100 CARDINAL PED PRESENTATIONS

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CASES 51-60

What is this lecture about?

- Pediatric – exclusive to or commonly seen in kids
- Not a Zebra (ie something I've either seen during my career or know has been seen in our PED)
- Not a horse either – ie something you may make it through training without seeing
- Emergency practitioner can make the diagnosis or at least suspect it
- Emergency practitioner *should* make the diagnosis or at least suspect it, and can make a difference by either getting diagnostic studies, appropriate consultations, and starting initial management or by not doing unnecessary work-up

Quick info in 3 slides

- Classic case – build on illness scripts to reinforce when you should suspect this entity
- What should make you suspect this diagnosis
- Basics of diagnosis and ED management
- You can look it up for more detail, but you can’t look it up until you at least suspect it
- FOAM resources for additional readings

How to use this lecture

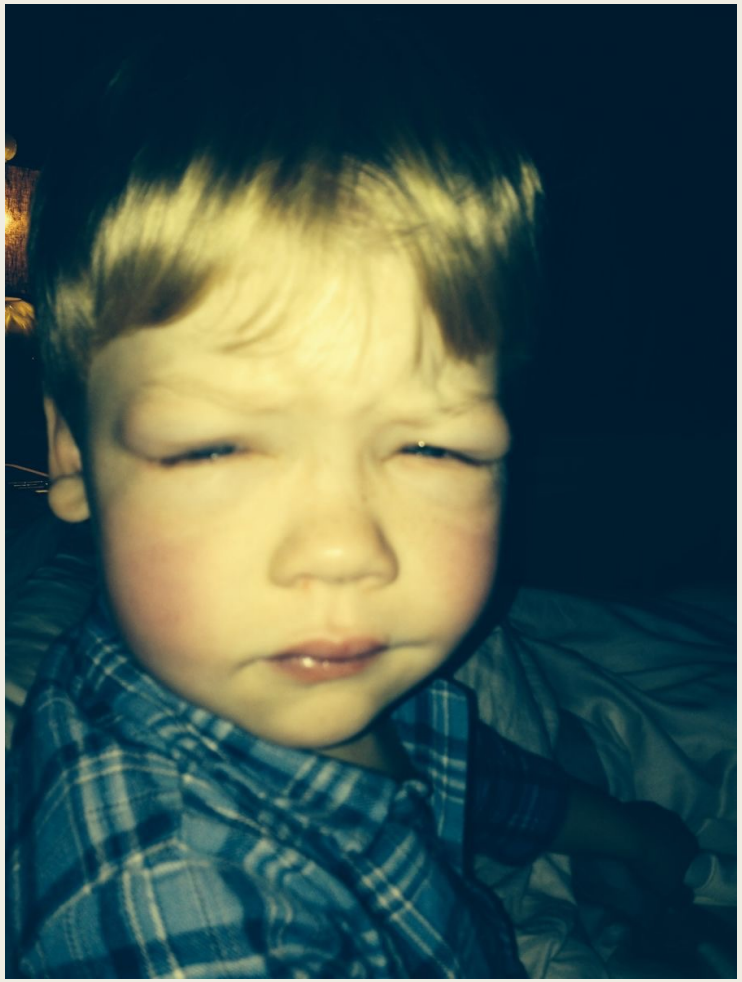
- After the initial case presentation, think about the differential diagnosis
- Helpful framework: SPIT
  - *What is the most Serious diagnosis?*
  - *What is the most Probable diagnosis?*
  - *What is the most Interesting diagnosis?*
  - *What is the most Treatable diagnosis (ie what diagnosis should the EP do something about ASAP)?*
- Write down what you think is the diagnosis – commit!
  - *At the end, see how many you got right*

3 year old girl with resolved headache

- 3yo girl has 2 week history of awakening with headache and sometime vomiting in the AM
  - *Headache is not well localized – she grabs at both sides of her head*
  - *After vomiting, she often feels better, and she is always better by mid-morning and attends preschool as normal*
  - *No fever, significant PMH or FH*
- VS temp 37.6, HR 90, RR 20, BP 90/45, 02 sat 100%
- Well-appearing, smiling, denies headache, no nuchal rigidity, lungs clear, heart RRR no murmur, abdomen benign, no rash
- Neuro nonfocal, patient walks with legs spread more widely apart than other 3 year olds you have examined

4 year old boy with facial swelling

- 4yo previously healthy boy with a few weeks of facial swelling, worsening over time, fatigue and malaise
  - *Noted especially in the mornings*
  - *Also note some bilateral lower leg swelling in the evenings*
- VS: temp 37.5, HR 100, RR 24, BP 110/55
- PE: pitting edema bilateral lower extremities and facial edema as shown, otherwise normal



http://www.infokid.org.uk

4 year old with fever, headache, vomiting, refusal to walk

- 4 year old previously healthy with < 24 hours of fever, headache, nausea and vomiting, c/o bilateral leg pain and now refuses to walk
- Parents feel that his hands and feet are cold
- Immunizations up to date
- VS temp 39.8, HR 150, RR 28, BP 80/40
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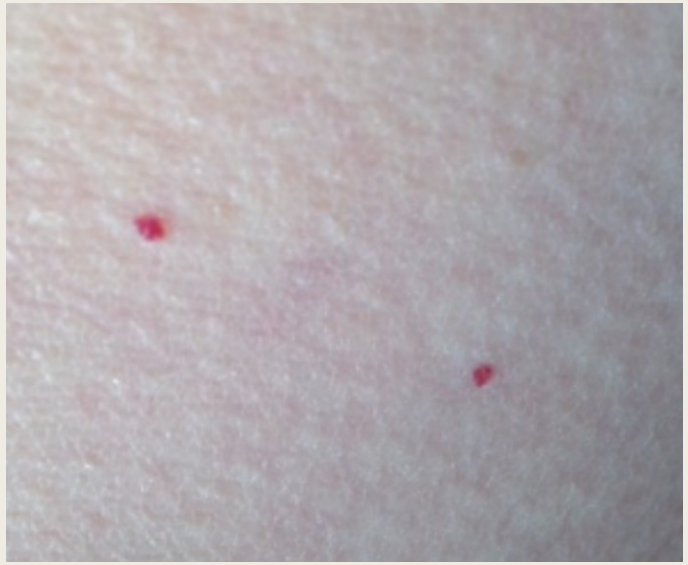
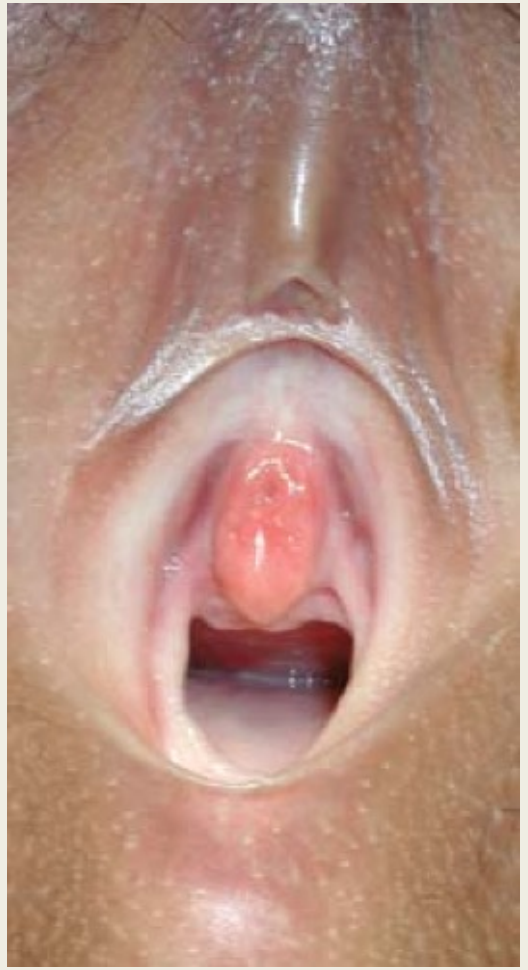


