



Pictures to Ponder: Pediatric Visual Diagnosis

A pediatric patient is brought in with a lump, bump, or rash. Could this finding be a harbinger of life-threatening disease? The speaker will present a number of pediatric cases in which the picture tells the story. Presenting conditions such as lumps, bumps, swellings, and rashes will be discussed.

- Identify common and uncommon pediatric conditions presenting with skin manifestations of systemic disease in children.
- Describe common pediatric rashes.
- Distinguish benign rashes from those caused by potentially life-threatening disease.
- Discuss the management priorities and follow-up for children with these conditions.

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(+)No significant financial relationships to disclose

(+)Ghazala Q. Sharieff, MD, FACEP
Medical Director, Emergency
Department, Rady Children's Hospital
and Health Center/Associate Clinical
Professor, University of California, San
Diego; Director, Pediatric Emergency
Medicine, Palomar-Pomerado
Hospital/California Emergency
Physicians, San Diego, California

**PEDIATRIC LIFE-
THREATENING RASHES**

Ghazala Q. Sharieff, MD, FACEP,
FAAP

**What makes you think that a rash
may be life-threatening?**

1. Mucous membrane involvement
2. Extensive blisters or peeling of skin
3. Extensive erythema and fever
4. Severe pain that appears to be out of proportion to the physical examination
5. ALOC
6. Petechial or purpuric lesions

Case presentation

- A 2 month old female presents with fever for 6 days associated with a few episodes of diarrhea. She has a maculopapular rash on her trunk. No other symptoms and no ill contacts
- Temp 101, HR 150 RR 30.
- What would your workup include?

Case Presentation

- A 3-year old girl presents with 5 days of fever to 104F, sore throat, diffuse rash, and “red eyes” and “lumps under her jaw” per her mother.
- There is no significant PMH, no meds except APAP
- The child has stable vital signs and the following findings on exam:

KAWASAKI SYNDROME Signs and symptoms

Fever \geq five days **and** four of following five:

1. Bilateral conjunctival injection
2. Oral mucosal changes
3. Rash: not vesicular
4. Extremity changes
5. Cervical adenopathy



Kawasaki's Disease

KAWASAKI SYNDROME

- Peak age is 1-2 years old
- 80% of cases occur before 5 years of age
- Acute phase lasts 7-14 days and is followed by the subacute phase (2-4 weeks):
 - **Thrombocytosis, desquamation of the fingers and toes, arthralgias, greatest risk for coronary artery thrombosis.**

KAWASAKI SYNDROME Differential Diagnosis

- Measles
- Scarlet fever
- Drug reactions
- Staphylococcal Scalded Skin Syndrome
- Viral and rickettsial exanths
- Toxic shock syndrome
- JRA

KAWASAKI SYNDROME Diagnosis & Treatment

- Elevated WBC, ESR >40, CRP>3
- ?BNP
- Pyuria due to urethritis
- EKG, echocardiogram
- Admit for ASA 80-100mg/kg/day until day 14 then 3-5mg/kg/day until platelet count is normal
- Gamma globulin therapy-single dose 2g/kg over 10 hours
- New studies underway

KAWASAKI SYNDROME

Complications

- Coronary artery aneurysms in 20-25% of pts not treated within 10 days of symptoms
- Risk factors include: male sex, age less than 12 months or over 8 years, fever for greater than 10 days, high baseline neutrophil count or hemoglobin less than 10g/dL, thrombocytopenia and fever persisting after IVIG.

