Abuse or Not Abuse: What is the Answer?
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Disclosure
• Natalie Kissoon, MD has no relationships with commercial companies to disclose.

Objectives
• Identify suspicious injuries
• Assess suspicious injuries
• Choose appropriate work-up in evaluation of injuries

Physical Abuse
• Cutaneous injuries
• Fractures
• Abusive head trauma
• Abdominal trauma

Physical Abuse
• Cutaneous injuries are most common presentation
  • Bruises, lacerations, abrasions, bites, burns
  • 50-60% of victims have skin findings
• Fractures
• Abusive head trauma
  • Most fatal form of child abuse
• Abdominal trauma
  • Second most fatal form of child abuse

What is the Mechanism of the Injury?
• Blunt force trauma
• Penetrating trauma
• Friction
• Heat
• Shear
• Compression
• Tension
• Bending
• Twisting
• Shaking
• Impact
Evaluation of Injuries

- What is the mechanism?
- History ≠ mechanism
- History ≠ development of child
- Other injuries
- Patterned

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- 70-96% African American and Asian infants
- 5% Caucasian infants

Dermal melanosis
- Location:
  - Most frequently sacral-gluteal region
  - Shoulder, flank, extremities
  - Gray-blue macule with indefinite borders
  - First years of life

Sentinel Injury

- None in not abused infants
- 8% with intermediate concern for abuse
- 27% of definitely abused
  - Bruising—80%
  - Intraoral injury—11%
  - Fracture—7%
  - 66% ≤3 months
  - 95% ≤7 months
- Medical provider aware of sentinel injury in 41.9% of cases

Bruising anywhere on an immobile infant is concerning for physical abuse
Bruising

- Those who don’t cruise, rarely bruise
- Children bruise commonly
  - Legs, knees, forearms, elbows, forehead
- Children bruise uncommonly
  - Thorax including buttocks and genital region, chin, ears, neck
- Other areas of concern
  - Intraoral, subconjunctival hemorrhage, cheek, eyelids

Neuroblastoma

- Clinical presentation
  - Systemic complaints
  - Weight loss
  - Fever
  - Pain
  - Paraneoplastic syndromes
  - Metastasis
  - Liver
  - Periorbital bones

Periorbital Ecchymosis

- May be caused by trauma
  - Basal skull fracture
  - Forehead contusion
- Mimics an injury resulting from direct periorbital trauma from physical abuse

Neoplasm of neural crest cells of the adrenal medulla and sympathetic nervous system **Neuroblastoma**

- Median age diagnosis: 17 months
- Most common extracranial tumor
- Clinical presentation
  - Asymptomatic
  - Abdominal pain ± mass
Accidentally injuries are rarely patterned

Patterned Injury
• Suggestive of an object
• Do not have to determine what object is used
• Can make generalizations about the object
  • Flat
  • Textured
  • Flexible

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Immobile infant

Buttocks

Patterned injury

History is Key

- Absent
- Inconsistent
  - With injury
  - With development of child
- Changing
- Cell mediated delayed hypersensitivity reaction
- Psoralens
  - Lemons, limes, dill, figs, parsley, parsnip, carrots, celery
- Erythematous macule ± bullae
- Can mimic bruises or burns
- Last months-years

Phytophotodermatitis vs Slap Mark
- Most common skin infection worldwide
- Non-bullous
  - >70% of cases
  - Staph aureus, group A beta-hemolytic strep
  - Usually on face
  - Need preceding break in skin
  - Regional adenopathy

**Impetigo**

- Bullous
  - Infants and young children
  - Staph aureus
  - Can be anywhere on body
  - No preceding break in skin

**Impetigo**

- Ecthyma
  - Ulcerative
  - Through epidermis to deep into dermis
  - "punched out" lesion, yellow crust, raised red borders

**Impetigo**

- Accidental scald burn

**Impetigo**

- Cigarette burn

- Ecthyma
Abusive vs. Accidental Burns

- Scalding by hot liquid is the most common agent for both accidental and inflicted burns in childhood
  - Abusive burns are most commonly due to immersion in hot tap water
  - Symmetric with sharp demarcations
  - Usually without splash marks
- Accidental burns are usually smaller, less severe, without a pattern, with an irregular depth

Where is the burn?

- Exposure of the skin to diarrhea induced by Ex-Lax (Senna)
- History
- Laxative induced Burns
- Exam
  - Diamond shaped lesion
  - Linear borders lined up with diaper edge
  - Sparing of skin folds
Laxative Induced Burns

Inflicted immersion burn

- 12 month girl with right leg swelling

- Per mother, she is crawling and pulling to a stand as normal

- You observe her crawling on the hospital bed

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More History

- Developmental delay recognized at 2 months
- Self-mutilation with gum chewing, biting fingers and lips
- Concern of congenital insensitivity to pain syndrome

Any fracture in a normal child of any age, without a plausible accidental mechanism of injury, is concerning...

...Any fracture can be caused from abuse

Specificity of Radiologic Fractures*

- High Specificity
  - Classic Metaphyseal lesions (CML)
  - Rib Fractures, especially posteromedial
  - Scapular Fractures
  - Spinous process fractures
  - Sternal fractures

- Moderate Specificity
  - Multiple, especially bilateral
  - Fractures of different ages
  - Epiphyseal separation
  - Vertebral body fractures and subluxations
  - Digital fractures
  - Complex skull fractures
  - Pelvic fracture

Specificity of Radiologic Fractures*

- Common but low specificity
- Subperiosteal new bone formation (SPNBF)
- Clavicular fracture
- Long bone shaft
- Linear skull fracture

• 3 month old ex-31 week twine male with new onset seizures

• Diagnosed with severe hemophilia A in the NICU

**Evaluation of Injuries**

- **Lab work**
  - CBC with platelet, PT/PTT, INR, PFA-100, LFTs, amylase, lipase, UA
  - Consider Mg, phos, Ca, alk phos, VitD 25-OH

**Evaluation of Injuries**

- **Complete skeletal survey**
  - All children ≤ 24 months
  - Consider in older child if egregious injuries, non-verbal child or other clinical indications
  - Series of 22 x-rays

**Evaluation of Injuries**

- **Head CT**
  - All children ≤ 12 months
  - Do 3D reconstruction
  - Consider in older child if symptomatic, polytrauma or other clinical indication

- **MRI brain**
  - If abnormal head CT

- **Ophthalmology exam**
  - If intracranial blood
Evaluation of Injuries

- **Abdomen/pelvis CT**
  - If abdominal trauma suspected, polytrauma or AST/ALT >80