md2015.org

4 year old African-American girl with blood in her underpants

- 4 year old African-American girl, previously healthy, brought in because mom sees spots of blood in her underpants
- She attends daycare, and mom is concerned about sexual abuse
- No trauma, no fever, no c/o dysuria
- VS: temp 37.5, HR 100, RR 22, BP 84/44
- Remainder of PE unremarkable



obgynkey.com

4 year old with fever, cough, abnormal chest x-ray

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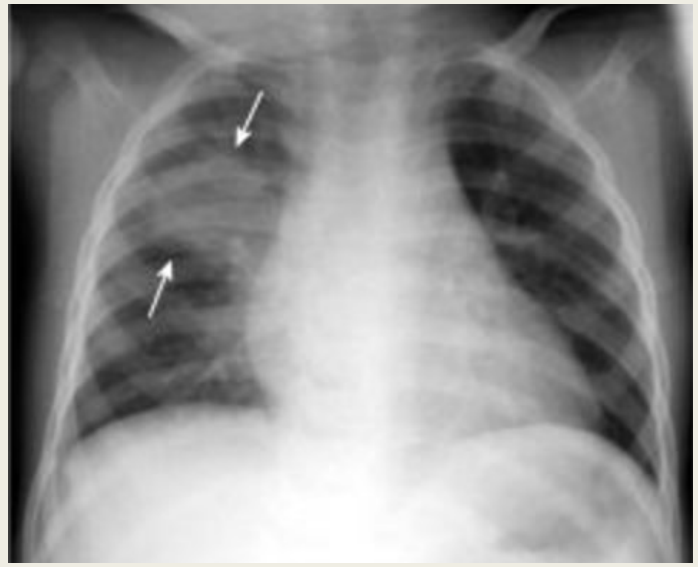
- Born full-term, no complications, negative PMH
- Temp 39.5, HR 170, RR 30, BP 80/40, O2 sat 94% on room air, weight 18kg, productive cough observed
- Coarse transmitted upper airway sounds bilaterally with decreased breath sounds right mid-lung fields
- Spherical lesion noted on chest x-ray
- Referred from outside hospital for r/o tumor



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4 year old girl with 3 days of fever and rash to face

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- 2 days ago, went to outside MD, who diagnosed impetigo and prescribed topical mupirocin
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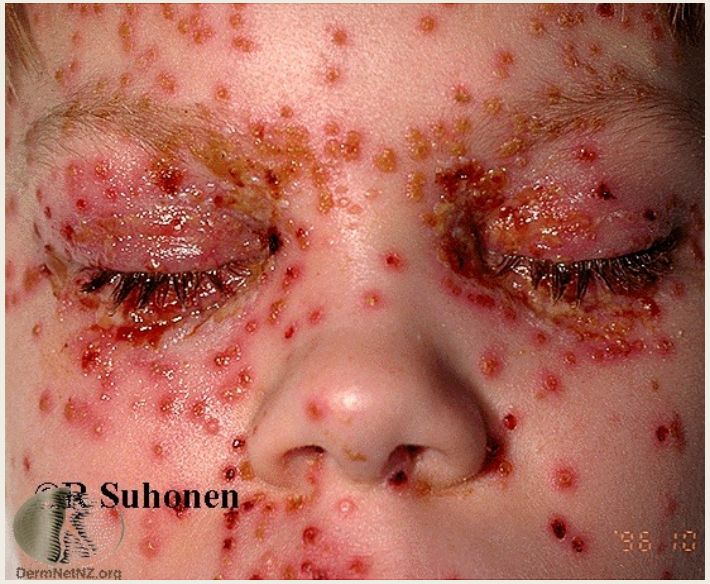
- What diagnosis, treatment, and who to consult?



www.dermnetnz.org

4 year old boy with trisomy 21, bilateral leg pain x 1 week

- 4yo boy with PMH of trisomy 21, no congenital heart lesions, has been intermittently refusing to walk, rubbing his bilateral legs and saying “owie”
- No fever, trauma, rash, joint swelling
- Does seem more tired than usual and maybe a little pale
- VS temp 37.5, HR 100, RR 24, BP 78/35, 02 sat 99% room air
- PE alert, nontoxic, no nuchal rigidity, HEENT normal except Downs facies, cardiac RRR no murmur, lungs clear, abdomen nontender, liver down 3cm, spleen palpable, cervical and inguinal lymphadenopathy nontender, bilateral lower extremities no redness, warmth, swelling, point tenderness, deformities, spine nontender, normal gait

4 year old boy with progressive lethargy, altered mental status

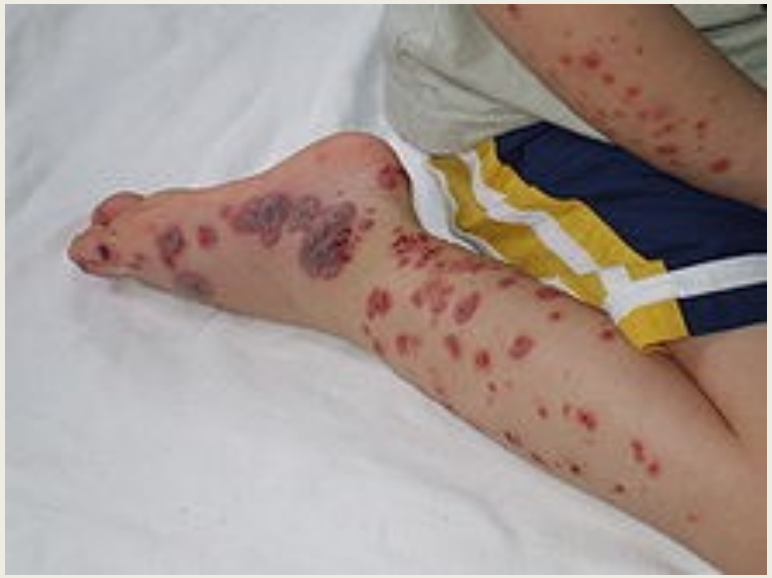
- 4 year old previously healthy boy with one week of progressive weakness and malaise, new-onset bedwetting, weight loss
- Over last 12 hours developed increasing shortness of breath and altered mental status
- VS: temp 37.7, HR 60, RR 30, BP 100/50, O2 sat 98% room air
- Altered, pupils dilated and minimally reactive, no nuchal rigidity, lungs clear, tachypnea without increased work of breathing, heart RRR no murmur, abdomen soft, nontender, no rash, fruity odor
- POC glucose too high for numerical reading, iStat pH 6.9, Na 128, K 4.0

