Identification and evaluation of the most common causes of contact dermatitis in the pediatric population

Appropriately counsel parents on avoidance of contact allergens in the pediatric population

DISCLOSURE OF RELEVANT RELATIONSHIPS WITH INDUSTRY

I do not have any relevant relationships with industry
Clinical Features

Acute → blistering and weeping

Chronic → lichenified or scaly plaques

PRURITIC!

Most Common Types of Contact Dermatitis

Irritant
- Most common
- Saliva, urine, feces, cleaning products, sanitizers
- Burning, stinging, some pruritis
- Direct cytotoxic effect
- Dependent on amount and duration of substance
- Occurs in everyone with correct amount of exposure
- Reaction remains localized to site of contact

Allergic
- Current prevalence in general pediatric population up to 24% (1)
- Poison ivy, nickel, lanolin
- Very pruritic
- Type IV Hypersensitivity
- Requires prior exposure and sensitization
- Small amount can cause reaction
- Reaction can spread beyond the borders of the contact

(1) Jacob et al, 2008

https://bio.libretexts.org/TextMaps/Map%3A_Microbiology_(OpenStax)/19%3A_Diseases_of_the_Immune_System/19.1%3A_Hypersensitivities
Toxicodendron Plants

- Family Anacardiaceae Genus Toxicodendron
- Poison ivy, oak, sumac
- Contains the allergen, urushiol
- Allergens can cross react with:
  - Japanese lacquer tree
  - Cashew nut tree
  - Gingko (seeds)
  - Indian marking nut tree
  - Mango (avoid contact with the rind)
  - Brazilian pepper tree – aka Florida holly

Toxicodendron Dermatitis

- Symptoms typically within 4-96 hours, last 2-3 weeks
- Erythema and pruritis—> papules, plaques, vesicles, bullae often linear
- Face or genital involvement can have significant edema
- Black spot dermatitis
  - Oxidized urushiol on the skin—> black dots
  - Dried black antigenic resin can remain on contaminated clothing, pet fur/claws, gardening tools, under fingernails, toys for days

Treatment of Toxicodendron Dermatitis

- Early: Entire body washed with copious amounts of water
- Early Treatment: Within 1-2 hours, forceful unidirectional washing with a damp washcloth and liquid dishwashing soap. Washcloth should be applied with repetitive, high-pressure, single-direction wipes under hot, running water for three rounds of about three minutes (1)
  - Wash fingernails
  - After 10 minutes, only 50% removed, after 60 minutes, none removed (2)
Treatment of Toxicodendron Dermatitis

- Weepy acute lesions best treated with wet to dry soaks such as Burow’s Solution (aluminum acetate) or calamine lotion
- High potency topical steroids if prior to vesicles/blisters
- Systemic steroids at 1-2 mg/kg/day gradually tapered over 3 weeks given high risk of rebound
- Zanfel® significantly relieves itch and erythema
- Several OTC pre-exposure preventative products

More on Toilet Seat Dermatitis

- Wooden toilet seat varnish (1), wood (2)
- Polyurethane toilet seats (3) or polypropylene toilet seats (4)
- Commonly irritant reactions from cleaning solutions (4, 5)
  - Irritant reactions healed with copious rinsing of seats with water, toilet seat covers, topical corticosteroids, petroleum jelly

References:
1. Raison-Peyron, 2013
2. Ezzedine, 2007
3. Turan, 2011
4. Heilig, 2011
5. Litvinov, 2010
In Order to Diagnose ACD...

1. First consider the possibility!
2. Ask the right questions
   • Exposures both at home and school; explore hobbies and activities
   • Effect of time away (vacations)
   • Ask about all personal care products
3. Perform a thorough exam paying attention to location
Nickel Dermatitis

- In the US, combined direct and indirect costs of nickel dermatitis - $5.7 billion/year (1)
- Sensitization through jewelry, clothing snaps, coins, toys, electronics, razors, belt buckles
- Nickel allergy and female sex (OR 5.19), past piercing (OR 3.86) and currently having ≥3 piercings (OR 5.58) (2)
- Can usually wear stainless steel, platinum, titanium, or gold (NOT white gold)
- Dimethylglyoxime test

(1) Jacob, 2014
(2) Schuttelaar, 2018

Consider Nickel:
- Clothing fasteners
- Ear piercings
- Nickel-containing dental work
- Laptop
- Razors
- Wind-up toys
- Video game controllers

(1) Jacob, 2014
(2) Johnson, 2013
(3) Hunt, 2014
(4) Berk, 2011

10 year old with history of Atopic Dermatitis

(5) Kaur 2017
Allergic Contact Dermatitis Provokes Atopic Dermatitis

- Important to consider a contact dermatitis, especially with a refractory dermatitis and those diagnosed with atopic dermatitis
- Atopic dermatitis predisposes patients via multiple mechanisms to developing allergic contact dermatitis
- 1142 children patch-tested found those with AD had statistically increased frequency of positive tests to cocamidopropyl betaine, wool alcohol, lanolin, tixocortol, and parthenolide (1)
  - Significant reactions to allergens in their skin care preparations

But...

- “I’ve been using the same product for years and I didn’t change anything before this rash started.”
  - Everyone’s immune system is unique and may require a certain number of exposures to become sensitized to a specific allergen.

