

FEVER WITH RASH

LEARNING OBJECTIVES

- Review high yield causes of fever with rash
- Review the clinical presentation of Meningococemia, Kawasaki Disease, GAS, and a few viral exams
- Review management of the aforementioned clinical scenarios

GROUP A *STREPTOCOCCUS*

- Aka *Streptococcus pyogenes*
- Two major virulence factors
 - Hyaluronic acid capsule prevents phagocytosis
 - M Protein, a surface protein that prevents opsonization and and phagocytosis, facilitates tissue invasion
 - Streptococcal toxins; superantigens; stimulate massive cytokine release
- Noninvasive infections
 - Strep pharyngitis → can lead to Acute Rheumatic Fever or PSGN
 - Scarlett fever
 - Impetigo
 - Erysipelas and cellulitis → can lead to PSGN
- Invasive infections
 - Streptococcal Toxic Shock Syndrome
 - Acute Necrotizing Fasciitis

SCARLET FEVER

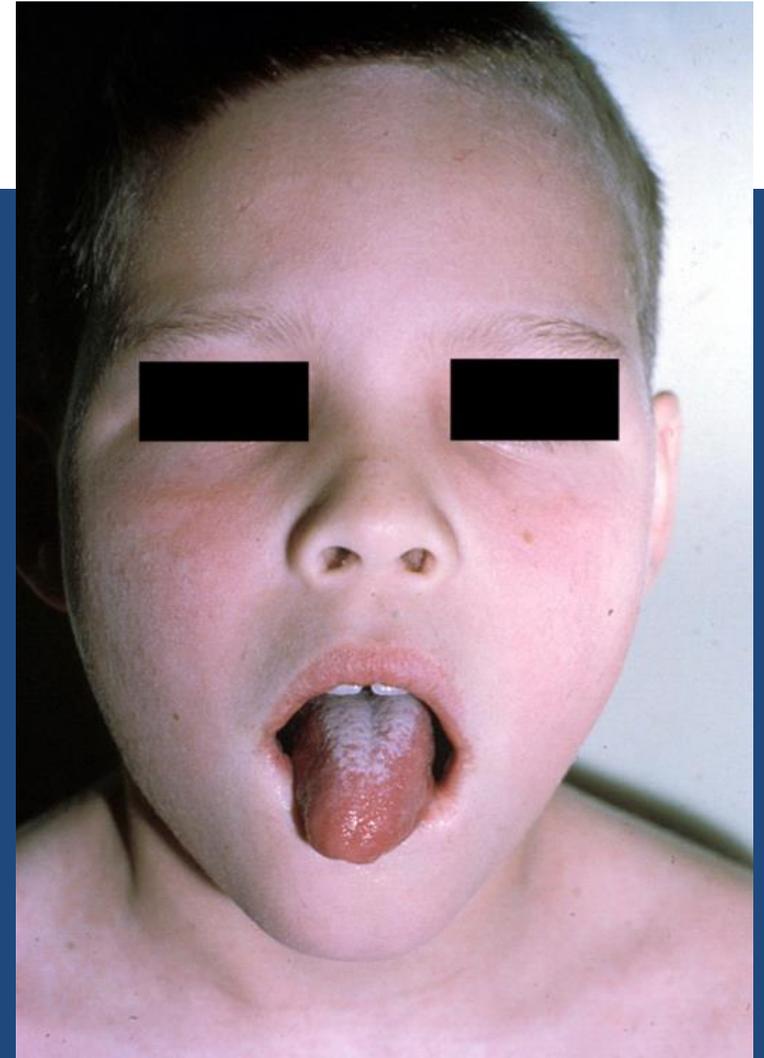
- Caused by exotoxin commonly associated with pharyngitis, but can be due to skin infections (pyrogenic exotoxin/erythrogenic exotoxin)
 - Less frequent in areas where antibiotics are commonly used
- Rash begins on upper chest/neck 1-2 days after the onset of infection and spreads to trunk and extremities
 - Diffuse erythema that blanches → sandpaper texture of skin
 - Pinpoint areas of deeper red scattered petechiae w/o blanching → Pastia's lines
- Other findings include circumoral pallor, strawberry tongue, eventual desquamation (after 3-4 days)
- Treat the underlying infection → PCN/amoxicillin, cephalexin, clarithromycin or clindamycin