5 year old girl fell off monkey bars

- First day of Kindergarten, 5yo girl fell off the monkey bars, landed on an outstretched hand (FOOSH)
- Had immediate pain
- Comes in with complaint of pain in the right elbow and very mild swelling
- Temp 37.6, HR 120, RR 24, BP 80/40
- Holding arm adducted and mildly internally rotated
- Difficult to localize tenderness as she cries whenever any part of her right arm is palpated

5 year old boy with rash

- 5 year old boy had a few days of nonspecific tactile fever, headache, decreased po intake, now with rash starting last night
  - *Also has complained of some joint pains and abdominal pain*
- VS: temp 37.7, HR 120, RR 24, BP 100/50
- Palpable purpura bilateral lower extremities and buttocks
- Remainder of exam is unremarkable



en.wikipedia.org

Did you write down what you thought the answers were? Answers on following slides

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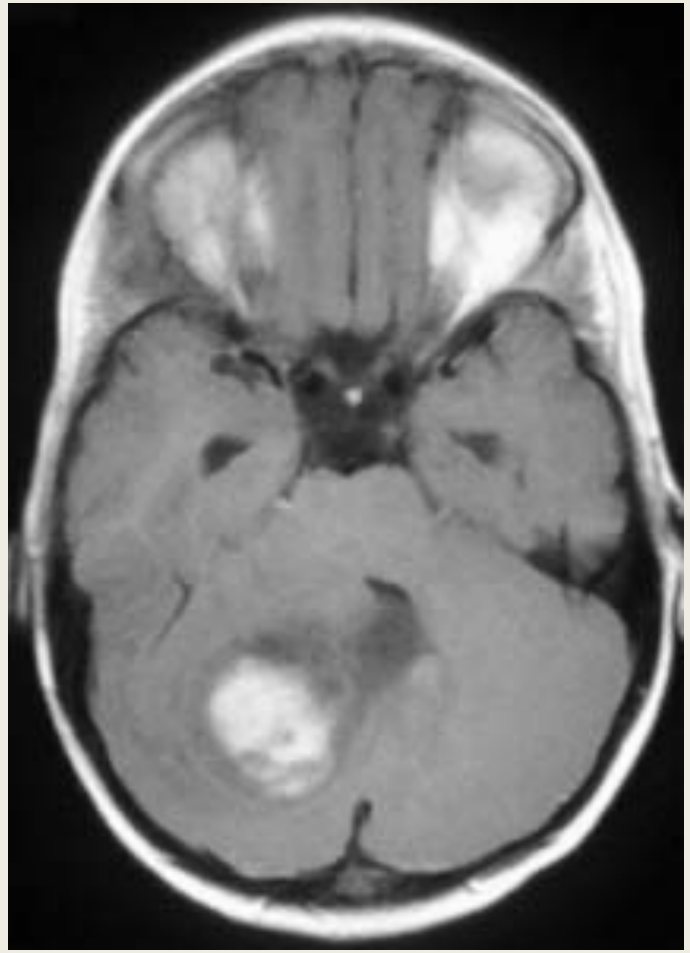
Pediatric brain tumor – suspect it

Red Flags

- Headache characteristics
  - *Progressive headache – worsening over time*
  - *Occipital headache*
  - *Headache that is worse in AM or with Valsalva, or awakens from sleep*
- Early morning vomiting (sign of positional increased ICP)
- Vision complaints – double vision, blurry vision, abnormal eye movements, papilledema on exam
- Ataxia (wide-based gait)
- Focal seizure
- Endocrine abnormalities may harbinger a pituitary tumor



http://peir.path.uab.edu/library/picture.php?/13970

Pediatric brain tumor – diagnose and manage it

- Best imaging test is MRI, but often not readily available in ED and requires sedation
- CT with contrast if highest suspicion is brain tumor
  - *With and without contrast if want to r/o hemorrhage before giving contrast*
  - *If CT negative but symptoms still concerning, outpatient f/u for MRI as some tumors may be difficult to appreciate on CT initially*
- Once diagnosed, consultation with pediatric neurosurgery and oncology
- Acutely manage significant increase in ICP or seizures as usual
- For more info: http://pemcincinnati.com/blog/symptoms-associated-with-brain-tumors-in-children/ and http://pemplaybook.org/podcast/pediatric-headache-some-relief-for-all/

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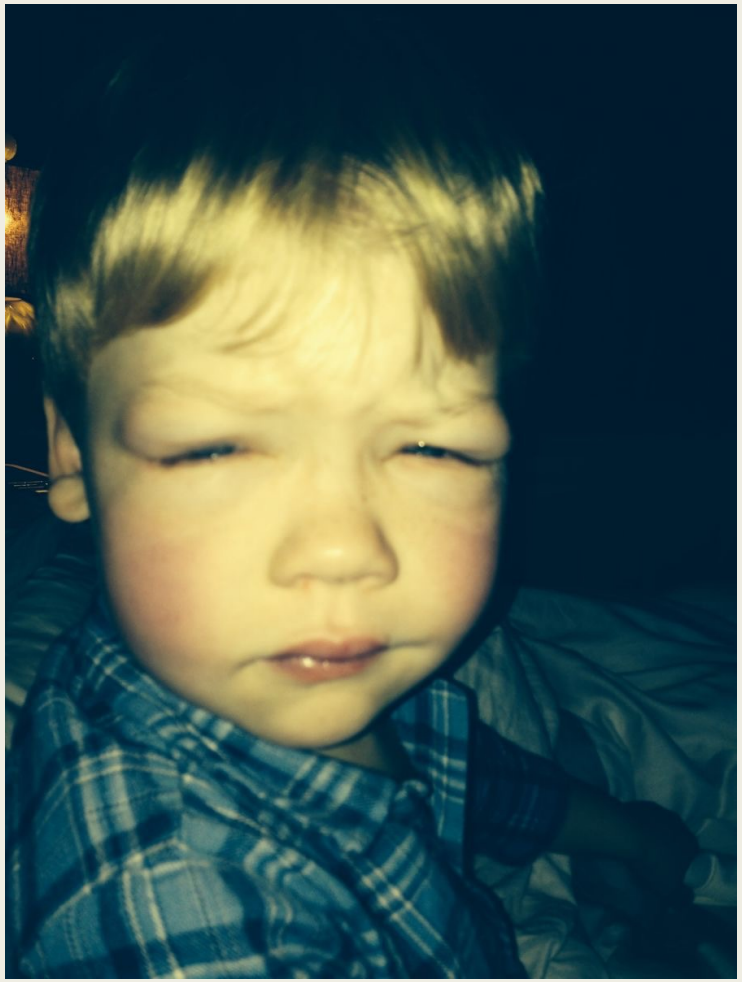

http://www.infokid.org.uk

Nephrotic syndrome – suspect it

- Proteinuria, leading to edema, hypoalbuminemia
- Minimal change disease most common underlying disorder
  - *Majority of minimal change disease in children < 5 years of age*
- Presents with edema, gravity dependent, pitting
  - *Facial, periorbital worse in the morning*
  - *Sacral, scrotal, legs in the evening*
  - *May have abdominal pain, ascites, peritonitis, pleural effusion & dyspnea*
  - *Malaise, fatigue, irritability, headaches*
  - *Hypertension and hematuria may occur depending on underlying cause*

