Common Presentations in the Pediatric Emergency Department

Kelly D. Young, MD, MS
Department of Emergency Medicine
Harbor-UCLA Medical Center
Associate Professor of Pediatrics
David Geffen School of Medicine at UCLA
Case 1

Handling a case of FOOSH
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- 16 year old female soccer player fell on an outstretched hand 1 hour ago
- Complains of pain in her wrist, both medially and laterally
- On exam, tender at wrist medially & laterally, no edema or ecchymoses, sensation intact to light touch at fingertips, decreased ROM secondary to pain
Handling a case of FOOSH

- How would you describe the findings on this x-ray?
- What is included in a complete examination of the hand?

www.hawaii.edu/medicine/pediatrics/pemxray/v1c14d.html
Case 1: How would you describe the findings on this x-ray?

- A) No fracture
- B) One fracture
- C) Two fractures
- D) Dislocation
- E) Fracture and Dislocation

www.hawaii.edu/medicine/pediatrics/pemxray/v1c14d.html
The hand and wrist exam

- Inspect for edema, ecchymoses, open wounds, abrasions
- Palpate for point tenderness, radial & ulnar pulses
- Test FDP, FDS, and extensor tendon function
- Test radial, median, and ulnar nerve motor and sensory function
- Attempt to test range of motion
- Check distal neurovascular status: 2-point discrimination (5-6mm), capillary refill, color
- Check for anatomic snuffbox tenderness
- Check normal closed-fist finger alignment
Tendon function

Flexor digitorum profundus: hold MCP and PIP straight, flex just the DIP

Flexor digitorum superficialis: flex entire finger (hold other fingers straight)

Extensor tendon: extend fingers with palm face down on table
Sensory and motor function

- Median nerve: OK sign, palmar 3 ½ fingers (tip of index finger)
- Radial nerve: hitchhiking thumb, dorsal hand (posterior web between thumb & index)
- Ulnar nerve: ab/adduction, palmar 1 ½ fingers (tip of pinky)
Scaphoid fractures

- 15-35yo m/c, forceful hyperextension
  - Younger child: physis fails first
- Patients may not report severe pain, may continue to use wrist, may have other fractures
- Risk of missed fracture: high rate of complications: avascular necrosis (especially if proximal), non-union (chronic pain and dysfunction)
Anatomy of the scaphoid

- Umbilical cord-like blood supply enters at waist
- Proximal fractures highest risk for avascular necrosis
- Fracture unstable if >1 mm displacement or any angulation
- Horizontal oblique most stable orientation

www.physportsmed.com/issues/1996/08_96/gutierrez.htm
www.hawaii.edu/medicine/pediatrics/pemxray/v1c14d.html
Examining the scaphoid

Snuffbox tenderness, axial loading, palpation of tuberosity, resisted pronation or supination

Anatomic snuffbox: scaphoid located at the floor

www.physportsmed.com/issues/1996/08_96/gutierrez.htm
www.hawaii.edu/medicine/pediatrics/pemxray/v1c14d.html
Avoiding the pitfall of a missed scaphoid fracture

- Perform and document maneuvers to r/o scaphoid fracture in all upper extremity injuries
- Order scaphoid views if suspicious
- Splint anyways and refer to Ortho if exam+ but x-rays negative

www.hawaii.edu/medicine/pediatrics/pemxray/v1c14d.html
Case 2

It’s elemental, my dear Watson
It’s elemental, my dear Watson

- 4yo Latino boy c/o 2 days of severe abd pain, N/V (post-tussive, NB/NB), tactile fever. No BM x 3 days, decreased urine output.
- PMH: 1 wk PTA green nasal discharge, sore throat, dry non-productive cough. Otherwise PMH unremarkable.
- PE: VS: 40.6, 162, 22, 109/65, wt 19.2kg
  Right TM red, retracted. Throat red, no exudate. Lungs CTA. Abd soft, ND, diffusely tender, decreased BS. Rectal and GU exams WNL.
It’s elemental, my dear Watson

- WBC 29,000 (diff 94%P, 4%L, 1%M), Hgb 11.7, Hct 35.2, Plt 346
- Chem panel and RUQ labs unremarkable
- UA, Ucx neg
- Pulse oximetry 96% room air
Additional history taken

- Patient was taken to a “curandera” for abdominal pain and given 1 teaspoon of silvery substance by mouth.