KAWASAKI SYNDROME

Other Complications

- Aseptic meningitis
- Gallbladder dilation
- Pancreatitis
- Facial nerve palsies

Atypical Kawasaki

Newburger J etal. Pediatrics 2004

- Infants can present with fever for more than 5 days with fewer than 2-3 of the principal features
- Infants < 6 months of age can also present with fever and few if any, principal clinical features.
- Perform KD workup in infants with prolonged fever

Staph Toxic Shock Syndrome(TSS)

- Can also be seen with group A B-hemolytic strep
- Many cases of non-menstrual TSS occur with upper airway infection
- Abrupt onset of high fever ($>38.9^{\circ}\text{C}$)

Staph Toxic Shock Syndrome(TSS)

- Diffuse macular erythroderma
- Desquamation 1-2 weeks after onset of sx
- Hypotension- SBP $<5^{\text{th}}$ percentile
- Negative CSF, throat cultures, RMSF, measles

Staph Toxic Shock Syndrome(TSS)

- Involvement of ≥ 3 organ systems:
 - GI-vomiting/diarrhea
 - Mucous membranes-hyperemia
 - Muscular-CPK $>2\text{X}$ normal
 - Renal- BUN or creatinine $>2\text{X}$ normal
 - Hepatic- Tbil, SGOT, SGPT , 2X normal
 - Platelets $< 100\text{K}$
 - CNS- ALOC without focal findings

Staph Toxic Shock Syndrome

- Supportive care
- Vasopressors may be necessary
- Antibiotics
- Research looking at the use of IV IG to block super-antigens

SCARLET FEVER

- Group A beta-hemolytic streptococcus
- Sand paper rash first in the skin folds of the axillae, groin, and antecubital area (Pastia's lines)
- Circumoral pallor, palatal petechiae
- Rash develops 12-48 hours after sore throat, and lasts 4-5 days
- Desquamation over the next 2 weeks
- Rx: Pen VK. No school until abx for 24 hrs

Case Presentation

- A 1 year old boy presents with a small lesion on his lower extremity which is warm and tender to palpation.
- The child appears quite uncomfortable
- 2 hours later you notice a bullae within the lesion

Necrotizing Fasciitis

- Group A Strep is more common in young patients and healthy adults
- Diabetics and immunocompromised are at risk
- Cellulitis initially, typically on the extremities
- Bullae can appear within 2 hours
- A purulent center develops followed by a necrotic black, eschar over a few days
- 30% have crepitance
- Lymphadenopathy is not present typically

Necrotizing Fasciitis Differential Diagnosis

- Spider bite
- Erythema marginatum
- Erysipelas
- Cellulitis

Necrotizing Fasciitis Treatment

- Surgical debridement down to the fascia
- Aggressive fluid management
- IV antibiotics
 - Penicillin/gentamicin/clindamycin
 - Ampicillin/gentamicin/clindamycin
 - Ampicillin/gentamicin/metronidazole
 - Consider Vanco for MRSA
 - Timentin/Unasyn for mixed infections

CA-MRSA

- Occurs in healthy patients
- Abscesses or cellulitis
- Septra or clindamycin
- Clindamycin is inducible

PERIANAL STREPTOCOCCUS

- Group A beta-hemolytic streptococcus.
- Occurs in children less than 10 years of age.
- Males > females
- Well-marginated erythematous ring extending evenly around the anus

PERIANAL STREPTOCOCCUS

- No induration, fever, or lymphadenopathy
- Perianal itching or pain with defecation
- Positive culture/recent GABHS infection or has a +throat culture
- Rx: Oral penicillin

STAPHYLOCOCCAL SCALDED SKIN SYNDROME (SSSS)

- Age less than 5 years
- Irritability when skin is touched
- Fever
- Generalized erythema followed by bullae formation and desquamation
- Nikolsky's sign
- No mucous membrane involvement!



STAPHYLOCOCCAL SCALDED SKIN SYNDROME (SSSS)

Treatment

- IV hydration
- Admit for nafcillin or cefazolin
- Admit all newborns regardless of clinical condition!