Nephrotic syndrome – diagnose and manage it

- Proteinuria on urinalysis and hypoalbuminemia (low serum albumin)
- Send additional labs to complete work-up and consult pediatric nephrologist, admit for further management
  - *CBC, metabolic panel, lipid panel, C3, C4, 24-hour urine collection for protein or first morning urine protein:creatinine ratio*
  - *Consider ANA, hepatitis B and C testing, HIV, especially in older child*
- Mainstay of therapy in minimal change disease is oral corticosteroids
- Depending on symptoms, albumin and furosemide may be administered
- For more info: http://pedemmorsels.com/nephrotic-syndrome/ and https://www.youtube.com/watch?v=4Y4PWTXjyEc

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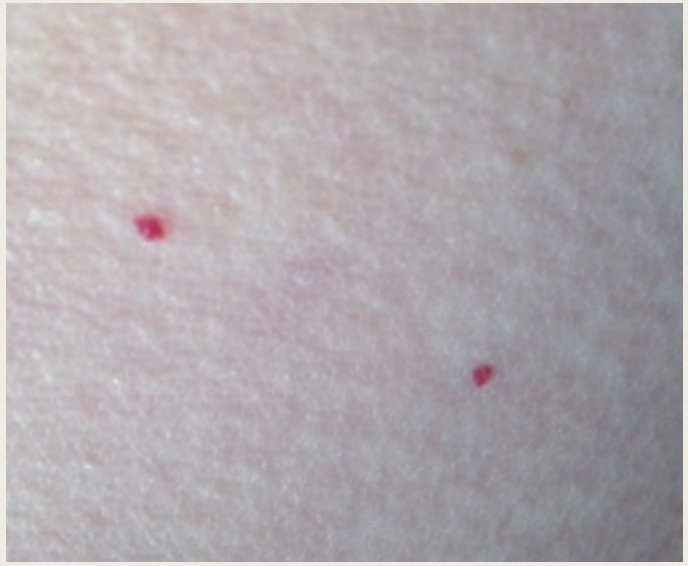
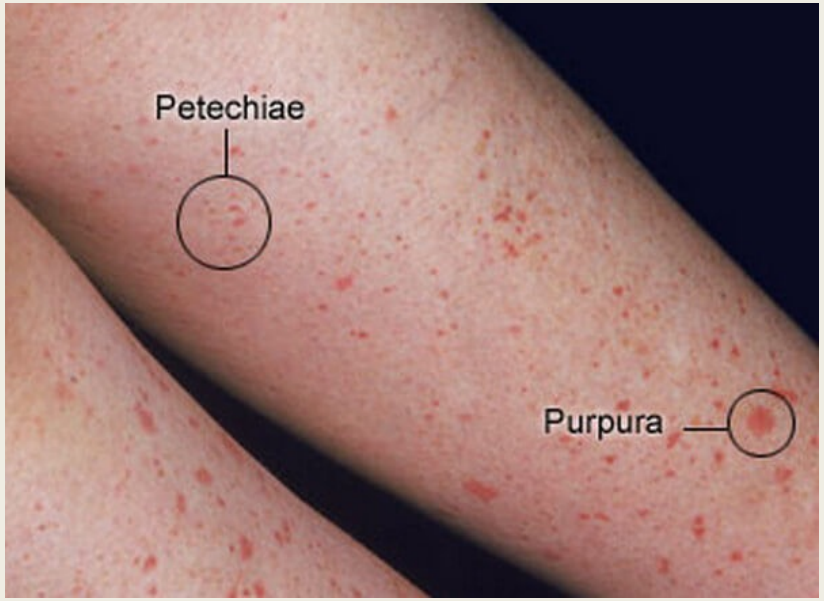


md2015.org

Meningococcemia – suspect it

- Any age, although < 6 months olds have some protection from maternal antibodies
  - *Outbreaks college students, other dorm-like living conditions, men who have sex with men*
- Fever, headache, N/V, petechiae / purpura, meningismus, leg pain, refusal to walk, cold hands & feet, pallor or mottling, shock
- Most difficult to dx early in course when symptoms similar to viral syndrome and only a few petechiae
  - *Look closely for petechiae*
  - *Keep a concerning child around for a bit of observation – meningococcemia progresses rapidly*



http://healthfixit.com

Meningococcemia – diagnose and manage it

- Initial diagnosis based on clinical suspicion, confirmed by culture
- CBC, blood cultures, lumbar puncture, DIC panel, metabolic panel
- Early IV antibiotics: cefotaxime or ceftriaxone
- Dexamethasone may be given at same time as antibiotics for suspected bacterial meningitis (LP with purulent fluid) of unknown organism, but stop once known to be meningococcus
  - *Dexamethasone beneficial only for pneumococcal meningitis*
- Supportive care with fluid resuscitation, airway and ventilatory support, vasopressors as needed for shock / sepsis
- Admit PICU and consult with intensivist, ID specialist early
- For more info: http://pedemmorsels.com/meningococcemia-and-petechiae/ and http://www.carolinascoreconcepts.com/pedemmorsels/Ped_Emergency_Medicine_Morsels/2010/Entries/2010/10/8_Meningococcemia_and_Petechiae.html

4 year old African-American girl with blood in her underpants

- 4 year old African-American girl, previously healthy, brought in because mom sees spots of blood in her underpants
- She attends daycare, and mom is concerned about sexual abuse
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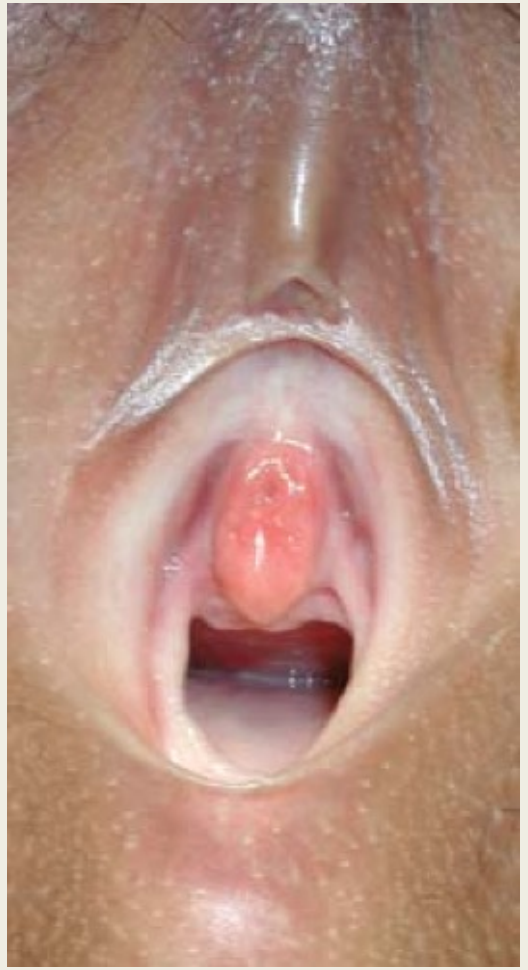
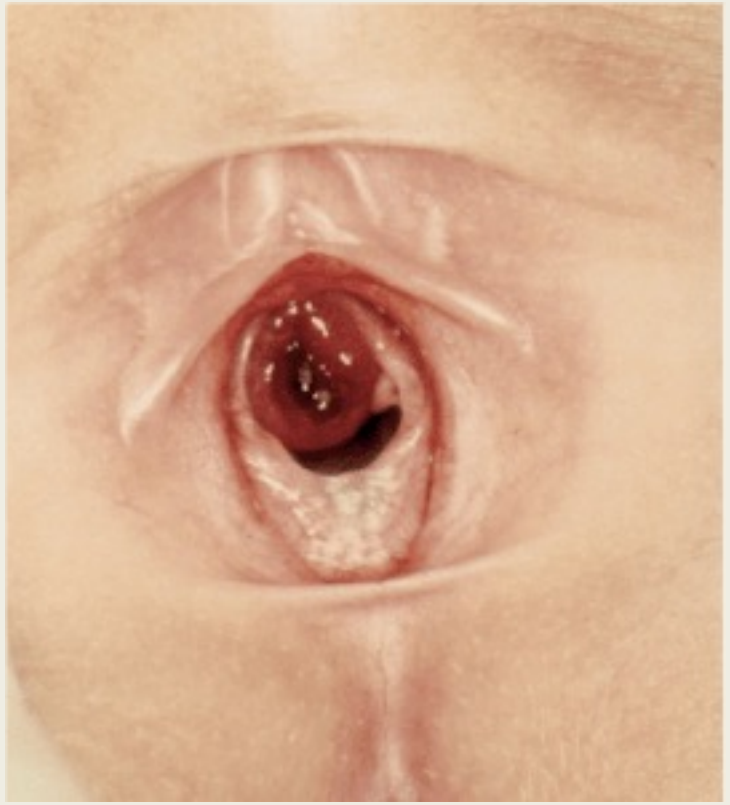
- VS: temp 37.5, HR 100, RR 22, BP 84/44
- Remainder of PE unremarkable
- Donut shape mucosa where urethra normally seen



