Pediatric dermatology for the emergency physician

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Disclosure

- Will discuss off-label use of systemic medications
- Otherwise, no relevant financial relationships to disclose
Overview

DDx of: “Fever and a Red Rash”

- The Spectrum of Erythema Multiforme
  - EM/SJS/TEN
- Toxic Erythemas
- Kawasaki Disease
- Hypersensitivity Syndromes
- Serum Sickness-Like Reactions
- Acute Hemorrhagic Edema
- Atopic Dermatitis in the ER

What to do?
How To Describe What You Are Seeing ... Over the Phone

Is it really “Maculopapular”??

Most skin eruptions are NOT maculopapular – usually only exanthems and drug eruptions.

Web resources:

- [http://www.pediatrics.wisc.edu/derm/](http://www.pediatrics.wisc.edu/derm/) a tutorial/primer of nomenclature
- [http://dermatlas.med.jhmi.edu/derm/](http://dermatlas.med.jhmi.edu/derm/) a wonderful atlas of many skin diseases
Clues: WHEN TO WORRY

**Age**
- Newborns (less than 1 month)
- Young infants

**High fever**

**Toxicity**

**Morphology**
- Blistering
- Mucosal involvement
- Hemorrhage/purpura

**Specific medications**
- Anti-convulsants
- Cefaclor
- Sulfonamides
Erythema Multiforme
ERYTHEMA MULTIFORME: Different Types

The terms EM Minor and EM Major are now discouraged

HSV-related or “Classic” EM (EM Minor)

- Target lesions with 3 zones
  - Dusky center
  - Pale edematous ring
  - Peripheral erythematous margin

EM Major = Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis
Red papules evolve into targetoid lesions over several days
Mucous membranes not involved (except for HSV lesions)
Often affects palms and soles
Self-limited
Does NOT progress to SJS or TEN
Somewhat rare in children
Which of the following is not associated with Stephens-Johnson Syndrome?

- A: *Mycoplasma pneumonia* infection
- B: Sulfa medications
- C: NSAIDs
- D: Anticonvulsant medications
- E: Staphylococcal infection
Stevens-Johnson Syndrome

- Originally described by Stevens and Johnson in 1922 in 2 boys aged 7 and 8
- Acute illness characterized by prodrome
- Often fever, malaise
- Severe conjunctivitis, mucositis, skin lesions (macular, targetoid, or even bullae) involving <10% BSA—epidermal detachment
- 2 mucosal sites involved
- Triggered by infections (Mycoplasma pneumoniae) and medications
- Mortality 1-5%
Toxic Epidermal Necrolysis

- Acute onset of widespread skin necrosis >10% BSA—epidermal detachment
- The one true “dermatologic emergency”
- Often erythema with tenderness without EM-like eruption
- Fever universal
- Mucous membrane involvement is less prominent than in SJS but can be present
- Medications most common cause
- Mortality 10-35% (depending on BSA involved)
- Rare in children
Drugs likely to cause drug-induced SJS and TEN

- **Anticonvulsants**
  - Cabamazepine
    RR=90
  - Phenytoin
    RR=53
  - Phenobarbitol
    RR=45
  - Valproic Acid
    RR=25
  - Lamotrigine

- **Sulfonamides**
  RR=172

- **Oxicam NSAIDs**
  RR=72

- **Allopurinol**
  RR=52

- **Corticosteroids**
  RR=54

- **Penicillins**
  RR=6.7

- **Griseofulvin**

EM: Recommendations

- In patients with prominent mucositis—evaluate for *M. pneumoniae*
- Promptly stop any unnecessary medications
Supportive care
- IV Fluids
- Attention to nutrition, infection, and pain control
- Consider **Burn Unit** if >25% BSA

Steroids not recommended (data controversial)

Data on IVIG therapy is conflicting…
- Proposed mechanism: IVIG blocks CD95 (Fas) and blocks interaction with Fas-ligand, preventing Fas-mediated keratinocyte apoptosis
- No randomized controlled trials
- Meta-analyses do not show dramatic efficacy of IVIG*

Differential Diagnosis-TEN

TEN must be differentiated from Staph Scalded Skin Syndrome (SSSS)

- Desquamation is more superficial in SSSS
SSSSS versus EM
**Staphylococcal & Streptococcal Toxin-mediated Syndromes**

- **Staphylococcal Scalded Skin Syndrome (SSSS)**
- **Toxic Shock Syndrome (TSS)**
  - usually due to Staph Aureus but can be associated with Group A Strep
- **Streptococcal Scarlet Fever**
**Staph Scalded Skin Syndrome**

