Childhood Exanthems

A review of rashes caused by (mainly) viruses

Sahra Niazi, MD, FAAP
Complete Children’s Health
Lincoln NE
Summer Splash 2017!
Exanthems

- An exanthem is any eruptive skin rash that may be associated with fever or other systemic symptoms

- Represents either a reaction to a toxin produced by the organism, damage to the skin by the organism, or an immune response

- Viral exanthems are common in childhood
  - ‘exanthema’ and ‘anthos’ = ‘breaking out’ and ‘flower’

- Causes:
  - Infectious pathogens, medication reactions
  - Most often related to viral infection
Exanthems

- > 12 million office visits annually for rashes and other skin concerns
- 68% are made to primary care physicians
- Recognizing key features can help distinguish the different types of rashes
- Some exanthems have specific morphologies that help ID and characterize the eruption
Exanthems

- 100 years ago, a group of characteristic childhood eruptions were described and numbered from one to six in the order they were discovered:
  - Measles
  - Scarlet fever
  - Rubella
  - Erythema infectiosum
  - Roseola infantum
  - ?4th disease

<table>
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<th>DISEASE</th>
<th>SEASON</th>
<th>MORPHOLOGY</th>
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<tr>
<td>Measles/rubeola (parainfluenza virus)</td>
<td>Winter to spring</td>
<td>Erythematous, confluent, maculopapular</td>
<td>Begins at the hairline and spreads inferiorly</td>
<td>Koplik spots, high fever, cough, coryza, and conjunctivitis, Forchheimer spots</td>
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<tr>
<td>Scarlet fever (Streptococcus pyogenes)</td>
<td>Fall to spring</td>
<td>Generalized erythema with a sandpaper texture</td>
<td>Begins on the face and upper part of the trunk and spreads inferiorly</td>
<td>Pastia lines, Forchheimer spots, strawberry tongue, exudative pharyngitis, abdominal pain, rheumatic fever</td>
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<tr>
<td>Rubella (Rubivirus)</td>
<td>Late winter and early spring</td>
<td>Rose-pink, maculopapular</td>
<td>Spreads inferiorly</td>
<td>Lymphadenopathy, arthralgia, Forchheimer spots</td>
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<td>Erythema infectiosum (parovirus B19)</td>
<td>Winter and spring</td>
<td>“Slapped cheek” appearance, lacy reticular rash</td>
<td>Erythematous cheeks, reticular eruptions</td>
<td>Rash waves and waves over weeks, arthritis, aplastic crisis</td>
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<td>Roseola (human herpesvirus 6 and 7)</td>
<td>Spring</td>
<td>Rose-pink, maculopapular</td>
<td>Neck and trunk</td>
<td>Lymphadenopathy, foliaceous eruptions, Nagayama spots</td>
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First Disease

- Measles virus
  - Measles occurs worldwide and is the fifth most common cause of death in children <5 years of age

- 1960s: Measles vaccine
  - Immediately impacted disease incidence and mortality rates

- Vaccination rates vary worldwide; in 2013, there were an estimated 145,700 deaths reported, predominantly in the developing world
First Disease

- Incubation 10-12 days

- Symptoms of fever, runny nose, watery red eyes, sore throat, cough and pathognomonic Koplik spots (gray-white papules on the buccal mucosa)

- Approximately 3-4 days after the prodromal symptoms; typical exanthema develops

- Highly infectious
  - Up to 4 days prior and 4 days after rash develops
First Disease

Paramyxovirus, genus Morbillivirus

Measles is caused by a virus
First Disease

- Complications
  - Occur in 30 percent of measles cases
  - Diarrhea is the most common complication
  - Most deaths are due to respiratory tract complications or encephalitis
    - Encephalitis occurs in up to 1 per 1000 measles cases
  - Otitis media occurs in 5 to 10 percent of cases and is more common in younger individuals
  - Case fatality rate is 4 to 10 percent in developing countries
Second Disease