obgynkey.com

Urethral prolapse – suspect it

- In children, almost always young prepubertal African-American girl < 10 years old, average age 4 years old
- May be asymptomatic and incidentally noticed by parent
  - *May provoke concern for sexual abuse*
- May present with bleeding, pain, dysuria, frequency, difficult urination
- Exam shows a donut-shaped mucosal mass at urethral opening



http://pemcincinnati.com/blog/quick-case-1-blood-on-the-tracks/

Urethral prolapse – diagnose and manage it

- Clinical diagnosis – you can't diagnose it without performing the genitourinary exam
- Conservative management generally recommended
  - *Sitz baths*
  - *Topical estrogen cream BID after sitz bath x 2 weeks*
  - *Follow up with PMD or pediatric urologist in 2 weeks for improvement*
  - *May apply topical antibiotic ointment as well*
- Urology consult if unable to urinate, evidence of necrosis, not resolving with medical therapy
- For more info: http://www.sciencedirect.com/science/article/pii/S2213576615000366

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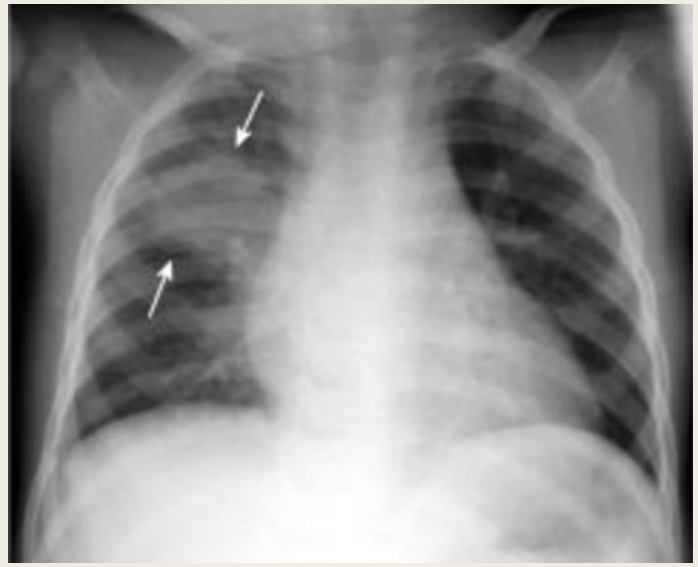

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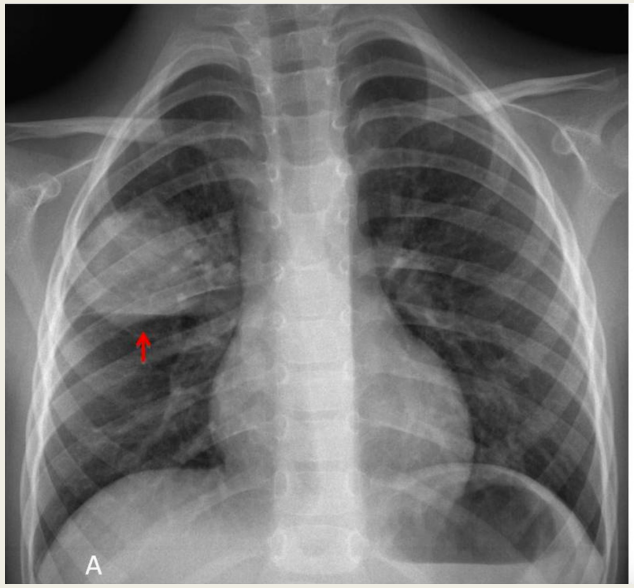
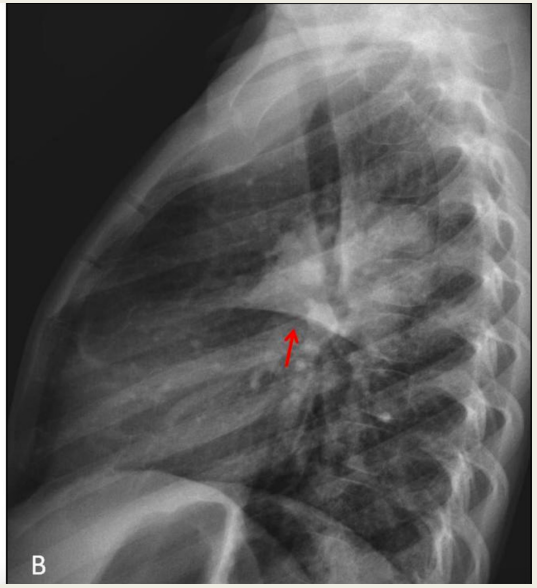
Round pneumonia – suspect it





http://blog.myesr.org/caceres-corner-case-123/

- Presents as any child with pneumonia: fever, cough, tachypnea
- Underdeveloped lung architecture contains spread of pneumonia into sharply marginated sphere
  - *Most common in < 8 years, rare in > 12 years, mean age 3-5 years*
- May be mistaken for a malignancy
- Most common cause: *Streptococcus pneumoniae*

Round pneumonia – diagnose and manage it

- Symptoms are c/w pneumonia and age is c/w round pneumonia
- CXR with spherical lesion, often with air bronchograms
  - *Typically near fissure in superior segment of lower lobes*
  - *98% solitary lesions*
  - *No air fluid levels to suggest lung abscess*
- If classic age, presentation, and CXR of round pneumonia, do NOT get a chest CT and do NOT consult an oncologist
- Treat with antibiotics as for any pneumonia and follow for resolution
- For more info: http://pedemmorsels.com/round-pneumonia/ and https://radiopaedia.org/articles/round-pneumonia-1