- Toxin-mediated cleavage of the epidermis
- Phage Group II strains of *Staph aureus* make exfoliative toxins (ET-A and ET-B)
- Toxins excreted by kidneys
- **At risk:**
  - Children < 6
  - Immunosuppressed adults
  - Pts with chronic renal insufficiency
- **Cultures of skin negative but cultures of pyogenic focus should be positive (NOT always skin!)**
Staph Scalded Skin Syndrome
Presentation

- Fever, malaise, irritability, skin tenderness +/- rhinorrhea/conjunctivitis
- Neonate: Widespread erythema, superficial erosions
- Toddlers/Older: Erythema, periorificial scale and erosions, less erosions elsewhere
Kawasaki Disease
## Diagnostic Guidelines for Kawasaki Disease

<table>
<thead>
<tr>
<th>Previous Criteria</th>
<th>Revised Criteria*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever ≥ 5 days</td>
<td>5/6 of items needed for Dx</td>
</tr>
<tr>
<td>+ 4 of the following</td>
<td>Fever may be &lt; 5 days if shortened by treatment</td>
</tr>
<tr>
<td>Exanthem</td>
<td>Conjunctival congestion</td>
</tr>
<tr>
<td>Conjunctival congestion</td>
<td>Mucous Membrane Changes</td>
</tr>
<tr>
<td>Mucous Membrane Changes</td>
<td>Exanthem</td>
</tr>
<tr>
<td>Cervical LAD</td>
<td>Extremity Changes</td>
</tr>
<tr>
<td>Extremity Changes</td>
<td>Cervical LAD</td>
</tr>
</tbody>
</table>

KAWASAKI DISEASE: 
Highlights

- Median age 2; 77% < than 5 yrs
- More common Asians, blacks
- Febrile, irritable, miserable
- Exanthem non-specific
- Acute perineal erythema VERY helpful

Perineal Desquamation in Kawasaki Disease

- Perineal involvement is seen in about 50% of cases of K.D.
- Often mistaken for severe diaper dermatitis
- Perineal desquamation is seen in the ACUTE phase of K.D.
Cutaneous Findings of K.D.

Polymorphous exanthem
Morphology can be targetoid...
Can even be micropustular

Almost diagnostic: ulceration at the site of BCG vaccination (*reported in Japan)*

Other Cutaneous Findings of K.D.

- Swollen and erythematous hands & feet
- Erythema of the urethral meatus associated with urethritis
Other Cutaneous Findings of K.D.

CONVALESCENT PHASE (10-14 d)
- Acral peeling and desquamation, starting at the fingertips and periungually
- Onset of psoriatic lesions* associated with increased frequency of coronary complications

Mucocutaneous Findings of K.D.

- Conjunctival injection with classic perilimbic sparing—NOT conjunctivitis!
- Slit lamp exam reveals anterior uveitis
Mucocutaneous Findings of K.D.

Red, cracked lips
Other Findings of K.D.

- “Strawberry” tongue
- Acute non-purulent cervical LAD (less specific)
Kawasaki Disease in General

- Multisystem vasculitis of unknown etiology
  - Most common systemic vasculitis in childhood after Henoch-Schönlein Purpura
- Complicated by the development of coronary artery aneurysms
  - Seen in up to 3-5% of treated patients and up to 25% of untreated patients
- Most common cause of pediatric acquired heart disease in developed countries
Kawasaki Disease: Pathogenesis

Infectious trigger in genetically susceptible host?

- Infectious trigger suspected based on...
  - Discrete seasonal peaks & geographic clustering
  - Clinical features (fever, rash, and adenitis) are suggestive of infection
  - Age group affected reflects that in which childhood infections typically occur (6 months to 4 years)

- Evidence pointing to a novel human coronavirus, the “New Haven coronavirus,” is controversial

- Family-based genotyping study of K.D. patients reports genetic variation the IL-4 gene and regions linked to IL-4

Kawasaki Disease: Treatment

CURRENT STANDARD OF CARE\(^1\):
- IVIG 2 g/kg: one infusion over 8-12 hours
  - If given within one week of onset of sx, more likely to prevent coronary disease
- Aspirin (ASA) 80-100 mg/kg/day divided QID
  - Continue through day 14 then reduce to 3-5 mg/kg until cardiac evaluation is complete, fever disappears, and platelets/ESR normalize

REFRACTORY DISEASE
- Addition of Steroids and/or Methotrexate?
- Infliximab\(^2\)

