Visual Diagnosis: ID the Disease Workshop

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Children's Mercy

Diagnosis of Neonatal HSV

- Swab specimen of eye, NP, mouth, anus, & lesions
  - Culture and if desired PCR
- PCR of CSF
- PCR of whole blood
- ALT

Treatment Neonatal HSV

- Acyclovir 20 mg/kg/dose q 8 hours
  - Skin Eye Mucous Membrane (SEM) - 14 days
  - Disseminated or CNS - 21 days
- Repeat LP at the end of therapy to ensure clearance and continue if not clear
- Suppression for 6 months following infection

Bullous Impetigo

- Most common in neonates, infants, young children
- Always caused by Staphylococcus aureus
  - Usually phage group 2 (approx. 80%)
  - Represent localized form of Staphylococcal scalded skin syndrome
- Presents with flaccid bullae which rupture quickly leaving erosions often with overlying crust and/or eschar
  - Blister in epidermal granular layer
  - May occur singly or in clusters
  - May develop generalized lesions following varicella – bullous varicella
Scabies
- Infestation caused by Sarcoptes scabiei ssp. Hominis
- Usually associated with generalized pruritus in older children/adults
  - Can present as irritability, insomnia, poor feeding in infants
- Characteristic features in infants:
  - Pustules & vesicles on palms/soles, dorsal foot
  - Facial & scalp involvement more common
  - Nodules on back, axillae, inguinal folds
- Pathognomonic skin features: the burrow
  - Hands, flexural wrists, lateral feet
  - Present in all ages
  

- Mite unable to survive more than few days without the human host
  - Lifespan of mite: up to 30 days
- Mite burrows into the stratum corneum laying up to 3 eggs per day
  - Larvae hatch in 3-4 days; mature into adult mites in 10-14 days
- Treatment:
  - 5% permethrin cream x 8-12 hours (infants > 6-8 weeks age) reapplication in 1 week
  - Treatment of all household members
  - Launder clothing/bedding in hot water
  - Symptomatic care: antihistamines, emollients, topical steroids

Incontinentia Pigmenti (IP)
- X-linked dominant disorder
- Mutations in NEMO gene
- 97% female patients
- Affects eyes, teeth, CNS
- May affect hair & nails
- Eosinophilia in infancy

Incontinentia Pigmenti
**Four Cutaneous Stages:**
1st: Inflammatory vesicles
2nd: Verrucous lesions
3rd: Whirled / Blaschkoid hyperpigmentation
4th: Streaks of hypopigmentation/atrophy

Varicella Diagnosis
- Primarily clinical
  - Dewdrop on a rose petal
  - Lesions in different stages

Varicella Diagnosis
- PCR of lesions
- Slow to grow in cell culture
**Varicella Treatment**

- Supportive care
- Oral acyclovir/valacyclovir - not recommended routinely
- Consider for healthy children at increased risk of moderate/severe disease:
  - Unvaccinated > 12 yrs
  - Chronic cutaneous or pulmonary disorders
  - Long term ASA therapy
  - Short / intermittent oral or aerosolized steroids

**Varicella Exposure**

- Consider acyclovir for secondary contacts
- Vaccinate if unimmunized
- VarZIG (IVIG) if indicated

**Bullous Impetigo**

- Common, contagious, superficial skin infection
- Staphylococcus aureus
- Results from production of exfoliative toxin (ETA, ETB)
  - Binds to desmosomal protein
  - Desmoglein 1 in the granular layer of the epidermis

**Bullous Impetigo**

- Common in infants & children
- Start as small vesicles that enlarge up to 5cm
- Flaccid bullae that rupture, leave a collarette of scale with minimal surrounding erythema
- Face, diaper area and extremities
- Resolve without scarring

**Bullous Impetigo**

- Work up
  - Culture exudate/crust or fluid from lesion
- Treatment
  - Cleansing area
  - Limited infection: topical medications
    - Mupirocin 2% ointment or retapamulin 1% ointment
    - B-lactamase-resistant penicillin, first generation cephalosporin, clindamycin, macrolides
  - Complicated: IV antibiotics

**Enterovirus**

- Hand, Foot & Mouth - CVA16 & EV71
  - Oral erosions
  - Oval vesicles on hands, feet, and buttocks
- Atypical presentation - CVA6
  - More wide-spread, severe and varied presentations
- Peak outbreaks in fall & summer months
Enterovirus