4 year old girl with 3 days of fever and rash to face

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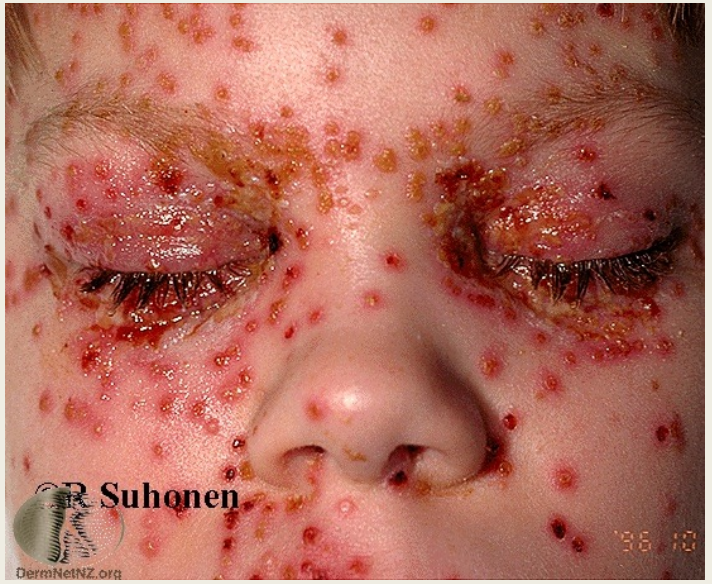
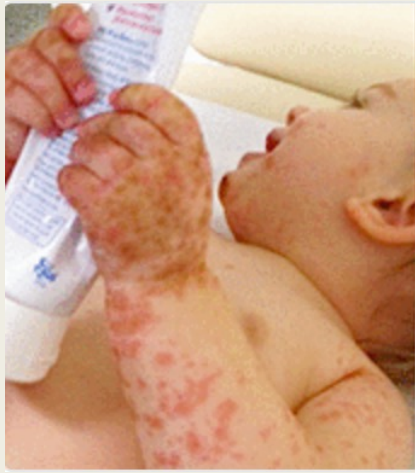


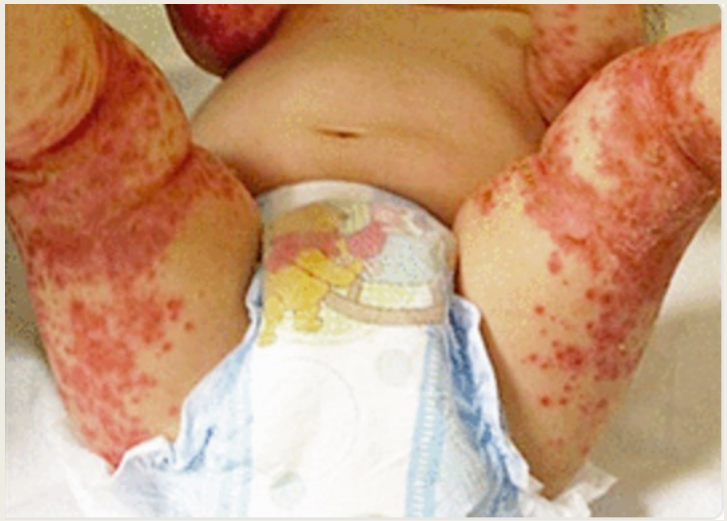
www.dermnetnz.org

Eczema herpeticum – suspect it



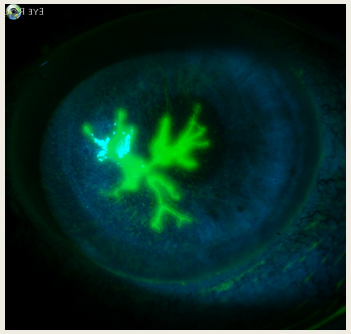
@ADC_BMJ

- Extensive vesicular rash in patient with pre-existing skin disease, commonly atopic dermatitis
  - *Don't be fooled by non-dermatomal distribution*
  - *Does not have to have active eczema lesions*
- Papulovesicular rash spreads and may rupture to form tiny punched-out ulcers
- May have mucosal vesicles also
- Fever, malaise, lympadenopathy
- Eczema coxsackium due to coxsackie virus (difficult to ddx from herpeticum) and eczema vaccinatum as complication of smallpox vaccine in either vaccine recipient or family member, have been described



Eczema herpeticum – diagnose and manage it

- May be mistaken for bacterial skin infection due to extensive lesions – suspect it based on clinical picture and papulovesicular or crusted ulcerous lesions
  - *May also be super-infected with bacterial skin infection*
- Diagnose: unroof and swab lesion for PCR or Tzanck smear
- Treat (without awaiting confirmation of diagnosis) with Acyclovir or Valacyclovir
  - *PO may be adequate with close f/u, but if extensive lesions, close to eye, admit for IV treatment and IV fluids*
- If near eye, consult ophthalmology immediately – concern for herpes keratitis
- For more information: http://pedemmorsels.com/eczema-herpeticum/ and http://www.pediatricsconsultantlive.com/pediatric-skin-diseases/eczema-herpeticum-0



Dendritic lesion of herpes keratitis from webeye.ophth.uiowa.edu

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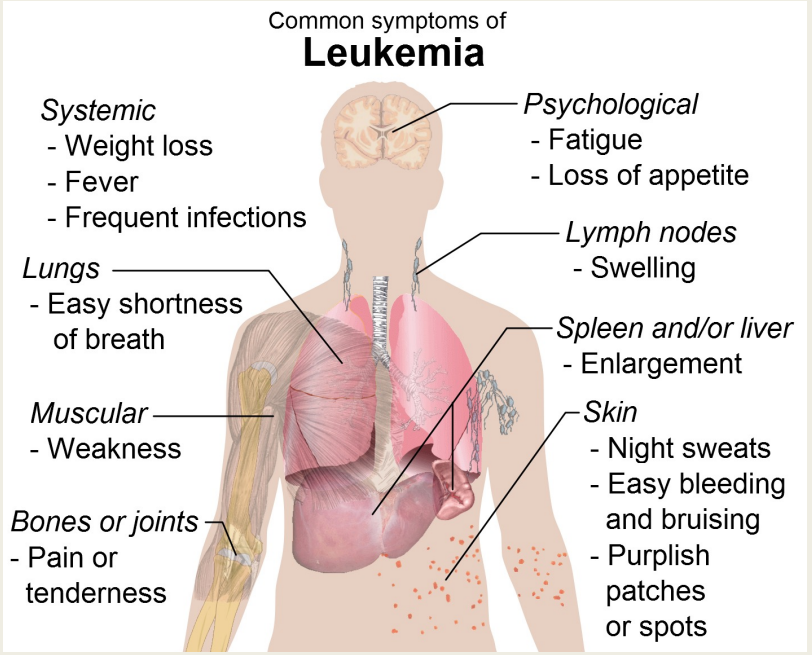
Childhood leukemia – suspect it

- Peak age: 2-5 years, increased risk: Downs, Bloom syndrome, neurofibromatosis type 1, ataxia telangiectasia syndrome
- May present with pallor (anemia), prolonged fever, fatigue, petechiae (thrombocytopenia) & bruising, bone pain and refusal to walk
- Physical exam may reveal lymphadenopathy, hepatosplenomegaly, asymmetric testicular or tonsillar enlargement
- Mediastinal mass (see CXR) may produce respiratory distress when supine, superior vena cava syndrome (swelling of the head, neck, and upper extremities)