\(^1\)Cimaz R, Falcini F. Autoimmunity Rev. 2003;2:258-263.
<table>
<thead>
<tr>
<th>Nature of rash</th>
<th>Staph Scalded Skin</th>
<th>Scarlet Fever</th>
<th>Toxic Shock Syndrome</th>
<th>Kawasaki’s Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diffuse tender erythema with easy denudation</td>
<td>Diffuse punctuate erythema</td>
<td>Macular erythroderma “sunburn”</td>
<td>Morbilliform or urticarial rash</td>
<td></td>
</tr>
<tr>
<td>Conjunctival hyperemia</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Erythema of the oral mucosa</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Strawberry tongue</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hypotension or shock</td>
<td>No (but can have)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Desquamation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Etiology</td>
<td>Staph Aureus Epidermolytic Toxins A &amp; B</td>
<td>Group A Strep pyrogenic exotoxins A, B, &amp; C</td>
<td>Staph Aureus TSST-1 and Staph Enterotoxin-B (SE-B)</td>
<td>?? Superantigen mediated??</td>
</tr>
<tr>
<td>Age</td>
<td>Infancy/early childhood</td>
<td>&gt;3 years old</td>
<td>All ages</td>
<td>&lt;5 years old</td>
</tr>
<tr>
<td>Recurrence</td>
<td>Unlikely</td>
<td>Rare</td>
<td>30%</td>
<td>3-4%</td>
</tr>
</tbody>
</table>
Drug Hypersensitivity Syndrome

- Begins 1-8 weeks after exposure to drug (21 days most common)
- Also known as:
  - Anticonvulsant Hypersensitivity Syndrome
  - Drug reaction, eosinophilia, and systemic symptoms (DRESS)
- Triad:
  1. Cutaneous eruption
  2. Fever
  3. Internal organ involvement
- Commonly get facial edema
- Rash can be morbilliform, maculopapular or TEN-like
- Most often due to aromatic anticonvulsants or sulfones

The internal organ(s) most often affected in Drug Hypersensitivity Syndrome is:

- A: Pancreas
- B: Lungs
- C: Liver
- D: Kidneys
- E: Thyroid
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Drug Hypersensitivity Syndrome

Associated findings/complications:
- Lymphadenopathy
- Atypical lymphocytosis
- Eosinophilia
- Hepatitis
- Nephritis
- Pneumonitis
- Hypothyroidism reported as late complication of DHS—should check TFTs 2-3 months after recovery
Drugs Associated with DHS

Aromatic Anticonvulsants
- Cabamazepine
- Phenobarbital
- Phenytoin
- Primidone

Other Medications
- Lamotrigine
- Sulfonamides
- Allopurinol
- Dapsone
- Minocycline
- Nitrofurantoin
- Terbenafine
Therapy for DHS

- Stop offending medication: benzodiazepines, gabapentin, and topiramate appear to be safe\(^1\)
- Supportive care
- Controversy regarding use of IV steroids and IVIG\(^2\)
- Most advocate for use of systemic corticosteroids (1 mg/kg) in severe cases
- Mortality \(~10\%\)

How to Differentiate DHS from SJS/TEN?

Can be extremely difficult as DHS can present with SJS/TEN-like skin lesions as well as mucosal involvement

**DHS**
- More delayed in onset (weeks rather than days)
- Internal organ involvement more severe
- Presence of eosinophilia and atypical lymphocytosis can be helpful
- Prominent facial edema can be helpful
Serum Sickness-Like Reactions (SSLR)

- Dusky urticaria plus edema, malaise, arthralgias, lymphadenopathy, & fever
- Can leave bruising
- Lesions longer duration than true urticaria
- Most common causes in kids: certain drugs but also infections (& sometimes vaccines)
- Usually occurs 1-3 weeks after exposure
Serum Sickness-Like Reactions (SSLR)

Unlike true serum sickness, SSLR does NOT have:
- Circulating immune complexes
- Hypocomplementemia
- Vasculitis
- Proteinuria

Benign course once offending medication is discontinued.
Medications Associated with SSLR

- Amoxicillin
- Ampicillin
- Beta-blockers
- Bupropion
- CEFACLOR
- Ceftriaxone
- Cefprozil
- Cephalexin
- Doxycycline
- Minocycline
- Penicillin
- Sulfonamides
Uncommon vasculitis of childhood

Affects children aged 4-24 months

Males > females

Benign course with rare visceral involvement

Along spectrum of HSP

Acute Hemorrhagic Edema of Infancy (AHEI)
Acute Hemorrhagic Edema of Infancy (AHEI)

Suggested Dx Criteria:

- Age <2
- Purpuric or ecchymotic target-like lesions with edema of the face, auricles, & extremities +/- mucosal involvement
- Lack of systemic or visceral involvement (aside from fever)
- Spontaneous recovery within 1-3 weeks
AHEI versus HSP

- Different distribution (rarely affects face in HSP)
- Younger age (<2 for AHEI)
- Rare to have renal or GI complications (however are exceptions!!)
- Different immunoglobulin deposition profiles
Histopathology: AHEI/HSP

- Histopath: LCV in small vessels
- DIF + C3
- HSP: perivascular IgA deposition 100%
- AHEI: more common to see IgM (80%) than IgA (30%)
AHEI: Pathogenesis?