- Empacho: folk illness of blocked digestion, treated with massage, manzanilla tea, sometimes lead (greta, azarcón) or mercury.
Mercury toxicity

Three forms

- Organic (e.g. methylmercury) found in antiseptics, fungicides, industrial run-off, contaminated foods (especially fish)
  - Neuropsychiatric symptoms from chronic toxicity
- Inorganic mercuric salts from batteries, industry specific (e.g. tattooing)
  - GI exposure = corrosive complications: hematochezia, vomiting, severe abd pain, shock
Mercury: a folk remedy for abdominal pain

- Inorganic elemental from thermometers
- Oral or rectal elemental Hg = no toxic effect; no specific therapy indicated
- Inhaled elemental Hg may cause pulmonary symptoms; supportive care
- Elemental Hg as a Mexican-American folk remedy for abdominal pain previously reported by McKinney PE, *J Toxicol Clin Toxicol* 1999;37(1):103-107 – may lead to appendicitis
So what’s the diagnosis?
Case 2: So what’s the diagnosis?

- A) Appendicitis
- B) Pneumonia
- C) Functional abdominal pain
- D) Constipation
- E) Mercury toxicity
Pneumonia – may see on KUB

http://www.hawaii.edu/medicine/pediatrics/pemxray/v1c03.html
Non-GI causes of abdominal pain

- Lower lobe pneumonia
- Asthma
- Strep pharyngitis
- Sickle cell crisis
- Toxic ingestion
- Viral (e.g. infectious mononucleosis)
- Leukemia
- Envenomations
- Testicular torsion, hernia
- PID, ovarian torsion, ectopic pregnancy, Mittelschmerz, imperforate hymen
- UTI, renal stone
- Constipation
- Henoch-Schönlein Purpura
- Zoster (before rash)
Case 3

Cyanotic, pallid, pale
Cyanotic, pallid, pale

- 19mo Latina female BIB mom for daily episodes of crying, turning white, then passing out, started 9 days ago
  - Episodes last approximately 2 minutes
  - Always occur with crying about something she’s not allowed to have
  - No generalized tonic-clonic activity or tongue biting
  - Brought in because had 3 episodes that day
- Physical exam unremarkable except slightly pale, VS stable, weight 12.4kg, PMH unremarkable
Mom has a video...
Breath-holding spells

- Self-limited, harmless, up to 5% of children
  - Ddx includes seizure disorder, cardiac dysrhythmia (long QT), syncope
- Cyanotic type usually precipitated by temper tantrum (anger, frustration) – 60%
- Pallid type usually provoked by sudden, unexpected event; only a little crying – 20%
- Mixed 20%
- Epidemiology: usually 6-18mo at first spell, peak 1-2yo, 50% resolve by 5yo, 90% by 6yo
Case 3: What work-up would you do?

- A) No tests, just reassurance and observation
- B) Screening laboratory tests: CBC, Chemistry panel
- C) Head CT and EEG
- D) EKG
- E) Screening lab tests, head CT, EEG, and EKG, and referral to pediatric neurology
Work-up? Admission?

- Atypical history or epidemiology (e.g. first spell in <6mo or >3yo) deserves further work-up (brain imaging)
- Long QT: screening EKG if spell precipitated by exercise or excitement, if family history of severe syncope, sudden death, or deafness, if recent incriminating medications
- EEG: if features suggestive of seizure
  - Consider asking parent to videotape episode
- What about a CBC?
Cyanotic, pallid, pale

- WBC 10.6, Hgb 7.5, Hct 22.2, Platelets 503,000, MCV 79.6, RDW 11.7
- Iron 115 ug/dL (35-140)
- Ferritin 100.4 ng/mL (11-306.8)
- Reticulocyte count < 0.1%
- Bone marrow: erythroids moderately decreased with variable distribution, storage iron decreased, myeloids & megakaryocytes normal
- Dx: transient erythroblastopenia of childhood
Breath-holding spells & anemia

- Association with anemia observed since 1960’s
- 91 children with breath-holding spells (60 cyanotic): 63 had iron-deficiency anemia = treated with iron x 3 mos
  - 84% of Fe-treated vs. 21% of not treated had significant decrease in spells
- 30 children with breath-holding spells and 30 matched controls
  - 70% of patients vs. 33% of controls had iron deficiency anemia (p=0.04)
- Case report: resolution of breathholding spells with anemia treatment.
  - Colina KF, Abelson HT, J Pediatr 1995;126:395-7
Breath-holding spells & anemia

- Autonomic dysregulation hypothesized as pathophysiologic mechanism for breathholding spells
  - Iron deficiency $\rightarrow$ decreased oxygen carrying capacity $\rightarrow$ affects myocardial oxygenation and cardiac recovery from brief cardiac pauses
- Treatment does not reduce spells in all children
- Iron may reduce spells in non-anemic children
- Trial of iron 6 mg/kg/day x 3 months
Case 4

Isolated trauma, or is it?
Isolated trauma, or is it?