Wikimedia Commons

Childhood leukemia – diagnose and manage it

- CBC with manual differential, electrolytes, renal and liver function tests, coags, LDH, uric acid, type and screen, cultures if febrile, CXR
- Final diagnosis will be via bone marrow biopsy
- Admit for pediatric oncologist consultation
- Consult oncologist emergently if fever and neutropenia, hyperleukocytosis/leukostasis, or tumor lysis syndrome
- Treatment will be chemotherapy
- For more info: http://pedemmorsels.com/leukemia-clues/ and http://www.pemcincinnati.com/blog/wp-content/uploads/2015/09/Ped-Onc-Emergenices.pdf

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DKA with cerebral edema – suspect it

- Rare complication of DKA in children, high mortality rate
- Risk factors: < 5 years of age, newly diagnosed diabetes (first presentation), severe DKA (very acidotic, high BUN, more dehydration)
- Most likely to occur within 4-12 hours of starting therapy for DKA, but has presented before any therapy as well
- Headache, vomiting, irritibility, lethargy, altered mental status
- Cranial nerve palsies, posturing, dilated nonreactive pupils
- Low heart rate and high blood pressure for age

DKA with cerebral edema – diagnose and manage it

- If clinically suspected and patient ill-appearing, ***do not delay therapy to obtain CT***
- CT may be normal early on, or may show edema
- Treat acutely to lower ICP, reduce risk of herniation
  - *Mannitol 1 gm/kg*
  - *3% hypertonic saline 5-10 mL/kg*
  - *Reduce rate of fluid administration*
  - *Mild hyperventilation to PCO2 35 mm Hg*
  - *Try to avoid intubation & mechanical ventilation if able*
  - *Elevate head of bed 30 degrees*
  - *Consult intensivist and neurosurgeon and endocrinologist*
- For more info: http://pedemmorsels.com/cerebral-edema-diabetic-ketoacidosis/ and http://www.emdocs.net/well-grounded-myth-association-iv-fluids-cerebral-edema-pediatric-dka/

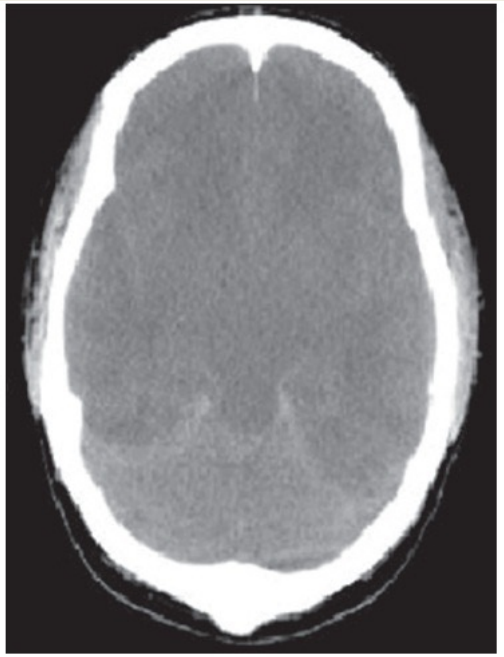
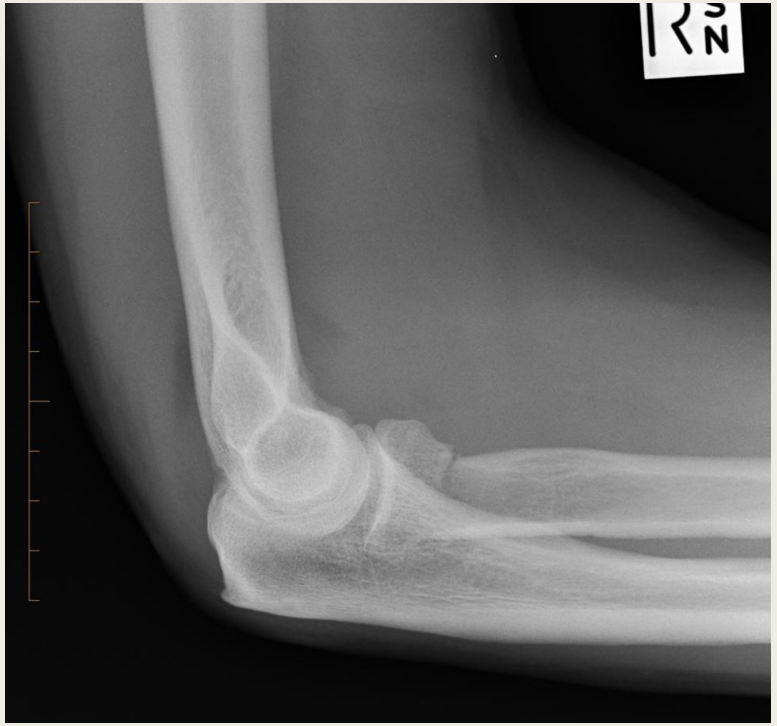


Figure – This image shows generalized cerebral edema in a patient with diabetic ketoacidosis. There is a loss of gray/white differentiation.

(Photo courtesy of http:// www.biomedcentral.com/1471-2369/5/9/figure/F1.)

5 year old girl fell off monkey bars

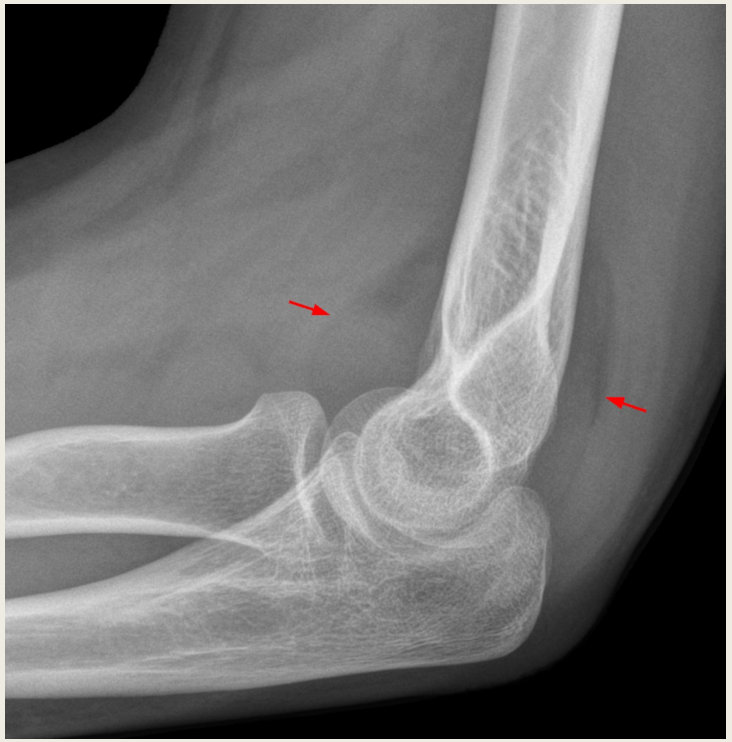
- First day of Kindergarten, 5yo girl fell off the monkey bars, landed on an outstretched hand (FOOSH)
- Had immediate pain
- Comes in with complaint of pain in the right elbow and very mild swelling
- Temp 37.6, HR 120, RR 24, BP 80/40
- Holding arm adducted and mildly internally rotated
- Difficult to localize tenderness as she cries whenever any part of her right arm is palpated
- You get an xray… diagnosis?



