Sweating the Small Stuff: “Sentinel Injuries” in Infants and Toddlers

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Disclosures

• I work as an expert witness in Child Abuse Medicine in criminal, family, and civil litigation.

• I discuss off-label indications for medications and lab testing.

• I have no affiliations or financial relationships related to any drug, therapeutic, or programming to disclose.
Objectives

• Recognize "sentinel injuries" as potential indicators of abuse.
• Increase comfort in discussing abuse work-up with families.
• Outline recommended abuse work-up by age and circumstances.
Bruises in Infants and Toddlers

Those Who Don't Cruise Rarely Bruise

Naomi F. Sugar, MD; James A. Taylor, MD; Kenneth W. Feldman, MD; and the Puget Sound Pediatric Research Network

Objectives: To determine the frequency and location of bruises in normal infants and toddlers, and to determine the relationship of age and developmental stage to bruising.

Design: Cross-sectional survey.

Setting: Community primary care pediatric offices.

Subjects: Children younger than 36 months attending well-child care visits.

Methods: Prospective data collection of demographics, developmental stage, and presence and location of bruises. Any medical condition that causes bruises as well as known or suspected abuse was also recorded. A χ² test or Fisher exact test was used to determine the significance of differences.

Main Outcome Measures: Presence and location of bruises as related to age and developmental stage.

Results: Bruises were found in 203 (20.9%) of 973 children who had no known medical cause for bruising and in whom abuse was not suspected. Only 2 (0.6%) of 366 children who were younger than 6 months and 8 (1.7%) of 473 children younger than 9 months had any bruises. Bruises were noted in only 11 (2.2%) of 511 children who were not yet walking with support (cruising). However, 17.8% of cruisers and 51.9% of walkers had bruises (P<.001). Mean bruise frequency ranged from 1.3 bruises per injured child among precruisers (range, 1-2 bruises) to 2.4 per injured child among walkers (range, 1-11). The most frequent site of bruises was over the anterior tibia and knee. Bruises on the forehead and upper leg were common among walkers, but bruises on the face and trunk were rare, and bruises on the hands and buttocks were not observed at any age. There were no differences in bruise frequency by sex. African American children were observed to have bruises much less frequently than white children (P<.007).

Conclusions: Bruises are rare in normal infants and precruisers and become common among cruisers and walkers. Bruises in infants younger than 9 months and who are not yet beginning to ambulate should lead to consideration of abuse or illness as causative. Bruises in toddlers that are located in atypical areas, such as the trunk, hands, or buttocks, should prompt similar concerns.

Arch Pediatr Adolesc Med. 1999;153:399-403
Sentinel Injuries in Infants Evaluated for Child Physical Abuse

What's Known on This Subject: Although it is known that relatively minor abusive injuries sometimes precede more severe physical abuse, the prevalence of these previous injuries in infants evaluated for abuse was not known.

What This Study Adds: A history of bruising or oral injury in a preschooling infant evaluated for abuse should heighten the level of suspicion because these injuries are common in abused infants and rare in infants found not to be abused.

Abstract

Results: Of the 200 definitely abused infants, 27.5% had a previous sentinel injury compared with 8% of the 100 infants with intermediate concern for abuse (odds ratio: 4.4, 95% confidence interval: 2.0–9.6, P < .001). None of the 101 nonabused infants (controls) had a previous sentinel injury (P < .001). The type of sentinel injury in the definitely abused cohort was bruising (80%), intracranial injury (11%), and other injury (7%). Sentinel injuries occurred in early infancy: 66% at <3 months of age and 95% at or before the age of 7 months. Medical providers were reportedly aware of the sentinel injury in 41.9% of cases.

Discussion

The findings from our study also suggest that in 27.5% of cases of definite physical abuse, there may be escalating and repeated violence toward the infant instead of a single event of momentary loss of control by an angry or frustrated caregiver.