- 6yo Latino male BIB father 2 days after falling from a ladder 5-6 feet height, landing on left side of body with left arm outstretched.
- 1 day PTA seen by PMD with swelling and pain left wrist, referred for xray, dx’d fracture, referred to ED for casting.
- VS: 101.4, 132, 28, 116/79, left forearm swollen distally, left hip bruise, mild tenderness LUQ abdomen. UA 12 RBC/hpf, Hgb 11.4
Isolated trauma, or is it?

- 13yo Latino male BIB parents, fell 6-8 feet out of a bunkbed at camp 2 days ago, h/o sleepwalking
- Complained of left head, chest, back, hip pain the next AM, seen by camp medical director, given NSAIDs and told to follow-up with PMD when arrives home from camp
- VS: 103, 98, 24, 104/62. Left temporal hematoma, left eyebrow abrasion, bruise left hip, abrasion left knee, mild tenderness LUQ, diffuse rebound tenderness. UA 11 RBC/hpf, Hgb 9.9
August 26, 1996

Ms. [Blurred] or Mr. [Blurred]

On Saturday night, [Blurred] was sleepwalking and fell from the loft where he was sleeping. [Blurred] now has a bump on the back of his head. He was checked for a concussion, but did not show any signs of one. I checked him many times on Sunday and found no problems. [Blurred] just had a bad headache. I also called the Avalon Hospital to check his symptoms and see if we should bring him in, to have them look at him. They said he was O.K., but he should be seen by his doctor when he gets home. If you have any questions please feel free to call me at Camp [Blurred] (310) 510-0466.

Sincerely,

[Signature]

[Blurred] Cohen

Camp Medical Director
Xray of the arm is obtained
Case 4: What should you do next?

- A) Refer patient to orthopedics for casting
- B) Refer patient to surgery for exam
- C) Obtain abdominal ultrasound
- D) Obtain abdominal CT scan
- E) Follow serial hematocrits every 1 hour
Abdominal CT scan

www.trauma.org/imagebank/imagebank.html

Large splenic laceration

www.emedicine.com/radio/topic645.htm#section~pictures

Small hilar laceration
Spleen trauma

- Mechanism: vehicle-related m/c, but can occur from falls, sports-related trauma
- Careful examination and close follow-up of children with suspected abdominal trauma
- Fever may occur due to reabsorption of hematoma; hematuria is a marker for abdominal injury
- CT scan with contrast
- Management conservative, admit, serial Hgb, surgeon, transfusion only if unstable or Hgb < 7.0
- True delayed rupture of the spleen rare, but occurs
Case 5

Surprise!
Surprise!

- 17yo African-American female BIB parents for 1 month history of increasing frequency of headaches
- PMH significant for migraines since age 10
- Headaches R forehead, behind eye, associated with mild photophobia, blurred vision at onset. Do not wake from sleep. No N/V.
- VS: 36.8, 70, 18, 127/74, wt 58.3kg, neuro exam nonfocal, fundi discs sharp, rest unremarkable
Headache types

- **Migraines**
  - Classic aura (20%), unilateral, throbbing
  - Often assoc N/V
  - Children as young as preschool, 5-10% school age children
  - More often bilateral in kids
  - FH for migraines, HA
  - Pain often relieved by sleep

- **Cluster**
  - Late adolescent, M>F
  - Sudden onset, unilateral, temple or periorbital, periodic
  - May be assoc with Horner’s syndrome

- **Tension**
  - Bandlike occipital, frontal, dull
  - Recent stressor
What are parents worried about?

- Signs of brain tumor
  - Onset of headaches < 6 months ago
  - Awakens patient at night
  - Associated with vomiting, especially early AM
  - Progressive (increasing severity, frequency, duration)
  - Clumsiness, ataxia, blurred vision
  - Behavioral changes
  - Polydipsia, polyuria (craniopharyngioma)
Other causes of headaches

- Fever
- Caffeine withdrawal
- Eye strain
- Tight hair braids
- Strep pharyngitis
- Sinusitis
- Dental pain / abscess
- Hypertension

- Hypoxia (CO poisoning)
- Meningitis or encephalitis
- Pseudotumor cerebri
- Intracranial hemorrhage
- Cavernous venous thrombosis
Case 5: What work-up would you do?