Pastia's Lines



Sandpaper Rash



Strawberry Tongue

KAWASAKI DISEASE

- Acute febrile illness of childhood characterized by vasculitis of medium-sized, extraparenchymal arteries, with predilection for coronary arteries → the reason for concern for coronary artery aneurysms
- Children of Japanese ancestry are at highest risk of KD
- Poor clinical outcomes associated with:
 - Age (>6 months; <9 years)
 - Male
 - Asian/Pacific Islanders and Hispanic

KD – CLINICAL PRESENTATION

- At least 5 days of fever and 4 principle criteria:
 - Fever is abrupt in onset $>39^{\circ}\text{C}$ that may not remit with antipyretics
 - $>90\%$ of children have bilateral conjunctivitis w/ limbic sparing
 - Erythematous oropharynx, cracked lips, strawberry tongue
 - Erythematous rash, not vesicular
 - Edema of extremities and erythema of palms and soles
 - Can progress to periungual peeling from fingers and toes 2-3 weeks after fever onset
 - Unilateral cervical LAD > 1.5 cm
- KD Algorithm



LAB FINDINGS

- Elevated acute-phase reactants (CRP ≥ 3 mg/dL [≥ 30 mg/L] or ESR ≥ 40 mm/hour)
- WBC count $\geq 15,000$ /microL
- Normocytic, normochromic anemia for age ([table 2](#))
- Platelet cell count $\geq 450,000$ /microL after seven days of illness
- Non-neutrophilic (sterile) pyuria (≥ 10 WBCs/high-power field)
- Serum alanine aminotransferase level > 50 units/L
- Serum albumin ≤ 3 g/dL

KD - TREATMENT

- If diagnosis is clear, treatment should not be delayed by echo
 - Proximal LAD and RCA most commonly affected by coronary artery aneurysms
 - Larger baseline measurements predict development of worsening lesions overtime
- Treatment is high dose IVIG (2g/kg) and medium to high dose ASA (ideally within first 7 days of illness)
- Children with exceptionally large aneurysms may require additional anticoagulation
- Problem of KD is not always the acute phase, but sequelae of coronary aneurysms
→ stenosis, putting them at risk for MI events

MENINGOCOCCEMIA

- Most common organisms
 - *S. pneumoniae* (mostly reduced due to vaccination)
 - *N. Meningitidis*
 - Hib (mostly eliminated due to vaccination)
 - GBS
 - *Listeria monocytogenes*
- Clinical presentation
 - Sudden onset of fever, N/V, headache, and myalgias
 - Progression of disease is very quick, between 12-24 hours depending on age → the younger the patient, the quicker the progression

MENINGOCOCCEMIA

- Maculopapular rash resembling viral exanthems, can be an early finding in meningococemia
 - Transient, generally does not persist beyond 2 days and frequently disappears within hours of 1st observation
 - Neither purpuric nor pruritic
- Petechial rash appears as discrete lesions 1-2mm in diameter usually on trunk and lower body
 - Petechiae can coalesce into larger purpuric and ecchymotic lesions, including mucous membranes
 - Petechiae correlate with degree of thrombocytopenia → important as an indicator of potential for bleeding complications secondary to DIC



MENINGOCOCCEMIA – MANAGEMENT

- Workup includes: CBC, BCx, LP (CSF gram stain, Cx, cell count, glucose & protein)
- Initial management is massive fluid resuscitation → patients can decompensate into shock and DIC
- If not in shock, need to be aware of SIADH and may need to end up on fluid restriction
- Elevated ICP is possible and may require mannitol and hyperventilation
- Any generalized seizures that occur can be managed with standard seizure medications
- Sequelae can include subdural empyema, which may require drainage

MENINGOCOCCEMIA – TREATMENT

- Immediately after LP, before results, start antibiotics
- Empiric treatment children >1 month involves vancomycin + 3rd gen cephalosporin
 - If resistant can escalate to cefepime or meropenem
- Narrow antibiotics after culture
- Poor prognosis if young age, greater bacterial burden, and delayed CSF sterilization
- Pretty much any organ system failure is possible with this bacteria

VIRAL EXANTHEMS

- VERY Broad Topic – we will cover a few
- Fifth Disease – Parvovirus
 - Slapped-cheek appearance, bright red macules that coalesce involving the cheeks with perioral sparing
 - In several days they are scattered on the limbs and trunk with central clearing
 - If fever, it's mild
 - Can cause aplastic crisis

