic fibrosis, Churg-Strauss and hypereosinophilic syndrome. Certain medications have also been shown to cause solar urticaria including chlorpromazine and oral contraceptive pills.^{4 12}

Given the absence of clinical features suggestive of underlying systemic disease and given the presence of history, physical examination and provocative test consistent with idiopathic solar urticaria, no further investigations are required. However, if the diagnosis is not clearly established additional tests may be required. These include CBC, inflammatory markers (including CRP), autoantibodies (including ANA, anti-Rho and anti-La antibodies) and plasma porphyrin (to exclude porphyria).⁷

TREATMENT

The parents were advised to give the child antihistamines (Benadryl) the day prior and during intense sun exposure, to apply sunscreen and also give the child protective clothing. First-line treatment for patients diagnosed with idiopathic solar urticaria involves using antihistamines around the time of sun exposure. Second generation, non-sedating antihistamines should be preferred.^{4 5} Patients can adjust this regimen based on their triggers and duration of sun exposure.

Severity of symptoms and provocation can vary based on season, latitude, altitude and reflection. Severity of reaction can increase with intensity of sun exposure, however, if a specific area is more frequently exposed to sun, it can become less sensitive with time, this is known as hardening.⁷ Phototherapy (hardening) is alternative to treatment in patients who do not respond to antihistamines.⁴ While rare, if the patient had anaphylaxis in a previous reaction, the patient should be given an epinephrine autoinjector.

OUTCOME AND FOLLOW-UP

While solar urticaria cases can be difficult to treat, the prognosis is usually good as the reactions are not severe and in most cases can be controlled with antihistamines. Follow-up is dependent on the patient's presentation and physician preference.^{7 10} The parents were asked to keep an urticaria activity score diary to assess the pattern of reactions.

Over a 6-month follow-up period, the parents reported that use of protective clothing and avoidance of direct sun exposure prevented the development of hives.

DISCUSSION

Solar urticaria in infancy has been rarely reported.⁵ The case presented depicts challenges related to the diagnosis of this condition and its management at a young age. We demonstrate the use of a simple provocation test for the diagnosis of this condition and avoidance of unnecessary blood tests and skin biopsy.

The pathogenesis of solar urticaria is unknown. It is suggested that light at a certain wavelength interacts with a chromophore in the skin and generates a photoallergen. This photoallergen is recognised by IgE located on mast cells, which causes degranulation and release of inflammatory mediators.¹³ This is known as the type I IgE-mediated reaction. In some cases it is suggested that abnormal IgEs produced bind to the normal chromophores and lead to a type II reaction.¹⁴ Passive tests to support these theories have been carried out in the past, however, they are difficult to perform due to ethical reasons.¹⁵

The largest cohort study carried out for solar urticaria followed 87 patients diagnosed with idiopathic solar urticaria between 1975 and 2000 in Dundee, Scotland. Among all patients, 70% were women with median age of onset of 35 years (range between 3 and 89 years). The probability of resolution was found to be 15%, 24%, 46% at 5, 10 and 15 years, respectively. In the study, 84% of the patients used sunscreen as control.⁷

In another cohort of 57 patients, the peak age was 20–30 years. In this cohort rates of resolution were higher with 70% of the patients reporting resolution of symptoms within 1 year.¹⁰

Treatment of solar urticaria consists of use of antihistamines and sun protection with appropriate clothing and sunscreen.⁴ A minority of patients would not respond to these measures and some are offered desensitisation by phototherapy also defined as hardening. The latter treatment strategy has been limited to adults with solar urticaria.¹⁶ Although the patient presented in the summer, it should be noted that she is at risk for reactions even during winter given that the family lives in Montreal, a city that receives more sunshine than northern and north-western Europe, especially during winter and throughout the year.

Finally, recent case reports suggest that anti-IgE, omalizumab, intravenous immunoglobulins and cyclosporine may have beneficial effects in refractory cases of solar urticaria.^{17–20}

In conclusion, solar urticaria may present at the first year of life. Accurate diagnosis is crucial to avoid unnecessary testing and to manage patients appropriately. If diagnosed properly such patients can be adequately treated and continue to enjoy activities outside.

Learning points

- ▶ A detailed history is essential when approaching all types of urticaria to rule out possible underlying causes and appropriately diagnosing inducible urticaria.
- ▶ Solar urticaria is an inducible urticaria associated with exposure to light sources.
- ▶ Each person with solar urticaria has a unique activation spectrum to visible light, ultraviolet (UV)-A and less commonly UV-B and infrared light.
- ▶ Once an appropriate diagnosis is made using a provocation test the patient can be managed efficiently with antihistamines and protective measures using clothing and sunscreen.

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