- Clinical manifestations
  - Commonly involve skin & mucous membrane
  - Severe disease can involve CNS
  - Aseptic meningitis, acute focal paralysis, brainstem encephalitis

- Diagnosis
  - Clinical, viral culture, PCR

- Supportive care

Classical Hand, Foot & Mouth Disease

- Self-limited febrile illness

- Oral ulcerations within 1-2 days of fever onset
  - Tongue, palate, buccal mucosa

- Skin eruption palms, soles, groin
  - Macules, papules, vesicles
  - Can be painful

Atypical Hand, Foot & Mouth

- Vesiculobullous & erosive eruption
  - Wide spread, perioral, acral buttock
  - Bullae <1 year

- Eczema Coxsackium
  - Vesicles & erosions in areas of eczema

- Gianotti Crosti-like eruption
  - Acrofacial papulovesicles with sparing of the trunk

- Petechial & purpuric rash
  - >5 years of age
  - Acral

Eczema Herpeticum

- Herpes simplex virus in patients with atopic dermatitis or other skin diseases

- Acute –onset of clustered vesicles or punched out erosions

- 3% atopic dermatitis patients
  - Tend to have more severe AD
  - Earlier onset of disease
  - Increase risk of food allergies and asthma
  - Tend to have recurrent S. aureus infections

Eczema Herpeticum

- Associated findings include:
  - Viremia
  - Fever
  - Lymphadenopathy
  - Keratoconjunctivitis
  - Meningitis

- Predilection for the face & chronic areas of dermatitis

- Widespread punched out erosions

Eczema Herpeticum

- Special considerations:
  - Keratoconjunctivitis
  - Secondary bacterial infection
  - Dehydration

- Treatment:
  - Antivirals +/− antibiotics
  - Supportive care (skin, hydration)
  - Ophthalmologic evaluation
Other Herpes Infections

- Cutaneous herpes can occur on any body surface
- Clustered vesicles or erosions on erythematous base
- Can have secondary infections or lymphangitis

Treatment Pediatric HSV

- Acyclovir (PO)
  - Orolabial: 20 mg/kg/dose q 6-8 hours
  - Genital: 400 mg PO TID for 10 days
- Valacyclovir (PO)
  - Genital: 1 gram BID for 10 days

Sweet's Syndrome

- Acute febrile neutrophilic dermatosis
- Painful papules, nodules, plaques, bullae
- Fever & Leukocytosis

Other Neutrophilic Dermatoses

- Pyoderma gangrenosum
- Vesiculopustular eruption
- Autoinflammatory conditions associated with systemic diseases
- Dense infiltrate of inflammatory cells (neutrophils)
- Rare in children
Diagnosis of Pediatric HSV
- Viral culture of blister or erosion
- PCR of skin lesion
- CSF PCR if concern for encephalitis

Mycoplasma - Induced Skin Disease
- Narita M. Front Microbial 2016
- Olson et al. Pediatr 2015
- Varghese et al. BMJ Case Rep 2014
- Wanat et al. Curr 2014
- Campagna et al. Pediatr Dermatol 2013
- Kunimi et al. Allergol Int 2011

Mycoplasma - Induced Rash & Mucositis (MIRM)
- Comprehensive literature search
  - 95 articles; 202 cases
  - Mean age 11.9 years; Males 66% patients
- Cutaneous involvement:
  - Absent (34%), Sparse (47%), Moderate (19%)
- Mucosal involvement:
  - Oral (94%), Ocular (82%), Urogenital (63%)
- Complications:
  - Mucosal damage (10%), scarring (5.6%), recurrence (8%), mortality (3%)

Stevens Johnson Syndrome (SJS) / Toxic Epidermal Necrolysis (TEN) vs. Erythema Multiforme
- Nosology previously confusing
- SJS & TEN now considered variants within a spectrum of adverse drug reactions
- Erythema multiforme considered a distinct disorder with different clinical features & precipitating factors

SJS & TEN
- Typically occurs 4-28 days after initiation of drug
- Prodromal symptoms: fever, malaise, myalgias, headache, sore throat
- Mucosal lesions may precede skin eruption
  - Usually ≥ 2 mucous membranes involved (esp. eyes, lips)
  - Ophthalmologic emergency – can result in to permanent visual impairment
- Eruption often begins on face, upper trunk, & proximal extremities
  - Dusky, dark red, purpuric macules with necrotic center (atypical targets); occasionally with typical target lesions
Stevens Johnson Syndrome & TEN