- *Streptococcus pyogenes*; Scarlett Fever
- Diffuse erythematous eruption that generally occurs in association with pharyngitis- “Strep Throat”
- Occurs as result of delayed-type skin reactivity to pyrogenic exotoxin produced by the organism
Second Disease

- Small red bumps that begin on the neck and groin and then spreads to the rest of the body
- Sandpaper feel
- Lasts five to six days
- The rash is sometimes worse on the neck, elbow creases, arm pits and groin and once the rash fades, the skin may peel
  - This peeling may last up to six weeks
Second Disease
Third Disease

- Rubella virus
- Prior to vaccine:
  - Outbreaks occurred variably every few years
  - School-age children
- 1964-1965: > 12 million cases of rubella and 20,000 cases of congenital rubella syndrome (CRS)
- 1969 (before the introduction of vaccine)
  - 58 cases per 100,000
- 1983
  - < 0.5 cases per 100,000
- 2015
  - declared eliminated from the Americas
Third Disease

- Incubation period -14 to 18 days

- Can be contagious for 1 - 2 weeks before the infection becomes clinically apparent

- Rash - 14 to 17 days after exposure
  - Lasts 1-3 days (aka “3 day measles”)
  - Head then to rest of body
  - Rash has been postulated as being immune-mediated

- Hallmark:
  - Generalized tender lymphadenopathy
  - Most striking in the head region
Third Disease
Third Disease

- More severe in adults - arthritis and encephalitis
- Virus crosses placenta
  - Birth defects in unborn fetus
    - Cardiac Defects, Cataracts
    - Mental retardation, Deafness
Fourth Disease

- *Staphylococcus aureus?*
- Controversial
- Clement Dukes in 1900
  - ? Described as what we now refer to as staphylococcal scalded skin syndrome (SSSS or Ritter's disease)
  - Caused by epidermolytic toxin-producing strains of *Staphylococcus aureus*
- ? Potential misdiagnosis of either scarlet fever or rubella and therefore a nonexistent disease entity
- The term was dropped from medical textbooks in the 1960's and is only rarely used for medical trivia purposes today
Fifth Disease

- Parvovirus B19
- Erythema Infectiosum
  - Mild and common infections
  - Self limited
- Incubation 1-2 weeks
Fifth Disease

- Fever, coryza, headache, nausea, and diarrhea
- Two to five days later - RASH: 3 stages of rash
  - Facial erythema ("slapped cheek") fading in 4 days
  - Fishnet like or reticular pattern -- begins on the extremities several days after the onset of facial erythema and extends to the trunk and buttocks, fades in 6 to 14 days
  - Reappearance of the rash after a variety of nonspecific stimuli, such as change in temperature, exposure to sunlight, exercise, or emotional stress
Fifth Disease
Sixth Disease

- Human Herpes Virus 6 or Human Herpes Virus 7
- Exanthem subitum, Roseola infantum
- 25 to 30% of children with primary HHV-6 infection develop roseola
- Incubation period 9-10 days
- Peak prevalence - 7 to 13 months of age
- 90% percent of cases occur in children < 2 years
- Occurs equally in boys and girls
Sixth Disease

- Characteristic clinic course

- Three to five days of HIGH fever that resolves abruptly and is followed by development of a rash - on neck and body, spreads to arms and legs

- Symptoms:
  - Lymphadenopathy - 98 percent
  - Erythematous tympanic membranes - 93 percent
  - Irritability - 92 percent (but well appearing child)
  - Anorexia - 80 percent
  - Upper respiratory tract symptoms - 25 percent
  - Diarrhea - 15 percent
  - Cough - 11 percent
  - Convulsions - 4 percent (increased risk of febrile seizures with HHV6)
Sixth Disease
Atypical Exanthems

- Unilateral laterothoracic exanthem (ULE)
- Begins on one side of the trunk and then generalizes
- 1-5 years of age typically
- Etiology unknown- but thought to be viral
- Can last several weeks
- Symptomatic cares
Atypical Exantherms