ERYTHEMA MULTIFORME

- Hypersensitivity reaction
- Recurrent herpes simplex infections occur 10 days before lesions
- Mycoplasma pneumoniae
- Drugs-PCN, Dilantin, cephalosporins

ERYTHEMA MULTIFORME

- Target lesions evolving over days and not hours
- Symmetric on elbows, knees, and extensor surfaces
- EM major involves mucous membranes
- Remove offending agent, symptomatic Rx
- May need hospitalization

Stevens Johnson Syndrome

- Age: 2-10 years
- NSAID's, sulfonamides, anticonvulsants
- Mycoplasma pneumoniae and HSV
- 1-14 day prodrome with fever, HA, sore throat, malaise, V/D, cough
- Severe mucosal membrane involvement with at least 2 sites-oral and eyes common

Stevens Johnson Syndrome

- Typical SJS-only a few red macules accompanying mucous membranes
- SJS-TEN overlap-10-30% skin involvement
- Toxic epidermal necrolysis (TEN) >30% body surface area involvement

Stevens Johnson Syndrome

- Burn protocols
- Aggressive IV hydration
- Removal of offending agents
- Close fluid and electrolyte monitoring
- May need ophthalmologic consult for eye involvement
- ?IV immunoglobulin therapy 1.5-2gm/kg/day for 3 days

CASE PRESENTATION

- A one week old female presents with erythema surrounding the umbilical stump that is starting to extend to the abdominal wall. She is afebrile, vital signs are stable, she is alert and interactive. She is breast-feeding well, and has no history of vomiting, and no ill contacts. What is the diagnosis? Should this patient be discharged?

OMPHALITIS

What is it?

- Inflammation and infection surrounding the umbilicus that can spread to the liver or peritoneum

OMPHALITIS
Clinical Presentation

- Fever may or may not be present
- Mild erythema surrounding the umbilicus
- Necrosing lesions surrounding the umbilicus and extending to the abdominal wall
- Systemic symptoms may be absent

OMPHALITIS
Treatment

- Perform septic workup
- Start IV antibiotics
- Surgical debridement for abscessed lesions
- Do not discharge these patients!

PETECHIAE/PURPURA
What are they?

- Petechiae: Non-blanching, purple lesions less than 2mm in diameter, resulting from bleeding into the skin from abnormal platelet function, vasculitis or thrombocytopenia
- Purpura: Circumscribed lesions >0.5cm in diameter, do not blanch

PETECHIAE

Etiology

- Meningococemia
- Bacterial infections
 - H. flu
 - E. Coli
 - S. Aureus
 - Group A Strep
- RMSF
- Stress petechiae
- ITP
- HUS
- Viral infections
 - RSV
 - Enterovirus
 - Adenovirus
 - EBV
- Gonococemia
- Endocarditis
- Leukemia
- Strep pharyngitis

HEMOLYTIC-UREMIC SYNDROME

- Triad of acute microangiopathic hemolytic anemia, thrombocytopenia and acute renal insufficiency/failure
- Diarrheal form associated with E. Coli 0157:H7

HEMOLYTIC-UREMIC SYNDROME

- 3-10 day prodrome of bloody or watery stools with crampy abdominal pain
- Petechiae/purpura, pallor, HTN occur when the GI symptoms seem to be improving
- Treatment-supportive, with early peritoneal dialysis

ROCKY MOUNTAIN SPOTTED FEVER

- Dermacentor Andersoni tick, Rickettsia rickettsii
- Incubation period 5-7 days
- Patients present with flu-like symptoms and get sicker.
- Fever, rash and tick bite in only 60-70%
- Rash starts on day 3 as pale pink or red macules that blanch on the wrists, palms, soles, ankles & forearms.

Henoch-Schonlein Purpura

- General
 - Also called anaphylactoid pupura
 - IgA mediated systemic vasculitis
 - Peak ages 4-11 years
 - Spring after URI
 - Associated with insect stings & drugs

HENOCH-SCHOENLEIN PURPURA “ARENA”

- A- abdominal pain, +/- bloody stools
- R- purpuric rash
- E- edema
- N-nephritis
- A- arthralgias/ arthritis

Henoch-Schonlein Purpura

- Diagnosis
 - Classic rash, abdominal pain, microscopic hematuria, arthralgias in non toxic patient
 - Screening tests: CBC, UA, Blood cultures, ESR, PT/PTT

Henoch-Schonlein Purpura

- Management
 - Symptomatic with close follow up
 - Steroids are controversial and only for severe cases

MENINGOCOCCEMIA

- Neisseria meningitidis
- 1-4 day prodrome of URI, ST, malaise
- Petechiae with rapid progression, purpura in up to 90% of pts
- Contact prophylaxis:
 - Rifampin
 - Cipro

PETECHIAE

How likely is meningococcal disease?

