IF YOU CAN'T CRUISE, YOU SHOULDN'T BRUISE:
EVALUATION FOR BLEEDING DISORDERS IN SUSPECTED CHILD ABUSE

Ryan Brown, MD
Clinical Associate Professor
Section on Pediatric Emergency Medicine
Assistant Director-Child Protection Committee
OBJECTIVES

- The audience will understand the definition, epidemiology, and reporting of child physical abuse.
- The audience will understand the work-up to rule in or rule out bleeding disorders in suspected child abuse.
- The audience will learn about mimics of physical abuse.
DISCLOSURES

- I HAVE SERVED AS A PAID EXPERT WITNESS FOR THE US MILITARY

- I do not intend to reference off-label drugs or tests
Brought to you by

Jimmy Everest Section of Pediatric Hematology/Oncology

OU Children's Physicians

EMERGENCY MEDICINE

Brought to You by the Letter B

Featuring Jim Henson's Sesame Street Muppets
WHAT IS THE MOST COMMON FORM OF ABUSE?

• A) Sexual Abuse
• B) Physical Abuse
• C) Psychological Abuse
• D) Neglect
• E) Medical Neglect
Types of Child Abuse in 2012

- Neglect: 78.3%
- Physical Abuse: 18.3%
- Sexual Abuse: 9.3%
- Psychological Maltreatment: 8.5%
- Medical Neglect: 2.3%
- Other/Unknown: 10.8%

Percentages are calculated against the number of unique victims, and a child may see multiple types of abuse or multiple instances of the same type of abuse.¹
BRUIISING

• Most common manifestations of physical abuse
BRUIISING

- MOST COMMON PHYSICAL MANIFESTATION OF CHILDHOOD
WHAT IS THE MOST IMPORTANT ASPECT IN EVALUATING CHILD MALTREATMENT?

- A) HISTORY
- B) HISTORY
- C) HISTORY
- D) HISTORY
- E) ALL THE ABOVE
CHARACTERISTICS OF NORMAL BRUISES

- Ambulatory child
- Bony prominences (head/forearms/lower legs)
- Polymorphic/nondescript
- MOST KIDS CAN NOT TELL YOU HOW AN ACCIDENTAL BRUISE WAS OBTAINED
“RED FLAGS” FOR ABUSIVE/PATHOLOGIC BRUISES

• Non-ambulatory child. “If they can’t cruise, they shouldn’t bruise”

• Bizarre bruises or bruises which suggest objects

• Bruises on areas of body not usually injured during normal play, especially multiple bruises

• Bruise pattern is not consistent with story or developmental stage of child

- Prospective study
- Subjects younger than 36 mos of age attending well child visits in community clinics.
- Data collected regarding any noted bruises with patient demographics & developmental stage.
- History of bleeding diathesis or abuse noted.
973 subjects selected without history of abuse or bleeding diathesis.

203 (20.9%) found to have bruises.

Only 2 (0.6%) of 366 children less than 6 months were noted to have any bruises.

Only 8 (1.7%) of 473 children less than 9 months were noted to have any bruises.
11 (2.2%) of 511 children who were not yet walking with support were noted with bruises.

17.8% of cruisers & 51.9% of walkers were noted to have bruises.

Pre cruisers demonstrated a frequency of 1.3 bruises/child, while walkers demonstrated 2.4/child.

Most frequent site for bruising was anterior tibia & knee with bruises of the forehead & upper leg also common among walkers.

Bruises of hands & buttocks were not observed at any age.
Prospective study.

Subjects 177 babies aged 6-12 months seen in hearing screening & well child clinics,

Data collection included infant's age, mobility, weight demographic details & “health visitor concerns.”

22 infants (12%) were noted to have a total of 32 bruises.

15 infants had a single bruise.
CARPENTER CONTINUED

• All bruises were found on the front of the body over bony prominences.
• 25 bruises were on the face & head.
• 7 bruises were noted on the shins of mobile infants.
BRUIISING

Pattern Injuries

- Hand
- Inflexible objects
  - Short linear bruises
  - Impact in one place and does not follow the curvature
  - May lead to larger ecchymoses that have no pattern
Note: Not all five fingers leave a mark!
BRUIISING

Pattern Injuries

- Flexible objects
  - Bruising pattern follows the curvature of the extremity
Pinna Bruising

- Easy access to child’s head
- Rarely result of accidental injury
HOW ACCURATE ARE WE AT DATING BRUISES?

- A) 25%
- B) 33%
- C) 50%
- D) 65%
- E) 85%
Can Bruises be Dated?

- Bariciak *Pediatrics* 2003
  - 50 children presented to ED with accidental bruising
  - Emergency physicians estimated age
  - Accuracy of estimation within 24 hours was 47.6%
  - Poor interobserver reliability
Can Bruises be Dated?

  - 44 children identified in ED setting with bruising
  - 3 described same bruises in vivo and later by photograph
  - Only 31% of descriptions completely agreed with the later description of the photograph of the same bruise
BRUIISING

Can Bruises be Dated?

