

# Childhood Exanthems

A review of rashes caused by (mainly) viruses

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# 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
  - ▶ ?4<sup>th</sup> disease

DISEASE	SEASON	MORPHOLOGY	DISTRIBUTION	ASSOCIATED FINDINGS
Measles/rubeola (paramyxovirus)	Winter to spring	Erythematous, confluent, maculopapular	Begins at the hairline Spreads inferiorly	Koplik spots High fever Cough, coryza, and conjunctivitis Forchheimer spots
Scarlet fever ( <i>Streptococcus pyogenes</i> )	Fall to spring	Generalized erythema with a sandpaper texture	Begins on the face and upper part of the trunk and spreads inferiorly	Pastia lines Forchheimer spots Strawberry tongue Exudative pharyngitis Abdominal pain Rheumatic fever
Rubella (Rubivirus)	Late winter and early spring	Rose-pink, maculopapular	Spreads inferiorly	Lymphadenopathy Arthralgias Forchheimer spots
Erythema infectiosum (parvovirus B19)	Winter and spring	"Slapped cheek" appearance, lacy reticular rash	Erythematous cheeks Reticular extremities	Rash waxes and wanes over weeks Arthritis Aplastic crisis
Roseola (human herpesvirus 6 and 7)	Spring	Rose-pink, maculopapular	Neck and trunk	Lymphadenopathy Febrile seizures Nagayama spots

# 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

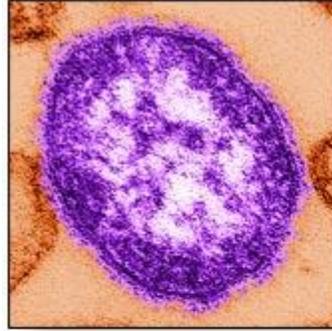


# First Disease

- ▶ 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*; Scarlet 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 Exanthems

- ▶ **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 Exanthems

- ▶ 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 Exanthems

- ▶ 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?