Wells LC et al. Arch Dis Child, 2001

- 218 children with petechial rash, infants to 15 years of age. The ability of clinical features and lab studies to predict meningococcal disease was studied
- 24 (11%) had proven meningococemia
- 5 kids had temperatures less than 37.5C
- Median age was less than 2 years of age, with 55% of pts with petechiae being less than 3 years

PETECHIAE

How likely is meningococcal disease?

Wells LC et al. Arch Dis Child, 2001

- Patients with meningococemia more likely to have temps >38.5C, have purpuric lesions, be ill-appearing, have delayed capillary refill times, prolonged INR, and abnormal neutrophil counts
- No patients with petechiae above SVC had meningococemia and no child with a CRP less than 6 mg/dl had meningococcal disease

PETECHIAE

How likely is meningococcal disease?

Brogan et al. Arch Dis Child, 2000

- “ILL” criteria to predict meningococemia
 - I= irritability
 - L=lethargy
 - L= low capillary refill time

FEVER & PETECHIAE

Mandl KD et al. J Peds, 1997

- Prospective study of 411 patients with temps greater than 38 C and petechiae
- CBC, blood cultures, coag studies and CSF studies were obtained
- 57.7% of patients were between 3 and 36 months of age
- 8 pts (1.9%) had bacteremia
 - 2 Neisseria, 1 group A strep, 3 purpura fulminans, 2 Strep pneumoniae. 0/8 had + CSF and all had petechiae below the nipple line

FEVER & PETECHIAE

Mandl KD et al. J Peds, 1997

- 0/356 well-appearing infants had serious bacterial illness
- 53 patients appeared ill, including all 8 with serious invasive bacteremia
- Ill-appearance had a sensitivity of 1 (0.6-1) and a WBC <5K or >15,000 also had a sensitivity of 1 (0.53-1) for detecting SBI
- All children with meningococemia had purpura

FEVER & PETECHIAE

Mandl KD et al. J Peds, 1997

- Authors conclude that patients with serious bacterial illness can be identified by clinical criteria and that treatment of well-appearing children with fever and petechiae as outpatients is supported.
- Patients should have normal lab studies, antibiotic administration and observation for several hours prior to discharge

Clinical recognition of meningococcal disease

Thompson J etal, Lancet 2006

- 486 pts 0-16 yrs of age with meningococcal disease
- 103 pts died
- Classic meningococcal symptoms of rash, neck stiffness, aloc occurred late in the course of disease 13-22 hours
- First signs were leg pains, cold hands and feet and abnormal skin color-median onset 8 hours

Clinical recognition of meningococcal disease

Thompson J etal, Lancet 2006

- Personal interviews with parents or retrospective questionnaire
- Clear bias due to retrospective nature and selective memory potential

Skin and Soft Tissue Infections

CELLULITIS

Etiology

- Periorbital / preseptal
 - S. aureus: trauma
 - H. flu B: bacteremia
- Orbital
 - S. aureus: trauma, sinusitis
- Trunk, extremities
 - S. aureus
 - Group A beta hemolytic strep

	Preseptal	Orbital
Fever	Yes	Yes
Lid edema	May be severe	Severe
Proptosis	None/minimal	Yes
Chemosis	None/minimal	Yes
Pain and decreased eye movement	No	Yes
Elevated WBC	Yes	Yes

VARICELLA

- Macules, papules, vesicles
- Spread over 24 hours
- Trunk, face to extremities
- Often in scalp, mouth
- Highly contagious until crusted

VARICELLA Complications

- Cellulitis
- Pneumonia
- Encephalitis: seizures, coma (early)
- Cerebellitis: benign ataxia (late)
- Reye syndrome

VARICELLA Treatment

- Antipruritics
- APAP
- 20mg/kg/dose qid acyclovir
- VZIG for kids at high risk within 96 hours of exposure
- Varicella vaccine 12-18 months of age
- After 13 years of age, need 2 shots