Conclusions: Previous sentinel injuries are common in infants with severe physical abuse and rare in infants evaluated for abuse and found to not be abused. Detection of sentinel injuries with appropriate interventions could prevent many cases of abuse. Pediatrics 2013;131:701–707
Sentinel Injuries in Infants Evaluated for Child Physical Abuse

WHAT'S KNOWN ON THIS SUBJECT: Although it is known that relatively minor abusive injuries sometimes precede more severe physical abuse, the prevalence of these previous injuries in infants evaluated for abuse was not known.

WHAT THIS STUDY ADDS: A history of bruising or oral injury in a precarious infant evaluated for abuse should heighten the level of suspicion because these injuries are common in abused infants and rare in infants found not to be abused.

FIGURE 1
Illustrative example of sentinel injury: a 2-month-old infant with unexplained cheek bruising, likely from abuse.
Bruising
(no matter how small)
Frenulum injuries
Frenulum injuries
Subconjunctival Hemorrhages
Intimate Partner Violence

About 1 in 5 women and 1 in 7 men report having experienced severe physical violence from an intimate partner in their lifetime.

About 1 in 5 women and 1 in 12 men have experienced contact sexual violence by an intimate partner.

10% of women and 2% of men report having been stalked by an intimate partner.
Abusive Head Trauma: Judicial Admissions Highlight Violent and Repetitive Shaking

abstract

OBJECTIVE: Confessions are uncommon in abusive head trauma (AHT) cases, and there is debate over whether shaking alone can cause the injuries characteristic of AHT. The objective of this article is to correlate legal statements by perpetrators with medical documentation to offer insights into the mechanism of injury.

METHODS: In this retrospective observational study we examined forensic evidence from 112 cases referred for AHT over a 7-year period. We compared 29 cases in which a perpetrator confessed to violence toward the child with 83 cases in which there was no confession. Inclusion criteria were subdural hematoma (SDH) on computed tomography and perpetrator admission of a causal relationship between the violence inflicted and the child’s symptoms.

RESULTS: All confessions came from forensic investigations. There was no statistically significant difference between the 2 groups for any of the variables studied. Shaking was described as extremely violent (100%) and was repeated (65%) from 2 to 30 times (mean, 10) because it stopped the infant’s crying (62.5%). Impact was uncommon (24%). No correlation was found between repeated shaking and SDH densities.

CONCLUSIONS: This unique forensic case series confirms the violence of shaking. The high frequency of habitual AHT is a strong argument for reporting suspected cases to judicial authorities and helps to explain the difficulty in dating the injuries. Pediatrics 2010;126:546–555

AUTHORS: Catherine Adamsbaum, MD, Sophie Grabar, MD, PhD, Nathalie Mejean, MD, and Caroline Rey-Salmon, MD

KEY WORDS: abusive head trauma, subdural hematoma, child abuse

ABBREVIATIONS
AHT—abusive head trauma
CT—computed tomography
SDH—subdural hematoma

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Implicit Bias is...

*Attitudes, Stereotypes, & Beliefs* that can affect how we treat others.

Implicit bias is not intentional, but it can still impact how we judge others based on factors, such as:

- **Race**
- **Ability**
- **Gender**
- **Culture**
- **Language**
Implicit Bias is...

Attitudes, Stereotypes, & Beliefs that can affect how we treat others.

“Clinical Intuition”

Risk factors for condition

Previous patient experiences
Now that abuse is on my DDx, what do I do?

• More!
  • History
    • More detail about what may have happened
    • Previous injuries, other suspicious circumstances
    • Medical Records review (patient portal info)
  • Physical exam with photos
  • Labs
  • Imaging
  • Call the Child Abuse doc
  • Refer to CPS
Is this bruise concerning for abuse?

**WARNING**

**CAUTION**

OFTEN ACCIDENTAL

All bruises are concerning in babies who do not yet pull to stand.

