PHYSICAL ABUSE INJURIES
Agenda

- First Things First
  - First Clues
- The Iceberg Concept
- Specific Injuries
  - Bruising in Infants and Children
  - Burns
  - Fractures
  - Abusive Head Injury
Hinkiness

- Hinky
  - The instant of knowledge when one becomes deeply aware there is...evil...afoot.

Urban Dictionary
First Things

- **Ask Questions**
  - So, what happened?
  - Keep the “hinky meter” plugged in.

- **Documentation**
  - Answers in quotation marks
  - Photographs
Clinical Approach to Pediatric Trauma
Physical Abuse; be afraid of what you can’t see

- Fractures
  - Skeletal Surveys
  - All children under 2yo in whom there is a suspicion of physical abuse

- Intracranial Injuries
  - CT, MRI

- Abdominal Visceral Injuries
  - Ultrasound
  - Abdominal CT
Clinical Approach to Pediatric Trauma
Clinical Approach to Pediatric Trauma
Bruising in Infants and Children

Physical Abuse Injuries
Bruising in Infants and Children

- Age of child
- Location
- Pattern bruises
Dating Bruises

- You can’t
- Dating “charts” not based on good science

![Bruises Chart]

- Purple (1–5 days)
- Green (5–7 days)
- Yellow (7–10 days)
- Brown (>10 days)
Bruising As a Motor Skill

- 3 months - beached whale
- 4 months - rolling over
- 6 months - sitting up
- 8-9 months - crawling
- 9-12 months - cruising
- > 12 months - crashing and burning
Example case: 6 week old infant with bruising of chest and abdomen
Bruising in Infant

- 11 week old infant with flank bruising - chest “popped” when held
- Fingertip bruising from forceful grasping
Plantar foot bruising

- 6 week old infant evaluated for bilateral plantar bruising
Plantar bruising
Birthmarks vs Bruising

- Slate Gray Spots
  - Very common in African American, Asian, and Hispanic Infants
  - Present at birth
# Bruising in Ambulatory Children

## Location of Bruises

<table>
<thead>
<tr>
<th>Accidental</th>
<th>Abusive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shins</td>
<td>Upper Thighs</td>
</tr>
<tr>
<td>Hips</td>
<td>Trunk</td>
</tr>
<tr>
<td>Lower Arms</td>
<td>Upper Arms</td>
</tr>
<tr>
<td>Spinal Prominences</td>
<td>Sides of Face</td>
</tr>
<tr>
<td>Forehead, chin</td>
<td>Ears, buttocks, genitalia</td>
</tr>
</tbody>
</table>
Bruising and Child Abuse

- Positive leotard sign
Bruising and Child Abuse

- Accidental shin bruising
Unique Challenges of Pediatric Trauma

- Big Headed People
Periorbital Bruising

- Periorbital bruising
Bruising in Children

- 2yo child with bruising
Bruising and Child Abuse

- Abusive bruising
  - Truncal bruising in fatal cases
15 month old child with abdominal bruising

Abdominal CT scan showing complex liver injury
Impact Trauma

- Earlobe bruising
Facial Bruising

- 6 month old child brought to ED for scalp swelling after allegedly falling from bed.
Facial/Earlobe Bruising

- 6 month old brought to ED for scalp swelling; family stated infant fell out of bed.
Facial/Earlobe Bruising

- 6 month old infant brought to ED for scalp swelling. Family states infant fell out of bed.
Pattern Injuries and Physical Abuse

Physical Abuse Injuries
Injuries Caused by the Human Hand

- Wraparound injuries
Injuries Caused by the Human Hand

- Slap marks
Injuries Caused by the Human Hand

- Grasp marks
Spanking Injuries

- Linear buttock bruising.
Pattern Injuries

- Shape of injury explains mechanism
Pattern Bruising
Periorbital Bruising
Periorbital Bruising
Periorbital bruising
6 year old female with periorbital bruising and alopecia. CT shows diffuse scalp swelling.
Periorbital Bruising/Pattern Injuries
Periorbital Bruising and Pattern Injuries

- 6 year old female with periorbital bruising and pattern injury to knees
Bruising and Abuse

- Bruising that can mimic abuse (cont)
  - Diseases that interfere with normal blood clotting
Bruising and Abuse

- Bruising that can mimic abuse
  - Coining, cupping
Bruising and Abuse

- Bruising that can mimic abuse (cont)
  - Increased pigmentation of skin
Bruising and Abuse

- Bruising that can mimic abuse (cont)
  - Injuries caused by medical care
Abusive Burns in Children

- 3 year old male - both hands immersed in hot water by Mother as punishment
Burns From Hot Objects

- Abusive cigarette burn
Burns From Hot Objects

- Moxibustion
Burns from hot objects

- Moxibustion
Conditions That Can Mimic Abuse

- Perianal chemical burn after ex-lax ingestion
Skeletal Injuries

Physical Abuse Injuries
Low Specificity Fractures

- The Clinical Conundrum: Fractures common in both abusive and accidental trauma
  - Femur fractures
  - Tibia/fibula fractures
  - Radius/Ulna fractures
  - Skull fractures
Femur Fractures

