Recognition and Evaluation of Child Physical Abuse: Bruising and Sentinel Injuries

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Slide contributions by Dr. Emily Killough

Disclosure

• I have nothing to disclose.

Objectives:

• Identify characteristics of bruising concerning for physical abuse
• Identify common patterns seen in abusive injuries and review mechanisms of injury that may cause patterned skin injuries
• Explain the recommended medical evaluation for bruising and other injuries concerning for abuse
• Understand your role in the evaluation of possible abuse
Skin

- **Epidermis**
  - Compact outer layer that is not easily damaged

- **Dermis**
  - Some capillaries and fibrous tissues
  - Resistant to damage

- **Subcutaneous tissues**
  - Many capillaries and much fat
  - Easily deformed
  - Main site of hemorrhage

**Infant Skin**

- Younger skin is more elastic
- Younger skin has a greater capacity to absorb energy without injury
- Threshold for injury is LESS likely to be exceeded in infants than in adults

- Bruising is NOT due to "sensitive baby skin"

**Review of Terminology:**

- **Bruise/contusion**
  - Bleeding beneath intact skin at the site of blunt force trauma

- **Ecchymosis**
  - Blood that has traveled through tissue planes

- **Hematoma**
  - Extravasated blood from the vascular system into another part of the body (may be trauma or disease)
The Bruise Balancing Act

Bruises in active mobile children are common.

Bruises are common manifestations of child abuse.

Physical Abuse: Bruising and Skin Injury

AGE

LOCATION

PATTERN

Age: Those Who Don’t Cruise, Rarely Bruise!

Sugar et al 1999

Table 1. Bruises by Age and Developmental Stage of Child

<table>
<thead>
<tr>
<th>Age, yr</th>
<th>Precursor</th>
<th>Cruiser</th>
<th>Walker</th>
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<tbody>
<tr>
<td>0-1</td>
<td>100 (100)</td>
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<td>1-2</td>
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<td>0-3</td>
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<td>4-6</td>
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<td>7-12</td>
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<tr>
<td>16-24</td>
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<tr>
<td>Total</td>
<td>100 (100)</td>
<td>100 (100)</td>
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</tbody>
</table>

Figure 1. Percentage of children with bruises by age (n = 800).
Accidental bruising: uncommon in infants < 6 months of age!

Well supported in literature:
- Sugar et al. 1999
- Carpenter. 1999
- Labbé and Caouette, 2001
- Maguire et al. 2005
- Pierce et al. 2016

It's not...“just a little bruise”:
- Risk of recurrent abuse
- Increasing morbidity and mortality
- Highest risk of death from abuse and neglect is in children < 1

Take Home Point #1:
Those who don’t cruise shouldn’t bruise

Sentinel Injury
- Relatively minor but suspicious injury
  - Inadequate developmental capacity
  - History does not adequately explain
- Sentinel injuries may be first indication that a child is being abused
Sentinel Injuries

- Case-control retrospective study of 401 infants

- 27% of 200 diagnosed abuse cases had prior sentinel injuries:
  - Bruising (80%)
  - Oral injury (11%)
  - Fracture (7%)

42% saw a medical provider

Age: Risk of Additional Injury

- Prospective observational study of 2890 children < 10 years evaluated by child abuse team for nonaccidental trauma:

  - 146 infants < 6 months with apparently isolated bruises at presentation
    - 34/146 (23.3%) additional injury on skeletal survey
    - 40/146 (27.4%) had additional injury on head imaging
    - 4/146 (2.7%) had additional abdominal injury

50% had at least 1 additional serious injury

Take Home Point #2:
A bruise may not be “just a bruise.” A bruise may mean abuse.
Physical Abuse: Bruising and Skin Injury

- AGE
- LOCATION
- PATTERN

Location, Location, Location

- Common non-abusive bruises (> 9 months)
  - Bony prominences!!!
    - Forehead, vertex of chin, elbows, knees, shins
- Bruises concerning for abuse
  - Protected anatomy
    - Ears, neck, upper arms/legs, abdomen, buttocks, genitalia, anus

Labbé and Caouette, 2001; Pierce et al. 2010; Sheets et al. 2013

TEN 4 FACES-P decision rule: any bruise present in any of the following locations should be concerning for child abuse.

- T: Tonsils including genitails
- E: Ears
- N: Neck
- F: Forehead
- E: Eyes
- N: Nose
- A: Angle of the mandible
- C: Cheek
- S: Subconjunctival hemorrhage
- P: Patterned bruising

TEN 4-FACES-P

- Clinical Decision Rule

Labbé and Caouette, 2001; Pierce et al. 2010
Physical Abuse: Bruising and Skin Injury

- AGE
- LOCATION
- PATTERN

Patterns Concerning for Abuse

- Larger in size
- Multiple
- Clusters
- Different planes of body
- Imprint of an object
- Different ages of skin markings

Pattern: Outlines vs. Imprints

- Outlines:
  - Forceful, rapid impacts
  - Blood in tiny capillaries forced AWAY from the impact
  - Blood gathers at area without applied force
  - Overfilled capillaries rupture, causing bruising BETWEEN fingers

- Imprints:
  - More "typical" bruising, occurs with "slower" impact
  - Blood vessels rupture and bruising appears at the site of impact
Case series of vertical gluteal cleft bruising
Pattern not caused by object, but by the anatomy of the impacted tissue
Caused by violent spanking, with the “sides” of the cleft pressing against each other as the child is hit.