- upper eyelid
- lower eyelid
- sclerae
- entire ear
- periauricular
- cheeks
- jawline
- frenula
- intraoral
- neck
- torso
- genitals and midline buttocks
- linear bruises
- patterned bruises regardless of location
- upper scalp
- forehead
- brows
- cheekbones
- chin
- forearms
- lower back
- hip bones
- knees
- shins
“Screening” Questions

1. ANY concerning injuries? More bruises than expected, patterned bruises, etc?
   - ANY concerning injuries?
   - Bruises on cheek, ear, neck, chest, upper arms, upper back, abdomen, genital area?
   - More bruises than most children with this level of activity?
   - Any patterned bruises, burns or marks?

2. Caregiver’s history conflicts with your observations?
   - Does the caregiver’s history conflict with?
   - Signs and symptoms in ER
   - Child’s developmental level
   - Typical explanations for this injury
“Screening” Questions

3 Concerns about delay in seeking care? Inadequate caregiving?

• Are you concerned about?
  • Delay in seeking care (as compared to most patients with these symptoms)
  • Caregiver treatment of child in ER
  • Caregiver impairment
  • Possible poor supervision or poor care at home
  • Nourishment or hygiene
Looking for additional injuries

0-5 months
- CT head or MRI brain
- Skeletal survey
- Consider AST/ALT/UA

6-23 months
- CT head or MRI brain for head or chest trauma
- Skeletal survey
- Consider AST/ALT/UA

2-4 year olds
- Imaging according to symptoms
- Skeletal survey becomes less useful
- Consider AST/ALT/UA
The Evaluation of Suspected Child Physical Abuse

Cindy W. Christian, MD, FAAP, COMMITTEE ON CHILD ABUSE AND NEGLECT

Child physical abuse is an important cause of pediatric morbidity and mortality and is associated with major physical and mental health problems that can extend into adulthood. Pediatricians are in a unique position to identify and prevent child abuse, and this clinical report provides guidance to the practitioner regarding indicators and evaluation of suspected physical abuse of children. The role of the physician may include identifying abused children with suspicious injuries who present for care, reporting suspected abuse to the child protection agency for investigation, supporting families who are affected by child abuse, coordinating with other professionals and community agencies to provide immediate and long-term treatment to victimized children, providing court testimony when necessary, providing preventive care and anticipatory guidance in the office, and advocating for policies and programs that support families and protect vulnerable children.
**BRAIN IMAGING**

Infants with intracranial injuries may have no neurologic symptoms and are sometimes identified during a medical evaluation for other suspicious injuries.\textsuperscript{75,138} Because the potential morbidity of AHT is so great, infants who are being evaluated for abuse benefit from brain imaging, whether or not they have neurologic symptoms.

**TABLE 2 Indications for Obtaining a Skeletal Survey**

- All children $<2$ y with obvious abusive injuries
- All children $<2$ y with any suspicious injury, including:
  - Bruises or other skin injuries in nonambulatory infants;
  - Oral injuries in nonambulatory infants; and
  - Injuries not consistent with the history provided
- Infants with unexplained, unexpected sudden death (consult with medical examiner/coronor first)
- Infants and young toddlers with unexplained intracranial injuries, including hemorrhage and hypoxic-ischemic injury
- Infants and siblings $<2$ y and household contacts of an abused child
- Twins of abused infants and toddlers
Does my patient need a skeletal survey?

INFANTS 0-11 months

• Almost all infants need a skeletal survey when there is a serious concern about abuse.
• ANY bruise for patients ages 0-4 months.

A skeletal survey is usually NECESSARY for all injured INFANTS, UNLESS:

• Injury event was witnessed by an independent witness.
• Injury mechanism was verified by police/first responders/medics.
• A clavicle fracture was likely caused by birth trauma.
• A single linear skull fracture in an infant 7+ months old, due to a fall from at least 3 feet or a fall with caregiver landing on child, AND no other concerning exam findings or social indicators.
• A radius/ulna buckle fracture from a witnessed fall while cruising or walking.
Does my patient need a skeletal survey?