- Stephenson Arch Dis Child 1996
  - 23 children evaluation with bruising
  - Blinded observer estimated age of injury as
    - Fresh (<48 hours)
    - Intermediate (48 hours – 7 days)
    - Old (>7 days)
  - Accuracy of estimation was 54.5%
BRUIISING

Conditions Mistaken for Physical Abuse

- Wardinsky 1995
  - 7% initially diagnosed as child abuse but found to have other conditions

- Wheeler 1988
  - 3% found to have conditions mistaken for abuse
HOW WELL CAN WE “AGE” BRUISES?


• Systematic review of the literature reveals that bruises do not necessarily follow any specific color chronology during healing.
HOW WELL CAN WE “AGE” BRUISES?

- Red, blue, purple or black may appear any time from 1 hour post injury to healing.
- Red may appear at any time & does not indicate “freshness” of injury.

HOW WELL CAN WE “AGE” BRUISES?

- Red, blue, purple – more common < 48 hours
- Yellow, brown, green - more common > 7 days

- HOWEVER – red, blue, purple seen in 30% of bruises > 7 days old
- Yellow, brown, green seen in 23% of bruises 48 hours old.

HOW WELL CAN WE “AGE” BRUISES?

- Physicians’ overall ability to age bruises within 24 hours of actual occurrence = 40%
- Ability to categorize as fresh (< 48 hrs), intermediate (48 hrs – 7 days) and old (> 7 days) = 52.7%
BRUISING

Differential Diagnosis

- Mongolian spots
- Phytodermatitis
- Erythema multiforme
- ITP
- Other coagulation disorders
- Ehlers-Danlos Syndrome
- Ink, dyes, paint, tattoos
ABUSIVE BRUISING

Imposters
CHANCES OF THE CUBS WINNING THE WORLD SERIES IN MY LIFETIME?!

- A) 10%
- B) 25%
- C) 50%
- D) 100%
- E) A Snowman has a better chance of surviving “In Summer”
ON COUMADIN THERAPY
Henoch/Schoenlein Purpura
IMPOSTERS

Folk Medicine
“COINING” FIVE-YEAR-OLD VIETNAMESE BOY
"Kerokan", the process where a coin is rubbed repeatedly along the skin to create bruising to release heat out of the body to rid it of fever or "evil humors"
MIMICS

Cupping- a cup containing alcohol is lit on fire, then the warm cup is placed on the child’s back to suck out their ailments.
“CUPPING”
MONGOLIAN SPOTS
BRUISING

Work-up
BRUIISING

Does the child need an eval for bleeding disorders?

- Situations in which a work-up may not be needed:
  - Clear disclosure or witness of event
    - Either accidentally or intentional
  - Patterned bruising
  - Other findings consistent with (non)abuse trauma
  - HISTORY clearly explains bruising
HISTORY

- The age and developmental capabilities of the child
- History of trauma
- Location and pattern of bruising,
- Significant bleeding after a circumcision or other surgery, epistaxis, bleeding from the umbilical stump, or excessive bleeding after dental procedures
- Family history of a specific bleeding disorder or ethnicity of a population with higher rates of a certain bleeding disorder
- Medications should be documented
“BLEEDING DISORDERS ARE GENERALLY PERMANENT CONDITIONS THAT DO NOT RESULT IN ABATEMENT AFTER A CHANGE IN CAREGIVERS.”
PREVALENCE OF BLEEDING DISORDERS

- Von Willebrand Disease
  - Up to 1% of the population (1/1000)
- Factor XI Deficiency
  - 1/1000
- Hemophilia A (Factor VIII Deficiency)
  - 1/5000 live male births
  - X-linked recessive
- Hemophilia B (Factor IX Deficiency)
  - 1/20,000 live male births
  - X-linked recessive
Contact activation (intrinsic) pathway

Damaged surface

XII → XIIa

XI → XIa

IX → IXa

Tissue factor (extrinsic) pathway

Trauma

VIIa → VII

VIIIa → VIII

Xa → X

Prothrombin (II) → Thrombin (IIa)

Fibrinogen (I) → Fibrin (Ia)

XIIIa → Cross-linked fibrin clot

Common pathway

PTT

PT
BRUISING

Clues to the presence of a bleeding disorder

- Petechia at clothing line pressure points
- Bruising at sites of object pressure points
- Severe bleeding disorders may also present with excessive diffuse bruising
BRUIISING

Initial Testing Panel

- Complete Blood Count (CBC)
- Prothrombin Time (PT)
- Activated partial thromboplastin time (aPTT)
- von Willebrand factor antigen
- VWF activity (Ristocetin cofacor)
- Factor VIII level
- Factor IX level
- *CMP with Amylase and Lipase
BRUIISING

• May not need the work-up if:
  • Independently witnessed trauma
    • Abusive or otherwise
  • Other medical finding consistent with abuse
• Up to 12% of children and young adults with bleeding disorders have had ICH at some time
  • 2008, Mishra P and 2009 Nelson MD
BRUIISING

Initial Testing Panel-ICH

- Complete Blood Count (CBC)
- Prothrombin Time (PT)
- Activated partial thromboplastin time (aPTT)
- Factor VIII level
- Factor IX level
- DIC Panel (d-dimer & fibrinogen)
BRUIISING

ABNORMAL TEST RESULTS or FURTHER TESTING

• Who ya gonna call?
THANK YOU!
ryan-brown@ouhsc.edu