- **Hand, foot, and mouth disease (HFMD) - coxsackievirus**
- Common enteroviral illness
- < 5 yo typically
- Late summer and fall months
- Systemic symptoms usually subside in a few days; the skin lesions resolve without scarring in days to weeks
  - Fever
  - Vesicles on the palms and soles, mouth and tongue and buttocks
  - Nail abnormalities up to weeks later
Atypical Exanthems
Atypical Exanthems

- PAPULAR-PURPURIC GLOVES AND SOCKS SYNDROME
- Parvovirus B19
  - Usually seen in adolescents and adults, distinct involvement of hands and feet
  - Spring and summer
  - Transmission occurs through respiratory secretions and saliva
  - Most contagious during active viral replication
    - precedes the appearance of skin lesions
Atypical Exanthsms

- Low-grade fever, myalgias, arthralgias, and fatigue
- The rash is rapidly progressive
- Edema and redness of hands and feet followed by the appearance of petechial and/or purpuric lesions on the palms and soles
- Sharp cutoff at the wrists or ankles
- Neurologic symptoms are sometimes associated
- Spontaneous resolution occurs in several weeks without sequelae
Atypical Exanthems
Atypical Exanthems

- Gianotti-Crosti syndrome (GCS)
- papular acrodermatitis → symmetric papular eruption with an acral distribution (cheeks, buttocks, and extensor surfaces of the forearms and legs)
- Incidence and prevalence - unknown
  - GCS is probably underdiagnosed
- < 5 yo
- Males = Females
- Epstein-Barr virus (EBV) infection, hepatitis B virus (HBV), other viruses
  - However, HBV is an uncommon cause of GCS in the United States and in other countries where universal hepatitis B vaccination during infancy is routine
Atypical Exanthems

- **Pathogenesis**
  - ? delayed hypersensitivity reaction to viral infections
  - children with GCS were significantly more likely to have had atopic dermatitis and to have a family history of atopy

- **Clinical features**
  - Illness in weeks leading up to rash
  - presents as a sudden symmetric eruption of multiple small papular or papulovesicular lesions
  - Can be very itchy for some kids
Atypical Exanthems
Atypical Exanthems

- Course
  - Spontaneous remission of the rash without active intervention typical
  - Rash can last weeks to months even
  - Gentle skin cares
Atypical Exanthems

- Pityriasis Rosea
  - acute
  - self-limited
  - exanthematous skin disease
  - rash usually on the trunk and proximal areas of the extremities
  - Viral etiology suspected (HHV7?)
Atypical Exanthsms

- Typically older children and young adults
- Women > men
- Usually asymptomatic, sometimes itchy
- Herald patch - 50-90% of cases
- Few days or one to two weeks later:
  - Oval lesions similar in appearance to the herald patch, but smaller, appear in crops on the trunk and proximal areas of the extremities
- "Christmas tree" distribution
Atypical Exanthems
Atypical Exanthems

- Spontaneously resolves within 2-3 months
- Usually does not recur in most patients
Atypical Exanthems

- Eczema herpeticum
Atypical Exanthems

- Eczema herpeticum
  - disseminated viral infection- herpes simplex virus type 1 usually
  - characterized by clusters of blisters or punched-out erosions
  - complication of atopic dermatitis
  - lesions appear 5 to 12 days after contact with an infected individual, who may or may not have visible cold sores

- Treat eczema
- Refer to ophtho if eye involvement
Conclusion

- Understanding of certain viral exanthems has expanded significantly
  - Especially since the original description of the classic exanthems of childhood
  - Many viral diseases (measles, rubella and varicella) are now preventable with vaccination

- Understanding and recognition of new viral-associated exanthems continues to expand
  - i.e., in case of Gianotti-Crosti of childhood, originally hepatitis B thought to be only culprit, now recognized to be a manifestation of a number of infectious agents, including viruses
Questions?