VARICELLA Treatment

- Acyclovir for healthy kids?
 - Reduction in days of fever
 - 80 fewer lesions
 - No difference between acyclovir and placebo in terms of varicella complications
 - Importance of treating healthy kids with acyclovir is still uncertain

**MORE COMMON
COMPLAINTS**

IMPETIGO

Epidemiology

- Common in Summer

Etiology

- Group A strep
- S. aureus also possible

IMPETIGO

- Honey crusted rash
- Streptococcus or Staph aureus (bullous)
- Cellulitis possible
- Acute Glomerulonephritis: uncommon
- Nephritis- may be seen in up to 28% of patients with nephritogenic strep strain

IMPETIGO

Treatment

- Topical mupirocin
- Oral penicillin, cephalosporin
- Erythromycin good alternative
- Intranasal mupirocin for patients with recurrent episodes as prophylaxis

SCABIES

- *Sarcoptes scabiei*
- Pruritic lesions especially in web spaces, groin, hands, feet, elbows, knees
- Facial involvement in infants
- Mite feces or eggs on scraping of the lesions in oil immersion
- Permethrin overnight, avoid lindane
- Treat the whole household!



CANDIDA

- Diaper dermatitis
 - Use topical antifungal cream
 - Add 1% hydrocortisone cream sparingly for severe cases
 - The dermatologists disapprove of Lotrisone!
- Oral Thrush
 - Use nystatin 100,000units/cc- 2cc po qid

TINEA CAPITUS

- Trichophyton tonsurans most common
- Person to person transmission via fomites
- Alopecia, black dot sign, Kerion
- Treat with Griseofulvin 20mg/kg/day for 6 weeks.
Give with a fatty meal
- Trials with ketoconazole show success
- May add prednisone for kerion
- Selenium sulfide shampoo 2X/week

ATOPIC DERMATITIS

- Itching
- Infants have lesions on cheeks and extensor surfaces
- Older children have lesions on flexor surfaces and antecutital/popliteal fossae
- Hypopigmented areas may be present
- Shiny nails from constant rubbing
- Dennie's lines

ATOPIC DERMATITIS

- Allergic shiners-hyperpigmentation below the eyelid
- 13% of kids with severe disease may develop cataracts not related to steroids
- Watch for secondary bacterial infection with S. Aureus

ATOPIC DERMATITIS

Treatment

- Moisturizers are cornerstone to therapy!
- Limit baths, trim nails
- Use gentle soaps
- Topical corticosteroids (ointment)
- Anti-histamines
- Bactroban or Keflex, erythromycin or Dicloxacillin for bacterial superinfection
- Topical Pemecrolimus 0.1%-nonsteroid inhibitor of inflammatory cytokines-more effective than topical hydrocortisone

Viral Exanthema



ERYTHEMA INFECTIOSUM

- AKA Fifth Disease
- Parvovirus B 19
- Incubation 4 – 20 days
- Sickle cell patient → aplastic crisis

ERYTHEMA INFECTIOSUM

- Fever in 15 – 30%: low grade
- Rash
 - Slapped cheeks on face
 - Lace-like rash on arms, trunk
 - Recurrent with heat, sunlight
- Adults and teens: arthralgia, arthritis

ERYTHEMA INFECTIOSUM

Treatment

- Supportive
- No labs
- Contagious for few days before and after rash
- Isolate inpatients: pregnant at risk

ROSEOLA

- Human herpes virus 6
- Exanthem subitum (“sudden onset”)
- Children 6 months – 2 years
- Incubation 5 – 15 days
- Contagious: unknown

ROSEOLA

Signs and symptoms

- High fever 3 – 5 days
- Febrile seizures possible
- Irritability
- Rash: sudden onset after defervescence
- No specific therapy

ERYTHEMA TOXICUM NEONATORUM

- Erythema toxicum neonatorum
 - Occurs in up to 50% of infants
 - Small, yellow papules or pustules with an erythematous base
 - Self-resolves in 5-7 days