TODDLERS

• All 1 year olds and some 2 year olds need a skeletal survey when there is a serious concern about abuse.

A skeletal survey is NECESSARY for TODDLERS with:

• any serious injury, probably inflicted
• described mechanism does not match injury
• significant delay in seeking care when child is obviously injured
• injured during domestic violence
• complex skull fracture (branching, depressed, multiple)
• any rib fracture
• most humerus & femur fractures
• fracture at/through a growth plate/metaphysis
• anogenital injury (sexual abuse and physical abuse can be comorbid)
Does my patient need a skeletal survey?

TODDLERS

A skeletal survey is **NOT** needed for TODDLERS when:

- Injury event was witnessed by an independent witness.
- Injury mechanism was verified by police/first responders/medics.

A skeletal survey is **NOT** needed for TODDLERS with the following injuries *caused by a fall*:

- Distal buckle radius/ulna fracture.
- Distal buckle tibia/fibula fracture.
- Non-displaced spiral tibia/fibula fracture.
Key clinical behaviors

Add abuse to your differential diagnosis
• The younger the patient
• The more vague or unknown the injury mechanism
• With positive screening questions

Complete screening for additional injuries
• Age + injury = abuse work-up
• Age + explanation + injury = abuse work-up
Clinical Action Summary

• Coach yourself – think positively about considering abuse
• Consider adding abuse to DDx
• Perform additional screening (rule in/rule out)
  • More history, consider MSW
  • Complete physical exam
  • Order skeletal survey and head imaging according to clinical guidelines
  • Consider screening for abusive abdominal injury: AST/ALT
• Consider how heavily you rely on your observation of caregiver-child interaction. Do you collect all the pieces of the screening puzzle with more weight on objective data?
Violence: Recognition, Management and Prevention

PALM BRUISING IN INFANTS: A RECOGNIZABLE PATTERN OF ABUSE

Tagrid M. Ruiz-Maldonado, MD,* Katie L. Johnson, MD,† Jennifer L. Sabo, MD,‡ Lynn K. Sheets, MD,§ and Antoinette Laskey, MD, MPH, MBA*

Figure 4. Five-week-old infant with palm bruising overlying the thenar and hypothenar eminences, as well as palmar and interphalangeal creases.

Figure 6. One-month-old infant with palm bruising overlying the thenar and hypothenar eminences, proximal phalanges, and the palmar and interphalangeal creases.
Infantile sucking bruises

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Figure 1  Right forearm bruises at the time of presentation.
Infant Sucking Bruises
Slap mark
## Preventing Child Abuse and Neglect

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## Preventing Child Abuse and Neglect

### Strategy

- Strengthen economic supports to families

### Change social norms to support parents and positive parenting

- Public engagement and education campaigns
- Legislative approaches to reduce corporal punishment

### Provide quality care and education early in life

- Preschool enrichment with family engagement
- Improved quality of child care through licensing and accreditation

### Enhance parenting skills to promote healthy child development

- Early childhood home visitation
- Parenting skill and family relationship approaches

### Intervene to lessen harms and prevent future risk

- Enhanced primary care
- Behavioral parent training programs
- Treatment to lessen harms of abuse and neglect exposure
- Treatment to prevent problem behavior and later involvement in violence

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**Make your office a No Hit Zone**

[https://nohitzone.com/](https://nohitzone.com/)

**Encourage positive discipline at every appointment**
## Preventing Child Abuse and Neglect

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- Create a medical home where parents come to you for support
- Help parents with practical interventions for difficult behavior
- Provide effective management for medical conditions with a behavioral component

- Intervene to lessen harms and prevent future risk
  - • Enhanced primary care
  - • Behavioral parent training programs
  - • Treatment to lessen harms of abuse and neglect exposure
  - • Treatment to prevent problem behavior and later involvement in violence