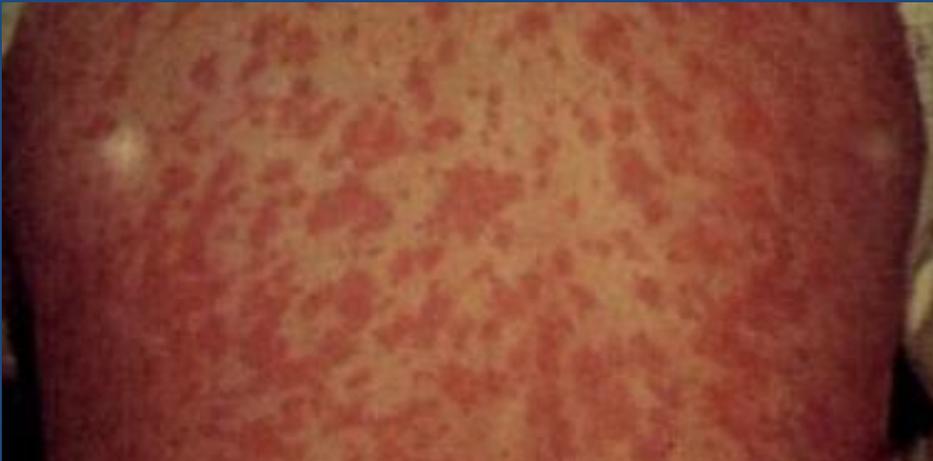


VIRAL EXANTHEMS

- Roseola (HHV6)
 - Rubelliform rash after 3-5 days of fever
 - Rose pink maculopapules throughout body
 - Fevers can be $>40^{\circ}\text{C}$, known to be associated with febrile seizures
- Enteroviruses (Echo and Coxsackie A&B)
 - Wide variety of presentations, but frequently morbilliform
 - Primarily affects young children
 - Can include fevers



MEASLES



- Early phase
 - Low fever, cough, photophobia, coryza, and may include GI symptoms
- A few days pass → Koplik spots develop on buccal mucosa (highly contagious at this point)
- Next few days → spots fade, fever rises, and rash appears
 - Red to purple red papules start on head and spread inferiorly
 - Coalescence of lesions occurs by 3rd day – may appear purpuric on fair skinned patients
- Sequelae include encephalitis and bacterial superinfection
- If not vaccinated, treatment is supportive along with Vitamin A, or can give IVIG or IMIG at time of exposure

PRACTICE #1

A 4-year-old Pacific Islander boy is diagnosed as having KD on day 6 of illness. He is admitted to the hospital for further management. Laboratory studies are obtained, and an intravenous peripheral line is placed. Which of the following is the most appropriate initial treatment regimen?

- A. Aspirin (40 mg/kg per day) plus IVIG (2 g/kg per day).
- B. Aspirin (100 mg/kg per day) plus solumedrol (30 mg/kg per day).
- C. Aspirin (80 mg/kg per day) plus solumedrol (2 mg/kg per day).
- D. IVIG (2 g/kg per day) plus cyclosporine (9 mg/kg per day).
- E. IVIG (2 g/kg per day) plus infliximab (5 mg/kg per dose).

WHAT IS THE LIKELY DIAGNOSIS? #2

A 9 year old girl is brought to the clinic because she is suffering from a headache, fever, chills, and a rash. The rash covers her neck, chest, and under her armpits. The parents explain that the rash appeared today, and that for the past two days the patient had been complaining of a sore throat. The child has no allergies, her immunizations are all up to date, and she has no other past medical history. Her blood pressure is 115/70 mm Hg, pulse is 110/min, respirations are 22/min, and temperature is 101.2°F. A physical exam reveals a generalized erythematous rash that has a sandpaper-like texture, and it will also blanch when pressure is applied. The patient also has submandibular lymphadenopathy, and the throat is covered in gray-white exudates.

PRACTICE #3

A 5-year-old girl presents to the clinic with 7 days of fever that responds occasionally to acetaminophen. Her physical examination is significant for an erythematous tongue, bilateral conjunctival injection, a maculopapular rash, and cervical lymphadenopathy. She is diagnosed as having KD. Which of the following clinical findings on examination of her hands and feet is most likely to be seen during the acute phase of the disease in this patient?

- A. Bruising of the fingers and toes.
- B. Desquamation of the fingers and toes.
- C. Firm swelling of the palms and soles.
- D. Hemarthrosis of the ankles and wrists.
- E. Lytic lesions in the long bones of the upper and lower extremities.

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Answer Key: 1. A, 2. Scarlet Fever, 3. C