Data!

Take Home Point #3:
Remember
TEN4-FACESp!

How old is that bruise?
- Blood cells and hgb break down → bruise changes color
- No predictable order or chronology
- Many factors affect appearance and rate of resolution
  - Force, duration, properties of object
  - Characteristics of tissue- vascularity, underlying bone, thickness
  - Quantity and depth of blood, etc etc
Documenting Exam Findings:

Physical Exam:

- Skin: multiple bruises of various ages to back and left leg
- Skin: brown and yellow bruises to back, patterned loop-like purple bruises to left posterior thigh

Take Home Point #4:

You cannot date bruises based on appearance.

What do I do if I have concerns?!!
**Obtain Additional History**

- How did this happen? Is there a known history of trauma?
  - Details about any falling/impact/injury?
  - Consider: What would be a plausible or implausible accidental history?

- When did it happen?
- Who cares for the child and where?
- Developmental capabilities?
- Has the child had previous injuries?

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**Talk to the (Verbal) Child**

- Obtain history from the child without the caregiver present
- Ask questions in a non-leading, open-ended fashion:
  - What happened? (point to the injury)
  - How did this bruise/cut/owie happen?
  - What happens at home when you get into trouble?
  - Tell me more.
- Respond:
  - Thank you for telling me.
  - I’m sorry that happened.
  - Give teens a heads up before you ask questions
  - Document what the child says
  - Do not make promises!

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**Perform a Complete Physical Examination**

- Evaluate skin from head to toe (ALWAYS)
- Neck (and neck rolls)
- TMs
- Conjunctivae
- Pinnae and periauricular scalp
- Oral cavity (frenula), oropharynx, teeth, gums
- Genitals and anus
- Axilla
- Hands and feet, including soles of feet
Phone A Friend!

Call your friendly local Child Abuse Pediatrician!

Urgent needs: Child Abuse Pediatrician on-call at Children’s Mercy (KC) or KU (Wichita)

Non-urgent needs: Contact your CARE Network Mentor

Make a Report to Child Protective Services

We are all mandated reporters!

Proof of abuse or neglect is not required!

Concern for abuse is required!

Report in the state of the child’s primary address

• In Kansas: DCF

From Suspicions of Physical Child Abuse to Reporting: Primary Care Clinician Decision-Making

Emelia C. Johnson, MPH; Robert G. Sapa, MS, PhD; John G. Primm, MD; Larri Lyn Price, WSU; Richard Wasserstrom, MD, MPH; Eric Burns, PhD; Andrew Weatherman, MPH; Zachary A. Meier, MD; Mary Lu Angel, MD; Diana Abney, MD; Robin L. Sana, MS, MPH

• Lack of hotlines by mandated reporters may affect quality of information and services/interventions available to the child
  - Clinicians did not report 23% of injuries considered to be likely or very likely due to abuse and 76% possibly due to abuse
  - Children who were black or unfamiliar were more likely to be reported
  - Children from families with > 1 risk factor were more likely to be reported

Separate emotions and relationships from data in cases of possible child abuse
Take Home Point #5: 
You are a mandated reporter!

Evaluation for Occult Trauma

- When physical abuse is suspected:
  - Screen for other medical conditions AND
  - Screen for additional injuries
    - Occult injuries are not specifically symptomatic or clinically apparent
    - Extent of testing depends on
      - Severity and type of injury
      - Age and development of the child

*More severe injury and younger child need more extensive diagnostic testing.

*Transfer to your local children's hospital for evaluation!!!
Consider Taking a Photograph!

- When there are traumatic physical exam findings related to the chief complaint
- When there are physical exam findings concerning for child maltreatment

How to get those studies done

- How to approach the family
  - Have a written policy
  - Be honest
  - Explain your actions as part of a partnership
- Where?
  - Likely in an Emergency Dept.
- Transportation
  - May have to transfer via EMS
- Security
  - Facility
  - Local law enforcement
  - 911
  - Child protective services

Take Home Point #6:
Suspicion of abuse frequently requires further medical evaluation.
Communication Pearls:

- Be straightforward and honest
- Partner with the caregiver:
  - "I hear how worried you are."
  - "I know we both want your child to be healthy and safe."
- Sharing medical results and concerns
  - "That is what we are trying to figure out."
  - "I am worried that someone may have hurt your child."
  - "I need more information to understand what has caused these injuries."
- Do not share possible mechanisms of injury
  - "Someone shook your baby."

What if I forget what to do????

- Contact your CARE Network mentor or nearest Child Abuse Pediatrician
- Access the Child Protector App on your phone

Take Home Points:

- Those who don’t cruise shouldn’t bruise
- A bruise may not be “just a bruise.” A bruise may mean abuse.
- Remember TEN4-FACESp!
- You cannot date bruises based on appearance.
- You are a mandated reporter!
- Suspicion of abuse frequently requires further medical evaluation.