https://radiopaedia.org

Occult elbow fracture - suspect it, diagnose it, manage it

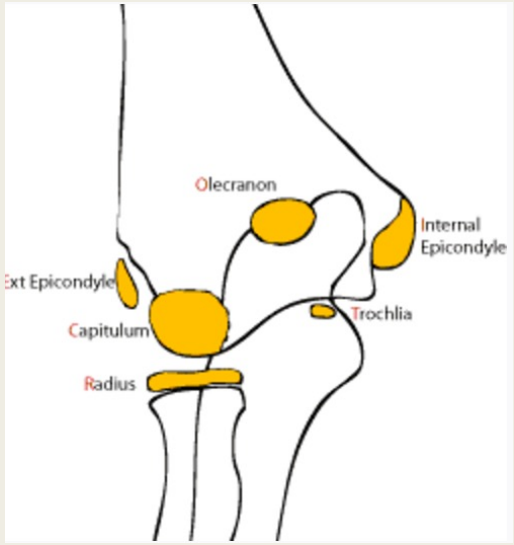
- Posterior fat pad sign is always abnormal (arrow on the right)
- Anterior fat pad that is right up against the bone may be normal, but if pushed out ("sail sign"), it is abnormal (left arrow)
- Fat pad signs don't always mean a fracture, but it is often enough that the patient should be immobilized in a splint and f/u with orthopedics
- POCUS has also been used: https://www.youtube.com/watch?v=cgB9dnHEdY4
- If no other major fracture or malalignment, splint in ED and have f/u with Orthopedist next day
- Pain management



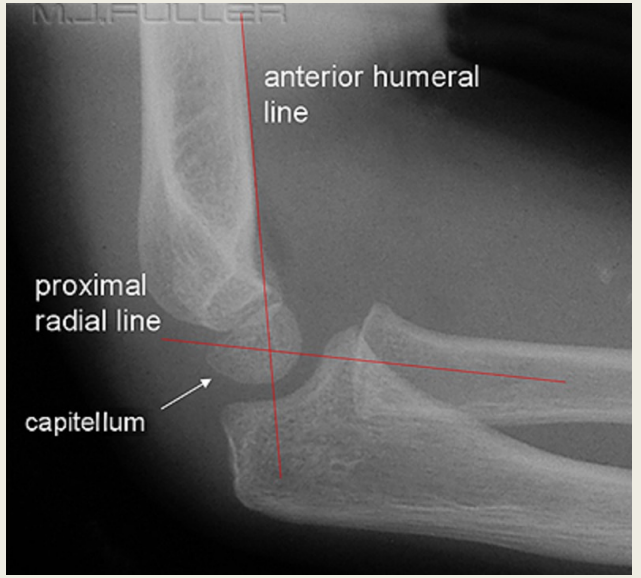
https://en.wikipedia.org/wiki/Fat_pad_sign

Pediatric elbow fractures

- Also look at elbow ossification centers (CRITOE mnemonic)
  - *Approximately appear at 1, 3, 5, 7, 9, 11 years – more important is that they appear in the order CRITOE*
  - *If out of order, it is an avulsion fracture, not an ossification center*
- Check alignment
  - *A line drawn down the anterior humeral line should split the anterior 1/3 of the capitellum from the middle 1/3*
  - *A line drawn up the center of the radius should go directly into the middle of the capitellum in any view*
- For more information: http://pemplaybook.org/podcast/pediatric-elbow-injuries/ and http://www.radiologyassistant.nl/en/p4214416a75d87/elbow-fractures-in-children.html and to test your skills at reading pediatric elbow radiographs http://www.hawaii.edu/medicine/pediatrics/pemxray/v2c18.html



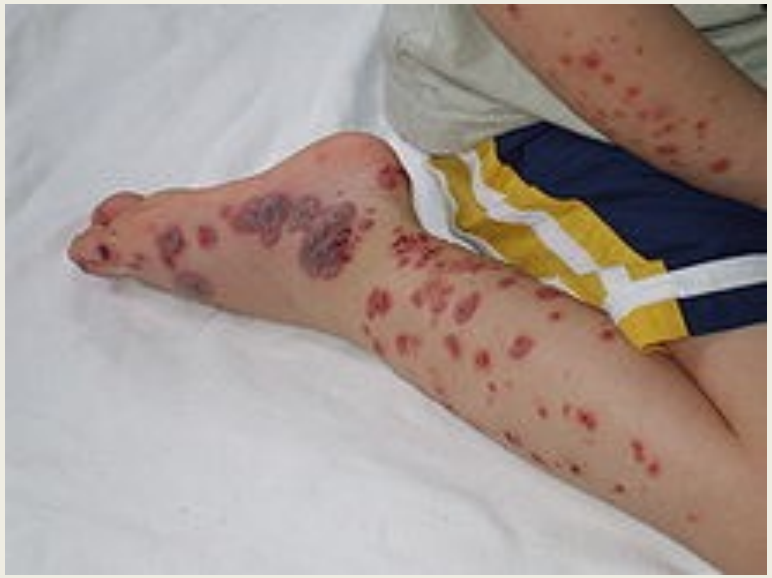
http://www0.sun.ac.za/ortho/webct-ortho/age/critoe.html



http://www.wikiradiography.net/page/The+Paediatric+Elbow

5 year old boy with rash

- 5 year old boy had a few days of nonspecific tactile fever, headache, decreased po intake, now with rash starting last night
  - *Also has complained of some joint pains and abdominal pain*
- VS: temp 37.7, HR 120, RR 24, BP 100/50
- Palpable purpura bilateral lower extremities and buttocks
- Remainder of exam is unremarkable



en.wikipedia.org

Henoch-Schonlein purpura – suspect it

- Most cases age 2-15 years, peak age 5 years
- Often nonspecific prodrome of fever, headache, anorexia
- Classic rash of palpable purpura on bilateral lower extremities
  - *May be difficult to recognize when other symptoms present and rash not yet present*
- Abdominal pain, may have bloody stools, intussusception
- Arthralgias, less commonly arthritis
- Edema, especially scrotal
- Most serious complication is renal involvement

Henoch-Schonlein purpura – diagnose and manage it

- Mostly a clinical diagnosis
- CBC to r/o thrombocytopenia, coags to r/o abnormality
- Urinalysis may show RBCs, WBCs, proteinuria, casts, and degree of abnormality correlates with degree of renal involvement
- Metabolic panel, BUN, Creatinine to assess renal involvement
- Exclude meningococcemia by clinical picture and cultures
- Patients often have elevated serum IgA and hypocomplementemia
- Ultrasound if symptoms of intussusception
- Admit if severe abdominal or joint pain, GI bleeding, renal insufficiency, hypertension
- Else, treatment is supportive with low salt diet and weekly follow-up to assess for symptomatology
  - *Consult with nephrologist*
- For more info: http://blog.clinicalmonster.com/2017/05/so-bored-i-grew-spots-henoch-schonlein-purpura/ and http://pedemmorsels.com/hsp-and-testicular-pain/ and http://pedemmorsels.com/hsp-and-intussusception/