75% of cases linked to recent infection, drug administration, or immunization.

Reported infectious triggers:
- Staphylococcus/Streptococcus
- Adenovirus/Rotavirus/Coxsackievirus

Reported drug triggers:
- Antibiotics: penicillin, cephalosporins, septra
- OTC meds: paracetamole, cough syrups

Environmental triggers/Immunization:
- Vaccinations with MMR/DtaP
AHEI: Treatment

- Usually none required
- Oral antibiotics if evidence of bacterial superinfection
- Oral corticosteroids may be recommended in severe cases (child is miserable)
TRIGGER FACTORS IN ATOPIC DERMATITIS

- ITCH/SCRATCH
- DRY SKIN
- IRRITANTS
- INFECTIONS
- STRESS
- ALLERGENS
- WEATHER CHANGES
FLARES of Atopic Dermatitis

- Multifactorial disease: Requires multi-modal management
- Rx of inflammation, infection, itch, dry skin
  ALL AT ONCE
- Infection – Think about it!
  - S. Aureus (consider MRSA)
  - HSV “Eczema Herpeticum”
  - Strep pyogenes (Group A Strep)
MRSA: community-acquired

- Seen in about **25-30%** of our patients. Even higher prevalence in Texas (**75%** and increasing!)
- These community-acquired MRSA infections are characteristically more invasive. Children present with furuncles and abscesses--one clue to MRSA
- Also seeing Clindamycin resistance
  - “**D test**” used to test for inducible clindamycin resistance
Bleach Baths

- Adding household bleach to bathwater helpful in some cases
  - Infection-triggered AD, MRSA, etc
- 1/4 - ½ cup per full tub of water
- Roughly equivalent to concentration of public swimming pool
- Side effects: bleaching of hair, clothing, etc
“Eczema Herpeticum”

HSV: most common viral infection in setting of AD

“Punched out” discrete lesions
HSV Superinfection
Group A Strep Superinfection
True or False: systemic steroids are often necessary in the treatment of atopic dermatitis?

True

False
Recipe for ER Rx Atopic Derm

- Culture, culture, culture!
  - Could be HSV or MRSA
- Cephalexin (unless already on) – consider MRSA and Rx with Septra or Clindamycin
- Acyclovir if HSV suspected (DFAs sometimes useful)
- Mid-potency steroids body, Low potency face
- Frequent baths, then grease ALL OVER
- Antihistamines – MAX doses hydroxyzine (1-2 mg/kg)
- Hospitalize – maybe
- Systemic steroids – almost never…
## Topical Steroid Ranking

<table>
<thead>
<tr>
<th>Potency</th>
<th>Steroid Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superpotent</td>
<td>Clobetasol 0.05%</td>
</tr>
<tr>
<td>High Potency</td>
<td>Fluocinonide 0.05%</td>
</tr>
<tr>
<td></td>
<td>(Lidex®)</td>
</tr>
<tr>
<td>Mid-Potency</td>
<td>Triamcinolone 0.1%</td>
</tr>
<tr>
<td>Mid- to Low Potency</td>
<td>Aclovate or Desonide</td>
</tr>
<tr>
<td>Low Potency</td>
<td>Hydrocortisone 2.5%</td>
</tr>
<tr>
<td></td>
<td>&amp; Hydrocortisone 1%</td>
</tr>
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- Systemic steroids – almost never…
Avoid Systemic Steroids...

- Work too briefly
- Rebound flares
- Long-term side effects with repeated use
“Cool Down” with Wet Dressings
**STEP 1:**
Apply the steroid ointment or cream to your child’s skin.

**STEP 2:**
Take one pair of your child’s sleepers and soak it in warm water.

**STEP 3:**
WRING OUT the sleepers until they are only very slightly damp.

**STEP 4:**
Put the damp sleepers on your child and cover with a pair of dry sleepers. DO NOT cover with plastic. The dampness MUST evaporate.

**STEP 5:**
Make certain the room is warm enough.

**STEP 6:**
Your child may complain at first, but be firm.
In Summary

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What to do?
THE END