- 2 month old infant brought to ED refusing to move left leg.
Skeletal Surveys

- Children under 2 yo with injuries suspicious for physical abuse
- Children 2-5 yo with serious child abuse injuries
- Not indicated for children > 5yo
- Repeat skeletal surveys in 2 weeks
- Uncertain areas
  - Severe neglect
  - Intoxication with drugs of abuse (eg, methamphetamine)
High Specificity Fractures for Abuse

- Classic Metaphyseal Lesions
- Rib Fractures
- Scapular Fractures
- Sternal and Pelvic Fractures
- Hand and Foot Fractures in infants
Classic Metaphyseal Lesion
Scapular Fractures
Acromial Fractures
Rib Fractures in Children

- 5 month old infant
2 month old with left femur fracture
Femur Fractures

- Largest bone in the body
- Often thought that “high energy forces” required to cause a fracture
Exersaucer related skeletal injury
Fracture Associated with Exersaucer

Transverse Metadiaphyseal Femur Fracture in Young Infant

4 month old infant in bouncy seat on bed; bouncy seat with infant falls forward off bed. Infant found to have bruise on left kneecap
4 month old infant in bouncy seat; bouncy seat with infant falls forward off bed. Infant found to have bruise on left kneecap.
Toddler’s Fracture

- Usually a subtle, spiral or oblique non-displaced fracture of the mid or distal tibia.
- Can occur from seemingly innocuous trauma
- May have a history of a limp with no witnessed trauma
- NOTE: you have to be toddling to have a “toddler’s” fracture.
Toddler’s Fracture
9 month old cruiser presents with 2 weeks of reluctance to bear weight on left leg. Prior xray of leg 1 week ago reportedly normal.
He returns to ED 2 weeks later with sudden onset of lethargy
Toddler’s Fracture
3 yo boy fell while rough housing with brothers
Spiral Femur Fractures

2 yo child stepped on a toy, slipped and fell; Immediately cried and could not walk.
Abusive Head Injuries

Physical Abuse Injuries
What do we call it?

- Shaken Whiplash Syndrome
- Shaken Baby Syndrome
- Shaken Impact Syndrome
- Abusive Head Trauma
- Inflicted Traumatic Brain Injury
- Inflicted Neurotrauma
Clinical Presentation

- Variable, depending on amount of brain damage
  - Irritability, lethargy, limpness
  - Seizures (40%–70%)
  - Feeding difficulty, vomiting
  - Hypoventilation, hypothermia, bradycardia
  - Coma, decreased responsiveness, death
Clinical Presentation

- More subtle presentations include vomiting, general irritability, developmental delay, increasing head circumference.
  - 1/3 of 173 patients with head injuries had been seen by physician after AHT and the diagnosis was not recognized.
  - AHT was more likely to be unrecognized in very young white children from intact families and in children without respiratory compromise or seizures.
Abusive Head Trauma

- Retinal Hemorrhages (RH)
Head Trauma

- 2 ½ month old infant taken to pediatrician by Mother because was lethargic. Seized in pediatrician’s office
Head Trauma

- CT scan of head showed multiple skull fractures
Head Trauma

- CT scan of chest showed multiple rib fractures
Head Trauma

- The infant had seizures that were difficult to control and signs of increasing intracranial pressure.
- She was taken to OR for a decompression craniectomy.
- There was no explanation for the injuries.
Head Trauma

- She remained in the hospital for 6 weeks.
- One year later (now 14 months old), she cannot sit, visually focus or follow, babble, or grasp with her right hand.
- She has daily seizures.
Head Trauma

- Head CT scan 10 months after the injury
Case Presentation

- Paramedics respond to a 911 call.
- A mother reports that one of her 7 week old twin infants is “twitching”.
- On arrival, Mother can’t remember which twin twitched.
- The infants appeared stable.
- Mother was instructed to take the twins to her “regular doctor”.

Case Presentation

- After the paramedics left, one of the infants began twitching again.
- Mother drove the infant to the ED.
- In the ED, the infant had a generalized seizure.
- After stabilization, the infant had diagnostic studies performed.
Case Presentation

- Mother stated the infant was previously well; delivered vaginally at 37 weeks gestation
- No history of trauma or significant illness
- No cutaneous injuries on examination
Case Presentation

- Further evaluation discloses:
  - Bilateral retinal hemorrhages involving multiple layers out to the ora serrata
  - Vitreous blood
  - Skeletal survey demonstrated a linear skull fracture
  - Coagulation studies, LFT’s, amylase normal
Case Presentation

CT Scan of Head
Head Injury: Abuse or Accident?

- 11 month old female presents with seizures and rapidly worsening mental status
- CT scan initially read as acute and chronic subdural hematomas
Case Presentation

- 38 day old infant with focal seizures
- Parieto-Occipital skull fracture
Case 3

- Twin B
- Parieto-occipital skull fracture
Case 3

- Twin B
Case 3

- Twin B-asymptomatic
- Extensive retinal hemorrhages
Head Injury: Abuse or Accident?

- Mother states infant was restrained in an infant seat that had been secured to a chair at the dinner table.
- Infant put her feet up against the edge of the table and pushed backward, striking back of head against floor.
- Initially cried; then became lethargic, unconscious, and seized within 15 minutes.
Head Injury: Abuse or Accident?

- Law enforcement scene investigation
Head Injury: Child Abuse or Accident

- Skeletal Survey - no fractures
- Chest and Abdominal CAT scans - no additional organ injury
- No cutaneous bruising