But...

- “I’ve changed everything since the rash started.”
  - Most types of products are made using similar ingredients; so even if you’ve changed your moisturizer, you’re probably still being exposed to the same allergen.
Commonly Sensitized Allergens in Pediatrics

- Nickel
- Neomycin 10% of population
- Bacitracin sensitivity (1.5-9.1%)
- Tixocortol-21-pivalate - tested substance for hydrocortisone
- Budesonide - Corticosteroid in the triamcinolone group
  - Desoximethasone least allergenic
- Personal care products
  - Balsam of Peru (Myroxylon pereirae) - diaper balms, wound ointments, liquid adhesives, mouthwash, toothpaste
- Formaldehyde and formaldehyde-releasing preservatives - personal care and cleaning products
- Cocamidopropyl betaine - shampoos, bath products, cleansers
- Fragrances (Mix I and II)

Commonly Sensitized Allergens and Sources in the Pediatric Population

- Potassium dichromate - tanning agent in leather
- Cocamidopropyl betaine - shampoo, cleanser
- Lanolin alcohol - emollient
- Propylene glycol - preservative, solvent/moistening agent
- Compositae mix/dandelion extract - ragweed family plant
- Cobalt Chloride - metal
- Quaternium 15 - preservative, formaldehyde releaser
- Methylchloroisothiazolinone/methylisothiazolinone - preservative
- Carba mix - rubber accelerator
- Disperse dyes (blue 124/106, yellow 3/9)
- Colophony - adhesives, topical medications

Cornerstone of Prevention is to Avoid Potential Sensitizers

- Allergen sensitization identified in 24.5% of 6 month to 5 year olds (1)
- No government/industry standard for products that are “safe for babies”
- Hypoallergenic Baby Products
  - https://www.doctorkatta.com/handouts
  - Consider connubial dermatitis
  - “Unscented” products may contain a masking fragrance
  - “Fragrance-free” products may contain fragrance ingredients used for other purposes

(1) Bruckner, 2000
(2) Bonchak, 2018
Repeat Open Application Test (ROAT)

- Apply the product to non-diseased skin such as upper arm, antecubital fossa, or flexor forearm BID for 1-2 weeks
- Allergic response typically in 2-4 days
- Does not identify specific allergen
- Other products may contain the same allergen
- Regional skin reactivity, exposure dose, time of exposure, percutaneous penetration or involvement of diseased skin can affect the reactivity of the skin

Mowad, 2016
Bolognia, 2012
Image from Spiewak, 2008

Patch Testing Indications

- Worsening of a previously stable dermatitis*
- Dermatitis that is unresponsive to treatment*
- Distribution highly suggestive for ACD*
- Clinical history highly suggestive for ACD
- Dermatitis of unknown etiology
- Cutaneous eruption from systemic exposure to an allergen

Mowad, 2016

Patch Testing

- Gold standard for diagnosis
- Overall, sensitivity 70% and specificity 80%
- Over 4350 chemicals identified as contact allergens (1)
- TRUE Test safe and effective in 6-18 year olds (2)
  - Only FDA-approved diagnostic tool down to age 6 years for ACD
  - 35 allergens and 1 control
- Minimum basic 20-allergen patch test series specifically targeted for pediatrics (3)
  - Recommended but not in TRUE Test: Cocamidopropyl betaine, compositae mix/dandelion extract, Disperse Blue 124, Fragrance II, propylene glycol

(1) Mowad, 2016
(2) Jacob, 2011
(3) Jacob, 2014
But...

“I purchased an all natural organic moisturizer but still itch”

- Botanicals are particularly difficult to test because of the lack of adequate screening series and the number of allergens is extensive (1, 2).
- Increasingly common in organic all natural products, including baby products (3).
- Term does not correlate with truly hypoallergenic.

International Contact Dermatitis Research Group Scoring System

- (-) negative reaction
- (?) doubtful reaction with faint erythema only
- (1+) Weak positive reaction with nonvesicular erythema, infiltration, possibly papules
- (2+) Strong positive reaction with vesicular erythema, infiltration, and papules
- (3+) Extreme positive reaction with intense erythema and infiltration, coalescing vesicles, bullous reaction
- (IR) Irritant reaction
- (NT) Not tested

(1) Mowad, 2016
(2) Simpson, 2004
(3) Yu, 2016
Resources for Allergen Information

- www.mypatchlink.com - free videos describing certain allergens
- www.chemotechnique.se - patient handouts
- www.truetest.com - patient handouts
- www.allergediar.com - patient handouts
- www.allergyfreeeskin.com - patient handouts
- ASCD Contact Allergen Replacement Database (CARD) - patient handouts
- www.contactderm.org (American Contact Dermatitis Society)
  - Find a physician
- Allergen Handouts - Contact Allergen Management Program (CAMP)
  - https://www.doctorkatta.com/handouts - patient handouts

References


References

References

- Karc S, Vasan MR. Contact Allergy to the ingredients of moisturizers in a boy with atopic dermatitis. Contact Dermatitis. 2017;76(4):81.

Diaper creams and ointments

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<tr>
<th>Brand</th>
<th>Product Name</th>
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**Soap and Shampoo**

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**Sunscreen**

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*Bonchak, 2018*
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