- A) Head CT or MRI
- B) Head CT or MRI and lumbar puncture
- C) Hematocrit, bedside glucose, urine pregnancy test
- D) All of the above
- E) No tests, reassurance and observation
ED work-up for headache

- Detailed history of headache onset, characteristics, associated symptoms
- Thorough physical exam including head and neck exam, complete neurologic exam, fundoscopic, BP, visual acuity
- Brain imaging if concern for mass lesion or intracranial hemorrhage
- LP if concern for SAH, CNS infection, pseudotumor cerebri
- Urine pregnancy test in child-bearing age female
Surprise!

- Urine pregnancy test x 2 positive in ED
- Patient informed without parents present
  - Her decision whether to inform parents
  - If <14yo and partner 14yo+, or 14 or 15yo and partner 21yo+, must report to DCFS
  - Be careful when charting – privacy issues
- Stat referral to adolescent clinic to address whether will keep baby
Case 6

Motorcycle Fever
Motorcycle fever

- 5yo HF presents with 1 week of fevers to 102-104 daily
  - Seen in ED 2 days ago with bilateral purulent conjunctivitis and prescribed antibiotic eye drops
  - Previously healthy
  - Immunizations up to date
  - No known ill contacts
Motorcycle fever

- Fever 39.3 in ED, remainder VSS
- Bilateral nonpurulent conjunctivitis
- 1.5cm left anterior cervical node palpable
- No rash
- No hand/foot swelling, erythema or peeling
- No perioral or intraoral findings
- Only 2/5 criteria – is it Kawasaki’s?
Classic Kawasaki’s disease

- High fevers for 5 or more days
- Erythema of palms/soles, edema of hands/feet, peeling at 2-3 weeks
- Rash: variable (morbilliform, scarlatiniform, E. multiforme-like)
- Conjunctivitis: nonpurulent, bulbar
- Cracked lips, erythema, strawberry tongue
- Cervical node: unilateral, > 1.5cm
Classic Kawasaki’s disease
Why does it matter?

- KD is a systemic vasculitis
- Most common form of acquired heart disease in children
- Early therapy can reduce risk of coronary artery aneurysm from 25% to <5%
Case 6: What should be done next?

- A) Refer to pediatric infectious disease specialist
- B) Order laboratory tests
- C) Order echocardiogram
- D) Refer to pediatric cardiologist
- E) Send home and perform repeat evaluation in 1-2 days to see if more KD symptoms develop
Incomplete or atypical Kawasaki’s

- 28% of patients in one study
- Risk factor for delayed diagnosis
- Suspect if fever and 2-3 classic criteria
- Suspect if < 6 months and fever 7 or more days, even if no other criteria
- Risk stratify using lab criteria
CRP, ESR
CBC
Albumin, ALT
UA

TABLE 2

**Laboratory criteria for diagnosing KD**

<table>
<thead>
<tr>
<th>Primary criteria (systemic inflammation)</th>
</tr>
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<tbody>
<tr>
<td>C-reactive protein &gt;3 mg/dL</td>
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<tr>
<td>Erythrocyte sedimentation rate &gt;40 mm/hr</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Supplementary criteria</th>
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</thead>
<tbody>
<tr>
<td>Albumin ≤3 g/d</td>
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<tr>
<td>Anemia for age</td>
</tr>
<tr>
<td>Elevated alanine aminotransferase level</td>
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<tr>
<td>Platelet count &gt;450 x 10^9/μL after 7 days of fever</td>
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<tr>
<td>White blood count &gt;15 x 10^9/μL</td>
</tr>
<tr>
<td>Urine &gt;10 white blood cells/high-powered field</td>
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</tbody>
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Adapted from Neuburger JW, Takahashi M, Gerber MA, et al.

Our patient

- **Primary criteria**
  - CRP 1.62 (<3)
  - ESR 70 (>40)

- **Secondary criteria**
  - Albumin 3.4 (>3)
  - Hemoglobin 10.5
  - ALT 13
  - Platelet count 496
  - WBC 12.6 (<15)
  - UA WBC 8 (<10)

1 primary, 2 (<3) secondary criteria

Echocardiogram done
Normal echo, ASO titer positive
Key Points

- Perform and document maneuvers to rule out scaphoid
  fracture
- Keep in mind non-GI causes of abdominal pain
- Check for iron deficiency anemia in breathholding spells
  and consider empiric therapy with iron
- Perform a careful exam to rule out multisystem trauma in
  patients with injury
- Perform urine pregnancy test in adolescents with
  nonspecific complaints or worsened symptoms of chronic
  disease
- Work-up for atypical Kawasaki’s if fever 5 or more days,
  even if symptoms not classic