- < 10% BSA involved = SJS
- 10-30% BSA involved = SJS/TEN overlap
- > 30% BSA involved = TEN

Stevens-Johnson Syndrome (SJS) & Toxic Epidermal Necrolysis (TEN)

- Acutely ill with prodromal symptoms of fever, malaise, and anorexia lasting 1-2 days before skin lesions
- Mucosal lesions: Extensive blisters with gray-white membrane, hemorrhagic crusts, especially on lips
  - Superficial erosions and ulcerations follow
  - Usually ≥ 2 mucous membranes involved (eyes, lips, genitalia, perianal)
- Ophthalmologic emergency
  - Can form pseudomembrane formation
  - May cause permanent visual impairment

Causes of SJS / TEN

- Usually drug-induced:
  - Sulfa antibiotics
  - Aromatic anticonvulsants
  - Lamotrigine
  - Penicillins/cephalosporins
  - Minocycline/tetracycline/doxycycline
  - Allopurinol
- Other: *Mycoplasma pneumoniae*

Staphylococcal Scalded Skin Syndrome

- Disease of young children - majority < 5 y/o
- Rare in adults - renal failure, malignancy, immunosuppression, chronic alcohol abuse, HIV infection
- Toxin-producing *S. aureus* detected in every case of SSSS

Staphylococcal Scalded Skin Syndrome Clinical features:

- Fever
- Irritability
- Skin tenderness
- Scarlatiniform erythema with flexural accentuation
- Sterile blisters & erosions develop within 24-48 hours
- Intraoral lesions do not occur (absence of granular layer)
- Sepsis rare in children; more common in adults
- Tx: antibiotics, fluid & electrolyte balance, topical care
- Mortality rate low (3%) in children vs. > 50% in adults

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Staphylococcal Scalded Skin Syndrome

- Infectious focus usually nasopharynx or conjunctivae
  - Recommended sites for cx; also perianal and umbilical
- Most often associated with exfoliative toxin A (ETA), occasionally ETA & ETB, rarely ETB alone
  - ETs may not act as superantigens but rather cause blistering in the granular layer of epidermis by binding directly to desmoglein 1

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Antibiotic Sensitivity & Resistance Patterns in SSSS

- Retrospective review 2005-2011 Philadelphia
- 21 patients
  - Median age 18 months
- 10 children (48%) with clindamycin resistant S. aureus
- 3 (14%) children grew MRSA
- 1 child with oxacillin and clindamycin resistant S. aureus
  - Rate of oxacillin susceptibility significantly higher than hospital culture
  - Rate of clindamycin susceptibility significantly lower than hospital culture
  - More clindamycin resistance in younger children


Treatment SSSS

- Oxacillin or cefazolin is preferred
- Consider clindamycin
- Typically 10 days
- May need admission for hydration due to increased insensible losses
- Oral therapy once improved
- Total skin peeling

Drug Reaction with Eosinophilia & Systemic Symptoms (DRESS)

Evolving Nomenclature:

- Drug-induced pseudolymphoma syndrome (1959)
- Anticonvulsant hypersensitivity syndrome (1960’s)
- Drug-induced hypersensitivity syndrome (DIHS)
  - Hypersensitivity syndrome (HSS)
- Drug rash with eosinophilia & systemic symptoms (DRESS)
  - Boquet et al 1996

DRESS: Clinical Evolution

- Usually begins 2-6 weeks after drug introduced
- Fever, malaise, cervical LAD, pharyngitis
  - Fever usually precedes cutaneous eruption
  - High spiking temperature, usually 38 - 40°C
- Symptoms may persist beyond discontinuation of offending medication

DRESS Systemic Manifestations

- Hepatic
- Hematologic (atypical lymphocytosis, eosinophilia)
- Renal
- Pulmonary
- Musculoskeletal
- Gastrointestinal
- Cardiac
- Neurologic
- Endocrine
Diagnosis of Kawasaki Disease

- Fever >101°F for 5 days & 4/5 clinical criteria:
  - Conjunctival injection w/o exudate (limbic sparing)
  - Erythematous mouth/pharynx, red, cracked lips, strawberry tongue
  - Polymorphous generalized erythematous rash; can be morbilliform maculopapular, scarlatiniform or resemble EM
  - Peripheral extremity induration of hands/feet w/ erythema of palms and soles and periungual desquamation later
  - Acute non-suppurative, usually unilateral cervical lymphadenopathy of 1.5 cm

Kawasaki Disease Treatment

- IVIG 2 grams/kg
- ASA 80-100 mg/kg divided q 6 hours
- Echocardiogram
- ~10% need retreatment after 36 hours

RMSF Epidemiology

- 60% of disease burden from 5 states
- Mortality is <1% since 2001
- Cases occur year-round; but peak in May through September
- Older adults at highest risk

Clinical Features

- Initial: non-specific fever, nausea, vomiting, abdominal pain, altered mental status
- Day 2-4: rash development (pink macules) in 90% of children
- Day 5-6: progression to petechial rash
- Arthralgia, some eyelid and dorsal extremity swelling
**Diagnosis and Treatment**

**Diagnosis:**
- High index of suspicion
- May be tick exposed w/o bite history
- Hematologic and metabolic derangement
- Serology

**Treatment:**
- Decision to treat is based on clinical diagnosis; not laboratory results
- Do not delay treatment
- Doxycycline 2 mg/kg/dose BID for 7-10 days (ALL ages)

**Ehrlichiosis**

- Difficult to distinguish clinically from RMSF
- Lab derangement is more common; rash less common
- Risk factor: tick exposed
- Treatment is doxycycline

**Meningococcemia**

**Clinical Presentation**
- Fever, myalgia, altered mental status, prostration
- Rapidly progressive disease with rash evolution over hours from macular to petechial-purpuric

**Diagnosis & Treatment**
- High index of suspicion
- Blood and CSF culture; culture of lesion; PCR
- Shock management
- 3rd gen cephalosporin
- Sequelae in up to 20%

**Pneumococcal Sepsis**

- Risk factor for fulminant disease: asplenia
- Immunization prior to splenectomy w/ PCV13 & PPSV23
- Diagnosed through blood cx
- Treated with ampicillin, 3rd gen cephalosporin
Henoch-Schönlein Purpura

- Systemic small vessel vasculitis
- Primarily in children (3-15yrs)
- Clinical features:
  - Arthritis
  - Abdominal pain
  - Glomerulonephritis

- Palpable purpura in dependent areas (legs & buttock)
- Crops and fade within 5 days
- Edema of hands, feet, face, scrotum
- Associated with abdominal & joint pain

- Possible triggers
  - Group A Streptococcal infection
  - Other viral & bacterial infections
  - Vaccination
  - Fall, winter & spring

- 80% systemic involvement
  - Glomerulonephritis 40-50%
  - Gastrointestinal
  - Joint involvement
  - CNS & pulmonary

Henoch-Schönlein Purpura

- 80% systemic involvement
  - Glomerulonephritis 40-50%
  - Gastrointestinal
  - Joint involvement
  - CNS & pulmonary

- Histopathologic exam
  - IgA + direct Immunofluorescence

- Laboratory work up
  - R/o other vasculitides
  - Identify complications

- Cutaneous findings < 2 months
  - 1/3 have recurrences

- Supportive care for most

Leukocytoclastic Vasculitis

- Small-vessel vasculitis
- Primarily affects the skin
- Often due to infections or medications
- Rare in children
Leukocytoclastic Vasculitis

- Crops of palpable purpura; can be petechial
- Dependent areas, sites of trauma, tight clothing
- Systemic involvement rare

Leukocytoclastic Vasculitis

- Infectious causes:
  - Streptococci,
  - Hepatitis B&C
  - Non-typhoidal salmonella
  - Mycobacteria infections

- Medications:
  - Antibiotics, NSAIDs, antiepileptics, insulin, omeprazole, OCPs

Finkelstein Disease

- Leukocytoclastic vasculitis
  - Skin limited
  - Lack GI, kidney & joint involvement
- Infants & children (<24 months)
- Non-ill appearing
- Fever (low grade)

Acute Hemorrhagic Edema of Infancy

- Rapid onset of skin lesions
- Edematous papules with petechiae that expand
- Cockade & targetoid lesions
- Involve cheeks, ears, extremities
- Edema of face, distal extremities and scrotum

Acute Hemorrhagic Edema of Infancy

- Etiology unclear - possible infectious trigger

- Preceded by URI / diarrhea

- Histology similar to HSP
  - Unlike HSP, DIF for IgA is negative
Acute Hemorrhagic Edema of Infancy

- Laboratory work up
  - Leukocytosis
  - Elevated sedimentation rate
  - No hematuria, proteinuria, hematochezia

- No treatment needed
  - Rapid onset & short course